Computer Program Manual t o Calculate Bone Age-Ebrí and Predicted Adult Height of Spanish children and Book Index Bone Maturation (Tarsus and Hand)

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PRESENTATION:

Dear mates:

On the occasion of the presentation that was on **December 11, 2015**, in this Illustrious College of Physicians of Zaragoza, of the Book: "Bone Maturation and Computer Program for Calculating Bone Age and Prediction of Adult Height" of which they are Authors, doctors: Bernardo Ebrí Torné and Inmaculada Ebrí Verde, since then from the web of the Illustrious College of Physicians of Zaragoza (Spain) www.comz.org/maduracion-osea the possibility of free downloading of the installer WinRAR ZIP (.zip): Ebri SetUp iv17.06.22

to the user's computer, to calculate the Bone Age (Hand and Tarsus Regions) and the Child's Prediction of Adult Height. (Region of the Hand).

This will allow, once downloaded and installed on the user's computer, the program, to be used from the Intranet of the Sanitary Working Network, to be able to calculate the bone age and the prediction of adult height of the child under study. In this document, we detail the rules of use of the software itself, such as measurement standards of digital radiography in INTRANET, radiological schemes, radiological extent, the last bibliography of publications of authors "bone age" including book "Index Bone Maturation in Spanis child".

As the accompanying diagrams illustrate how to perform the measurements of the bones, and the computer window that comes once introduced the measures in the program, and providing the osificativo diagnosis of child and adult height prediction.

It is advisable and to work on the Intranet, where it is possible to use the digital measurement tool of the carpal bones and metacarpal-phalanges of X-rays to study child patients, the program is downloaded from the Web or used from your computer work, and so saved. Thus, as explained in the rules of use of the program can easily follow the steps to once measured the bones and entered data can be obtained so quickly and automatically bone age of the child and his prediction adult height.

We hope that this service offered to interested physicians, mainly pediatricians, endocrinologists and radiologists, will be useful in their daily practice, because in this way, and to proceed database Aragonese child, "Andrea Prader Study" (Director: Dr. Angel Ferrández Longás) can be overlooked obtaining bone age and height prediction methods for other outsiders, so we estimate the predictions are more accurate FOR SPANISH AND HISPANIC CHILDREN, but it can also be used in Anglo children; and the minimum time learning the technique, we will be amply rewarded by the most accurate results. We believe that the method can also be used for biomedical research.

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Best regards of the authors:

Dres. Bernardo Ebrí Torné and María Inmaculada Ebrí Verde

1-USER MANUAL FOR IVOS-EBRÍ PROGRAM

Through the Ebrí methodical applied to the indexes: IC (carpal), IMF (metacarpophalangeal and ICMF (carpal-metacarpophalangeal) and after introducing in the General Program for children from 0.5 to 20 years, the data of the child and the measurements of the maximum diameters of the carpal and metacarpophalangeal ossification nuclei studied, the predictive diagnoses, both of bone age and prediction of adult height, can be obtained automatically and directly. Likewise, once the installer downloaded and executed, the user will have a specific program for children from 0 to 4 years old, for the purpose of a more accurate calculation for these short ages of bone age (not for prediction of adult height). And another program, for the region of Tarsus, for children 0 to 4 years, in order to calculate the bone age in this region, which serves as a support to further specify the ossification (it does not serve

to predict adult height). The user will have to download and install on the computer, the file WinRAR ZIP (.zip): Ebri SetUp iv17.06.22 attached, which carries the program: “Ebrí-Hand and foot”. When executing the file, the program will be installed in the computer, being searched in "All the programs". (To do this, go to the Windows icon located in the upper left corner of the computer, and click on it. When doing so, the user will see "All programs", and clicking on it, will open, letting the program "Ebrí Hand and Foot." Clicking on it again, will open up and let you see different options: 1) Uninstall the program; 2) First aid (brief information on the program); 3) Program Ebrí Hand 4 years; 4) Ebrí Hand Program (General Series of 0.5 to 20 years), 5) Program Ebrí Foot 4 years.
By clicking on any of these programs, a column is opened, where the user can enter the data: measurements of the bones (in mm, those of the hand and in cm of the feet), data of the child as sex and dates of birth and RX, size of him and his parents in cm. Once entered, "Vale" is clicked and the enclosed white space will be filled with the child’s ossifying diagnosis and his prediction of adult height. Clicking on the column in "User Manual" opens an information window about the most detailed features of the program itself.

During the installation of the WinRAR ZIP File (.zip) the question will arise if the user wants to install a program icon on the desktop. If so desired, a torch-shaped icon of the 3 programs will be installed, and clicking on each one of them will appear the data entry column, and the user can act directly on this icon.

The data specified in the open column will be filled out by the user, such as the child’s initials, gender: Male (H) or Female (M), the measurements of the bones in their maximum distances (See schemes), child size and parents in centimeters, date of birth of the child and the x-ray (day and month to two digits, year in four digits). The x-ray of the hand from which the measurements are taken has to be left-hand and dorsopalmar projection, including the distal ends of cubit and radius. From a lateral x-ray of the foot and in a dorsoplantar projection, as described in the radiological charts, measurements of the tarsus (right foot) are obtained. In this way and after being entered the data of the child are validated by clicking on: "Okay!"
Thus, the following programs automatically give us the three ossific indexes of the hand: (A program calculates bone ages from 0.5 years to 20 years, and another from 0 to 4 years). Another program is for the Tarsal Index, for the calculation of the bone age from this region (children from 0 to 4 years). In all of them, osseous ages quantified by each index, and so-called IVOS (ossific indexes) that allow the reading of bone age directly, will be shown in the form of full normal, advanced or "normal" or significant delay, being recommended then a study or follow-up of the child. The program of 0.5 to 20 years of age allows us to obtain Adult Height Predictions (PTA) through the three indices described, and in two ways: with and without the paternal mean size. The programs for children from 0 to 4 years, only allow the calculation of the Bone Age.

If you enter the data, whether the size or measurements of the bones, the program does not support them, information appears that details the causes for not accepting the data: Usually in the sizes is usually an inadequate measure, and in the nuclei some false measures by excess. Whole numbers followed by decimals, either because of mistakes in the size of the child or in the size of the bone, must be separated from the decimal by a period (.) not by a comma (,) since it is not recognized as a numerical value. If you enter several decimals, the program rounds them.

Obviously, for a correct PTA, the size of the child we introduce into the program must be obtained at a date as close as possible to the date of the hand radiograph. The size of the study child we introduce is assimilated by the program, which refers the data to the prediction equations belonging to each group of the children's base in Aragon.
The software, is well adjusted to the PTA, in a period of validity from the three years and half to 17 and a half. At bone ages outside these limits, the program does not gives estimates of PTA, although if bone age.
Obtaining PTA could also be obtained manually with a calculator from the age of four, through the prediction equations of a variable (indices), two variables (indices and size of the child) and three variables (indices, child, and paternal mean size; Equations published in the accompanying bibliographical citations. The program, of course, simplifies and automates manual calculation. The measurements obtained from the maximum diameters of the carpal bones, metacarpals and phalanges studied, as well as the radial and cubital distal epiphyses are made in millimeters and their tenths. Measurements of tarsal bones are done in cm. All the measurements have been obtained with a calimeter, nonius or a king's foot, observing the indications of measurement of these bones, as can be observed in the radiological schemes published in the attached bibliography.
As today, physical X-ray is not usually available, the measurements of the bones have to be made with a digital measuring tool, available in the X-ray viewer of INTRANET.

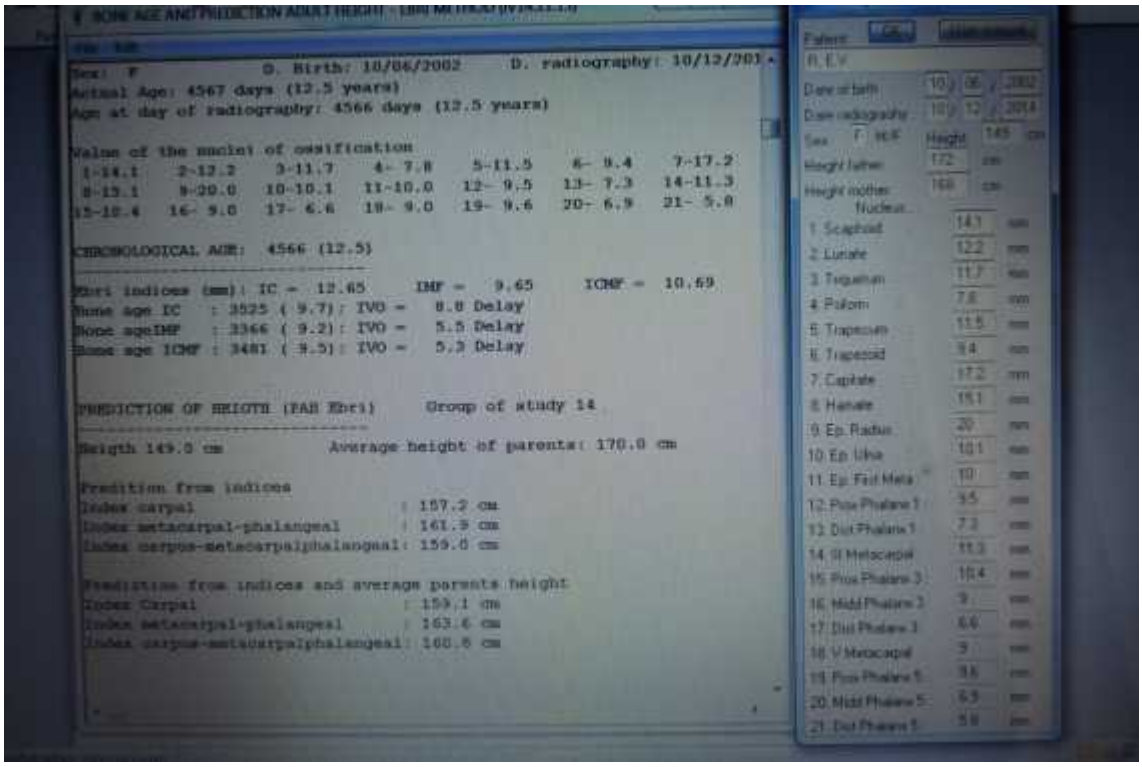
2- Management of radiological measurements obtained in the INTRANET viewer RX. Standards of measure in the bones of the hand in the viewer of x-rays after being installed in the 'Ebrí-IVOS Program´ on the computer to calculate the bone age and the prediction of adult height of the child.

The Installer WinRAR ZIP File (.zip): Ebri SetUp iv17.06.22, ("Ebrí Hand and Foot") will be installed on the user's computer, before the measurement of the bones of the hand. Opening this one will appear a series of icons, in the shape of a torch and it is here where we have to click on it again. Then a white space and a column with the name of the

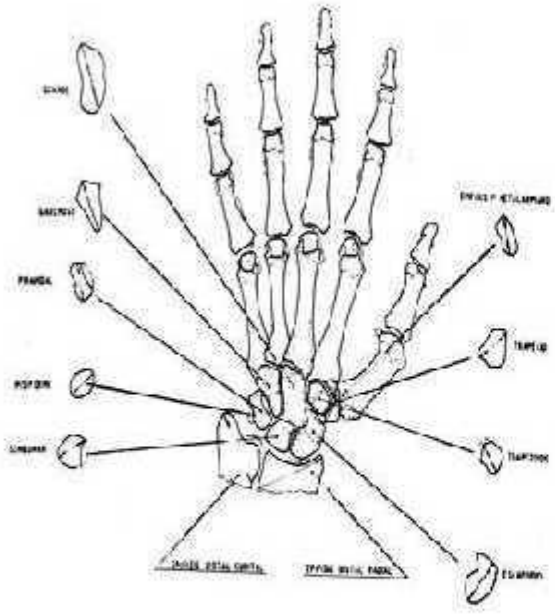
bones of the hand appear, as well as spaces to put the name of the patient, sex, date size of the child and the parents on it It will then minimize the open image in the taskbar of the computer, while we proceed to enter the Healthcare Network INTRANET.

Once in it, x-ray of patient´s left hand is located to study, or lateral and dorsoplantar radiographs of the right foot to study, then opening the display where the radiographic image can be seen. Search on it: tools icon with the name of ‘point to point´ or ‘distance´ measuring instrument (terminology that varies depending on the used display). In any case, click on that instrument, so ‘the mouse´ is enabled to carpal bones and epiphysis nuclei that have to be measured in the hand. Thus maximum distances ‘point to point´ are measured to these bones and nuclei. The carried out measures will appear printed on the measured bone (See the attached diagrams that guide how to measure these maximum distances, as well as publications and the book of ‘ Maturing Bone ´included in it) If there was an error in the measure putting ‘the mouse ´ over the wrong measure clicking on it with the right side of ‘the mouse ´, we can select the option of ‘delete annotation ´. The measures are in mm and tenths of millimeters (mm) or in centimeters (cm) in the foot. Depending on the viewer that is used for the measurement, may only allow the measurements in mm, rounding the figures without tenths. In any case and taking into account that the measurements are made about 21 bones in the hand and 9 bones in the foot, and whose result is an average, the possible errors of tenths in rounding are sometimes compensated by more and sometimes by less. It is advisable to measure a bone and then point the figure in the open column of the ‘Ebri Program´ that will be minimized in the taskbar of the computer, but when you click on, it (torch icon) becomes large and appears on the computer screen, then taking advantage to type the numbers obtained on the spaces prepared in it. It will proceed to continue measuring bone by bone, taking the measurements to the column. At the end of these, we fill other data such as size in cm, dates, sex, and initials of the patient.

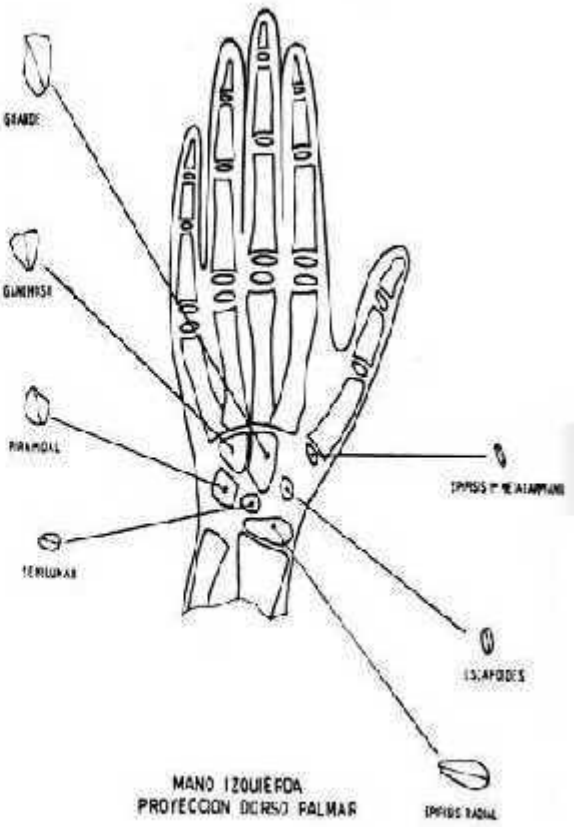
Once completed everything, we click on ‘Ok ´ column of data. Then in the blank space will appear the bone age by the three methods IVO-Ebrí diagnosis and the prediction of the adult height of the child (General Series) (See the outline of a clinical case in the window of the computer where an example of a patient is detailed) Likewise, bone age can be obtained in children aged 0 to 4 years by the three IVO-Ebrí and IVO-Tarsiano methods.



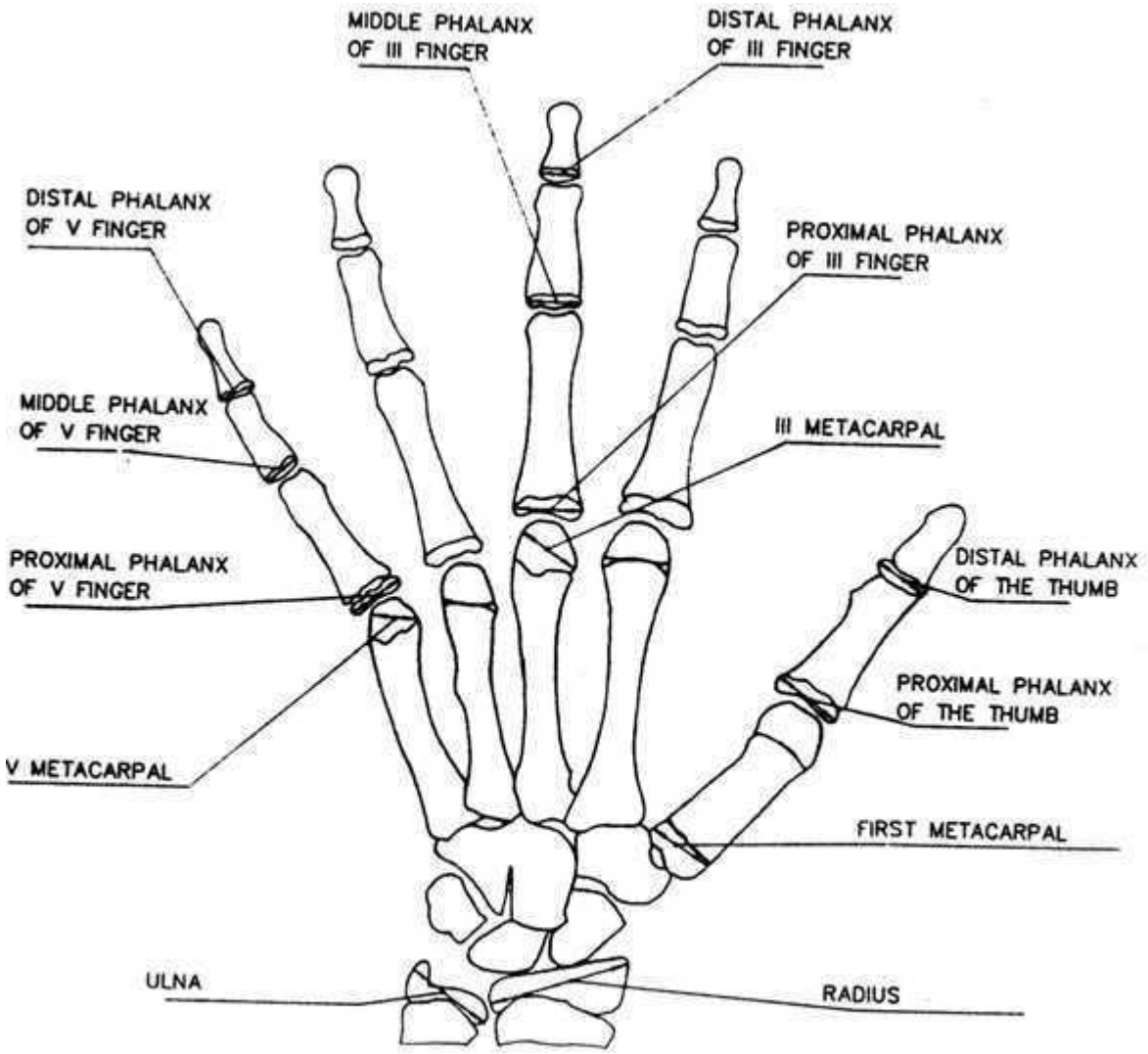
3- SCHEMES IMAGING:



MANO IZQUIERDA
PROYECCION DORSO PALMAR

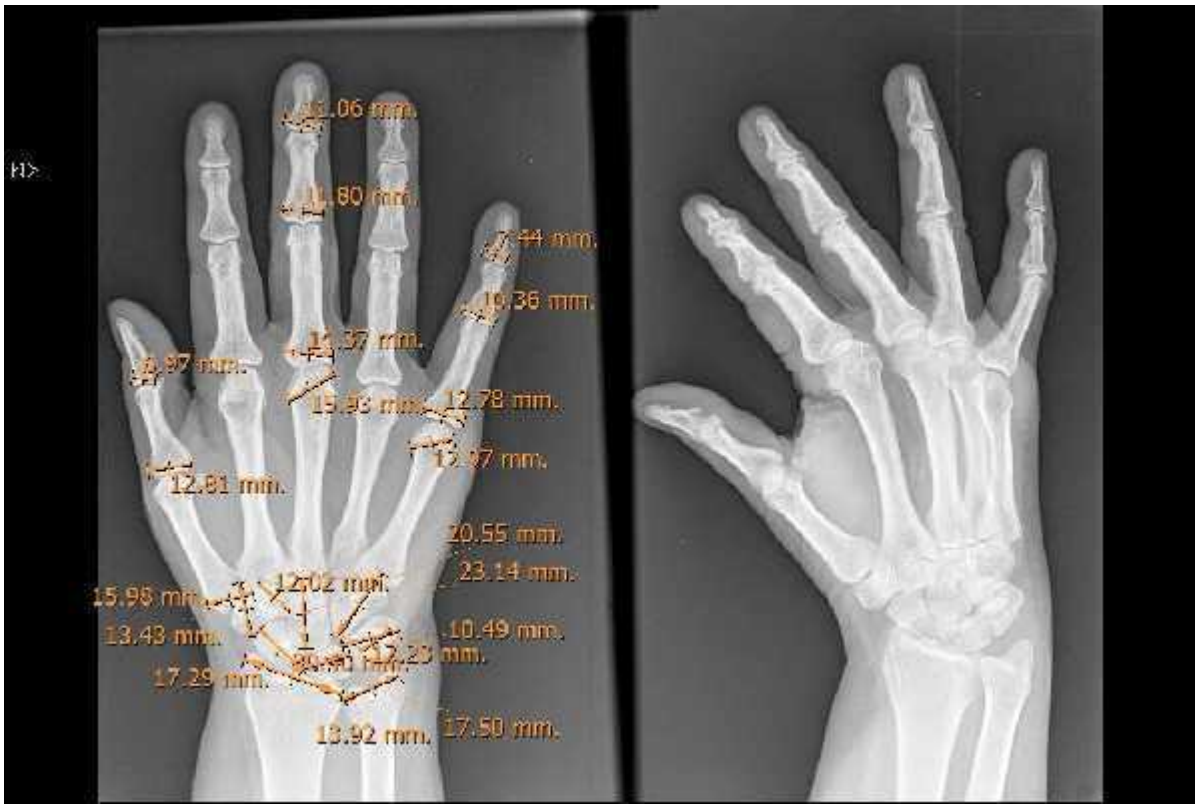


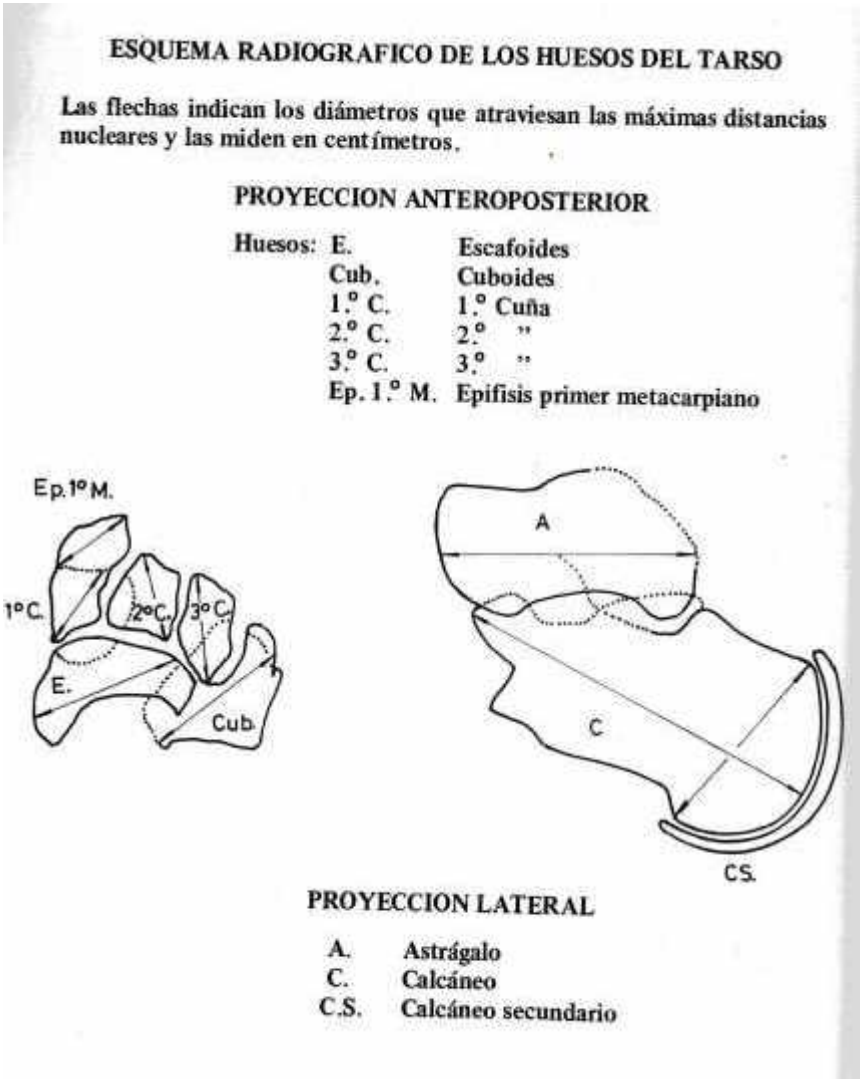
MANO IZQUIERDA
PROYECCION DORSO PALMAR



LEFT HAND

DORSO PALMAR WIEW


12.78 mm.
12.81 mm.
20.55 mm.
23.14 mm.
15.96 mm.
13.43 mm.
10.49 mm.
17.29 mm.
18.92 mm.
17.50 mm.



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5-Note: The full text of the book "MATURATION BONE IN SPANISH CHILD" IS IN SPANISH LANGUAGE

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