RADIOGRAPHIC ATLAS OF SKELETAL DEVELOPMENT OF THE HAND AND WRIST

Click Here for Male Standards

SECOND EDITION

Click Here for Female Standards

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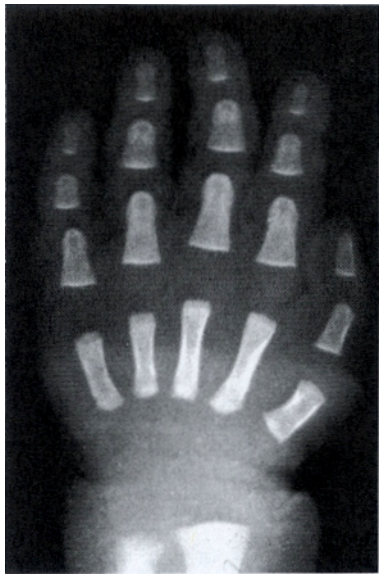
MALE STANDARDS

The size of the individual bones as they appear in these standards is the same as in the original hand-films from which the plates were made.

Go to: Newborn 3 years 5 years 10 years 15 years



The degree of flaring of the distal ends of the radius and ulna is that usually seen in hand-films of full-term infants.

The shafts of the second to fifth metacarpals are slightly constricted in their middle portions. If the hand has been positioned properly with the palm and fingers flat on the film holder, the proximal ends of the metacarpals are somewhat closer together than their distal ends and, consequently, the shafts appear to radiate out from the carpal area. At birth, the metacarpals of premature infants are usually more parallel to each other.

The distal ends of the proximal and middle phalanges are rounded and their proximal ends are wider and flat.

Skeletal Age of Individual Bones

Distal End of Radius	3 mo.	Proximal Phalanx I	3 mo.
Distal End of Ulna	3 mo.	Proximal Phalanx II	3 mo.
		Proximal Phalanx III	3 mo.
Capitate	3 mo.	Proximal Phalanx IV	3 mo.
Hamate	3 mo.	Proximal Phalanx V	3 mo.
Triquetral	*		
Lunate	*	Middle Phalanx II	3 mo.
Scaphoid	*	Middle Phalanx III	3 mo.
Trapezium	*	Middle Phalanx IV	3 mo.
Trapezoid	*	Middle Phalanx V	3 mo.
Metacarpal I	3 mo.	Distal Phalanx I	3 mo.
Metacarpal II	3 mo.	Distal Phalanx II	3 mo.
Metacarpal III	3 mo.	Distal Phalanx III	3 mo.
Metacarpal IV	3 mo.	Distal Phalanx IV	3 mo.
Metacarpal V	3 mo.	Distal Phalanx V	3 mo.
Pisiform	*		
Adductor Sesamoid of Thumb	*		
Flexor Sesamoid of Thumb	*		

* These centers are still cartilaginous at this stage of development.

The flaring of the distal ends of the radius and ulna is slightly more pronounced than it was in the preceding standard. A beaklike projection on the radial side of the distal end of the ulna, such as the one visible in this plate, usually persists for several years.

A center of ossification is now visible in both the capitate and the hamate. The capitate usually reaches this stage of development slightly earlier than the hamate, as is indicated here by its larger ossification center and somewhat rounder shape.

Both the proximal and the distal ends of the second to fifth metacarpals are relatively larger than they were in the preceding standard and the central portions of their shafts are now more constricted. The proximal ends of the second and fifth metacarpals tend also to be more rounded than they were at birth. The proximal or future epiphysial margin of the first metacarpal is now distinctly flattened and so resembles the corresponding portion of the proximal phalanges.

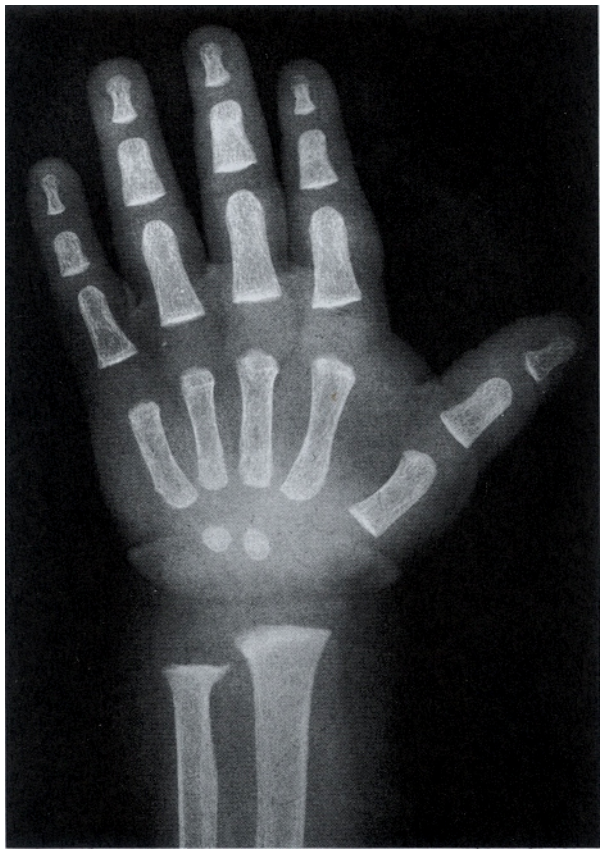
The phalanges have increased relatively more in length than in breadth and are beginning to show individual differentiation.

Skeletal Age of Individual Bones

Distal End of Radius	6 mo.	Proximal Phalanx I	6 mo.
Distal End of Ulna	6 mo.	Proximal Phalanx II	6 mo.
		Proximal Phalanx III	6 mo.
Capitate	6 mo.	Proximal Phalanx IV	6 mo.
Hamate	6 mo.	Proximal Phalanx V	6 mo.
Triquetral	*		
Lunate	*	Middle Phalanx II	6 mo.
Scaphoid	*	Middle Phalanx III	6 mo.
Trapezium	*	Middle Phalanx IV	6 mo.
Trapezoid	*	Middle Phalanx V	6 mo.
Metacarpal I	6 mo.	Distal Phalanx I	6 mo.
Metacarpal II	6 mo.	Distal Phalanx II	6 mo.
Metacarpal III	6 mo.	Distal Phalanx III	6 mo.
Metacarpal IV	6 mo.	Distal Phalanx IV	6 mo.
Metacarpal V	6 mo.	Distal Phalanx V	6 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.



The flaring of the end of the radius and of the ulna is quite pronounced at this stage of development.

When the osseous particles are first organized into a carpal or an epiphysial center, the resulting nodule is rounded or oval in form. The next stage of development is localized flattening. The capitate, though somewhat farther advanced than the hamate, shows as yet no distinct flattening of its hamate surface, the region in which that change will first appear. The increase in size that has taken place in the capitate and hamate centers since the preceding standard has brought these developing structures more closely together. It should be remembered, of course, that the cartilaginous carpals in which these centers of ossification are developing are in close apposition to each other as their adequate functioning would require. The future long axis of the capitate is already established.

There are now distinct individual differences in the shape and dimensions of the metacarpal shafts.

Skeletal Age of Individual Bones

Distal End of Radius	9 mo.	Proximal Phalanx I.	9 mo.
Distal End of Ulna	9 mo.	Proximal Phalanx II	9 mo.
		Proximal Phalanx III	9 mo.
Capitate	9 mo.	Proximal Phalanx IV	9 mo.
Hamate	8 mo.	Proximal Phalanx V	9 mo.
Triquetral	*		
Lunate	*	Middle Phalanx II	9 mo.
Scaphoid	*	Middle Phalanx III	9 mo.
Trapezium	*	Middle Phalanx IV	9 mo.
Trapezoid	*	Middle Phalanx V	9 mo.
Metacarpal I	9 mo.	Distal Phalanx I	9 mo.
Metacarpal II	9 mo.	Distal Phalanx II	9 mo.
Metacarpal III	9 mo.	Distal Phalanx III	9 mo.
Metacarpal IV	9 mo.	Distal Phalanx IV	9 mo.
Metacarpal V	9 mo.	Distal Phalanx V	9 mo.
Pisiform	*		
Adductor Sesamoid of Thumb	*		
Flexor Sesamoid of Thumb	*		

* These centers are still cartilaginous at this stage of development.

The surface of the capitate adjacent to the hamate has begun to flatten.

The bases of the second, third, fourth, and fifth metacarpals have become relatively larger and more rounded. A similar change has taken place in the distal end of the first metacarpal.

Skeletal Age of Individual Bones

Distal End of Radius	12 mo.	Proximal Phalanx I	12 mo.
Distal End of Ulna	12 mo.	Proximal Phalanx II	12 mo.
		Proximal Phalanx III	12 mo.
Capitate	13 mo.	Proximal Phalanx IV	12 mo.
Hamate	12 mo.	Proximal Phalanx V	12 mo.
Triquetral	*		
Lunate	*	Middle Phalanx II	12 mo.
Scaphoid	*	Middle Phalanx III	12 mo.
Trapezium	*	Middle Phalanx IV	12 mo.
Trapezoid	*	Middle Phalanx V	12 mo.
Metacarpal I	12 mo.	Distal Phalanx I	12 mo.
Metacarpal II	12 mo.	Distal Phalanx II	12 mo.
Metacarpal III	12 mo.	Distal Phalanx III	12 mo.
Metacarpal IV	12 mo.	Distal Phalanx IV	12 mo.
Metacarpal V	12 mo.	Distal Phalanx V	12 mo.
Pisiform	*		
Adductor Sesamoid of Thumb	*		
Flexor Sesamoid of Thumb	*		

* These centers are still cartilaginous at this stage of development.

The ossification centers of the capitate and hamate have grown larger and are now close together. Some further flattening has occurred in the hamate surface of the capitate.

The proximal phalanges have grown somewhat more in length than in width and the tips (distal ends) of the third and fourth appear to be slightly compressed laterally.

Skeletal Age of Individual Bones

Distal End of Radius	14 mo.	Proximal Phalanx I	15 mo.
Distal End of Ulna	15 mo.	Proximal Phalanx II	15 mo.
		Proximal Phalanx III	15 mo.
Capitate	15 mo.	Proximal Phalanx IV	15 mo.
Hamate	13 mo.	Proximal Phalanx V	15 mo.
Triquetral	*		
Lunate	*	Middle Phalanx II	15 mo.
Scaphoid	*	Middle Phalanx III	15 mo.
Trapezium	*	Middle Phalanx IV	15 mo.
Trapezoid	*	Middle Phalanx V	15 mo.
Metacarpal I	15 mo.	Distal Phalanx I	15 mo.
Metacarpal II	15 mo.	Distal Phalanx II	15 mo.
Metacarpal III	15 mo.	Distal Phalanx III	15 mo.
Metacarpal IV	15 mo.	Distal Phalanx IV	15 mo.
Metacarpal V	15 mo.	Distal Phalanx V	15 mo.
Pisiform	*		
Adductor Sesamoid of Thumb	*		
Flexor Sesamoid of Thumb	*		

* These centers are still cartilaginous at this stage of development.

A small center of ossification is visible in the distal epiphysis of the radius.

The flattening of the hamate surface of the capitate is now more pronounced than it was in Standard 5 and the adjacent surface of the hamate has become somewhat less convex. At this stage, the future trapezoid margin of the capitate may be convex, distinctly flattened, or slightly concave, as it is in this standard. If a notch subsequently appears at the junction of the capitate, scaphoid, and trapezoid, it will develop in the region where this concavity first begins. Such a notch was present in the capitate of about 40 per cent of the children in our study. In the others, this osseous feature was not seen at any stage of their development.

That portion of the base of the second metacarpal which will later articulate with the capitate has begun to flatten.

The sides of the distal ends of the proximal phalanges of the third and fourth fingers are now somewhat flattened. The trochlear surface of each phalanx will form later between and immediately distal to those flattened areas.

Skeletal Age of Individual Bones

Distal End of Radius	19 mo.	Proximal Phalanx I	18 mo.
Distal End of Ulna	18 mo.	Proximal Phalanx II	18 mo.
		Proximal Phalanx III	18 mo.
Capitate	19 mo.	Proximal Phalanx IV	18 mo.
Hamate	19 mo.	Proximal Phalanx V	18 mo.
Triquetral	*		
Lunate	*	Middle Phalanx II	18 mo.
Scaphoid	*	Middle Phalanx III	18 mo.
Trapezium	*	Middle Phalanx IV	18 mo.
Trapezoid	*	Middle Phalanx V	18 mo.
Metacarpal I	19 mo.	Distal Phalanx I	19 mo.
Metacarpal II	20 mo.	Distal Phalanx II	18 mo.
Metacarpal III	20 mo.	Distal Phalanx III	18 mo.
Metacarpal IV	23 mo.	Distal Phalanx IV	18 mo.
Metacarpal V	19 mo.	Distal Phalanx V	18 mo.
Pisiform	*		
Adductor Sesamoid of Thumb	*		
Flexor Sesamoid of Thumb	*		

* These centers are still cartilaginous at this stage of development.

The ulnar side of the radial epiphysis is pointed and its radial (lateral) side is thicker and convex.

Centers of ossification are now visible in the heads of the second, third, and fourth metacarpals, in the proximal phalanges of the same fingers, and in the distal phalanx of the thumb. Ossification in these epiphyses usually appears first centrally and subsequently extends transversely. These metacarpal epiphyses, especially that of the fourth metacarpal, are slightly advanced in their development.

Skeletal Age of Individual Bones

Distal End of Radius	21 mo.	Proximal Phalanx I	24 mo.
Distal End of Ulna	21 mo.	Proximal Phalanx II	24 mo.
		Proximal Phalanx III	24 mo.
Capitate	21 mo.	Proximal Phalanx IV	24 mo.
Hamate	21 mo.	Proximal Phalanx V	24 mo.
Triquetral	*		
Lunate	*	Middle Phalanx II	24 mo.
Scaphoid	*	Middle Phalanx III	24 mo.
Trapezium	*	Middle Phalanx IV	24 mo.
Trapezoid	*	Middle Phalanx V	24 mo.
Metacarpal I	24 mo.	Distal Phalanx I	25 mo.
Metacarpal II	24 mo.	Distal Phalanx II	25 mo.
Metacarpal III	24 mo.	Distal Phalanx III	25 mo.
Metacarpal IV	24 mo.	Distal Phalanx IV	25 mo.
Metacarpal V	24 mo.	Distal Phalanx V	25 mo.
Pisiform	*		
Adductor Sesamoid of Thumb	*		
Flexor Sesamoid of Thumb	*		

* These centers are still cartilaginous at this stage of development.

The capitate and hamate have increased further in size.

A tiny center of ossification seems to be present in the epiphysis of the fifth metacarpal, in the original film. It is not visible in this illustration, however.

Ossification has now begun in the epiphysis of the proximal phalanx of the fifth finger and in the epiphyses of the middle and distal phalanges of the third and fourth fingers. The epiphyses of the proximal phalanges of the second, third, fourth, and fifth fingers and that of the distal phalanx of the thumb are now disc-shaped and their margins are smooth.

Skeletal Age of Individual Bones

Distal End of Radius	33 mo.	Proximal Phalanx I	32 mo.
Distal End of Ulna	33 mo.	Proximal Phalanx II	32 mo.
		Proximal Phalanx III	32 mo.
Capitate	33 mo.	Proximal Phalanx IV	32 mo.
Hamate	33 mo.	Proximal Phalanx V	30 mo.
Triquetral	36 mo.		
Lunate	*	Middle Phalanx II	30 mo.
Scaphoid	*	Middle Phalanx III	30 mo.
Trapezium	*	Middle Phalanx IV	30 mo.
Trapezoid	*	Middle Phalanx V	30 mo.
Metacarpal I	32 mo.	Distal Phalanx I	30 mo.
Metacarpal II	33 mo.	Distal Phalanx II	37 mo.
Metacarpal III	33 mo.	Distal Phalanx III	33 mo.
Metacarpal IV	33 mo.	Distal Phalanx IV	34 mo.
Metacarpal V	32 mo.	Distal Phalanx V	37 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.

The epiphysis of the radius has become wedge-shaped through the relative flattening of its proximal margin and the ulnar half of its distal margin.

The triquetral, one of the most variable of the carpals in the time of its beginning ossification, now contains a slightly advanced bony center, which has the form of a rounded nodule with smooth margins.

It is apparent that the ossification of the epiphysis of the first metacarpal began more recently than that of the fifth metacarpal, in which the process probably began soon after the stage of development depicted in the preceding standard.

Ossification centers are now visible in the proximal phalanx of the thumb (where, in the original film, it takes the form of one larger and several much smaller discrete nodules which are disposed transversely), in the middle phalanx of the second finger, the distal phalanges of the second and fifth fingers, and in the first metacarpal. The width of the epiphyses of the proximal phalanges of the second, third, fourth, and fifth fingers now equals or exceeds half the width of the adjacent margins of their shafts. The central portion of their growth cartilage plates is now as thin as it will become until those epiphyses begin to fuse with their shafts. The epiphysis of the distal phalanx of the thumb has flattened to conform to the shape of the adjacent surface of its shaft. Its growth cartilage has also attained its definitive thickness.

Skeletal Age of Individual Bones

Distal End of Radius	39 mo.	Proximal Phalanx I	38 mo.
Distal End of Ulna	36 mo.	Proximal Phalanx II	36 mo.
		Proximal Phalanx III	36 mo.
Capitate	39 mo.	Proximal Phalanx IV	36 mo.
Hamate	36 mo.	Proximal Phalanx V	34 mo.
Triquetral	36 mo.		
Lunate	42 mo.	Middle Phalanx II	36 mo.
Scaphoid	*	Middle Phalanx III	36 mo.
Trapezium	*	Middle Phalanx IV	36 mo.
Trapezoid	*	Middle Phalanx V	36 mo.
Metacarpal I	36 mo.	Distal Phalanx I	36 mo.
Metacarpal II	36 mo.	Distal Phalanx II	36 mo.
Metacarpal III	36 mo.	Distal Phalanx III	36 mo.
Metacarpal IV	36 mo.	Distal Phalanx IV	36 mo.
Metacarpal V	34 mo.	Distal Phalanx V	36 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.

The volar and dorsal surfaces of the radial epiphysis can now be distinguished. The volar margin is visible as a rather thick white line. Distally, the thin dorsal margin of the epiphysis projects beyond the volar margin.

The concavity in the margin of the capitate adjacent to the hamate suggests the beginning of reciprocal shaping, but its depth is an individual variation and should not be regarded as a characteristic feature of this standard.

Ossification has begun, somewhat precociously, in the lunate.

The epiphyses of the second, third, fourth, and fifth metacarpals have enlarged and have become more uniformly rounded and their margins somewhat smoother.

The epiphyses of the middle phalanges of the second, third, and fourth fingers have widened transversely to form disc-like structures which are thickest in the middle and taper toward each end. Their margins are smooth.

Skeletal Age of Individual Bones

Distal End of Radius	44 mo.	Proximal Phalanx I	37 mo.
Distal End of Ulna	44 mo.	Proximal Phalanx II	42 mo.
		Proximal Phalanx III	42 mo.
Capitate	42 mo.	Proximal Phalanx IV	42 mo.
Hamate	42 mo.	Proximal Phalanx V	42 mo.
Triquetral	42 mo.		
Lunate	54 mo.	Middle Phalanx II	36 mo.
Scaphoid	*	Middle Phalanx III	38 mo.
Trapezium	*	Middle Phalanx IV	38 mo.
Trapezoid	*	Middle Phalanx V	38 mo.
Metacarpal I	36 mo.	Distal Phalanx I	40 mo.
Metacarpal II	42 mo.	Distal Phalanx II	42 mo.
Metacarpal III	42 mo.	Distal Phalanx III	42 mo.
Metacarpal IV	42 mo.	Distal Phalanx IV	42 mo.
Metacarpal V	42 mo.	Distal Phalanx V	42 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.

The lunate is much advanced in its development as compared with the other bones. The approximately transverse position of its future long axis is already indicated.

That surface of the base of the second metacarpal, which will later articulate with the trapezoid, has begun to flatten. The trapezoid facet makes a wide angle with the smaller capitate facet, which forms the remainder of the proximal border of the shaft.

The epiphyses of the distal phalanges of the second and fifth fingers are now clearly visible. The corresponding epiphyses of the third and fourth fingers are now disc-shaped and their margins are smooth.

A series of hand-films of this boy are used as Standards 11–23, inclusive.

SKELETAL AGE: 4 YEARS

Skeletal Age of Individual Bones

Distal End of Radius	50 mo.	Proximal Phalanx I	42 mo.
Distal End of Ulna	50 mo.	Proximal Phalanx II	47 mo.
		Proximal Phalanx III	48 mo.
Capitate	48 mo.	Proximal Phalanx IV	48 mo.
Hamate	48 mo.	Proximal Phalanx V	48 mo.
Triquetral	48 mo.		
Lunate	60 mo.	Middle Phalanx II	42 mo.
Scaphoid	*	Middle Phalanx III	46 mo.
Trapezium	60 mo.	Middle Phalanx IV	46 mo.
Trapezoid	*	Middle Phalanx V	39 mo.
Metacarpal I	46 mo.	Distal Phalanx I	45 mo.
Metacarpal II	48 mo.	Distal Phalanx II	48 mo.
Metacarpal III	48 mo.	Distal Phalanx III	48 mo.
Metacarpal IV	48 mo.	Distal Phalanx IV	48 mo.
Metacarpal V	48 mo.	Distal Phalanx V	48 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.

The irregular white line which is visible in the ulnar half of the radial epiphysis about midway between its proximal and distal margins and which extends toward its ulnar tip, forms with a similar line along the proximal margin of the epiphysis the outline of its volar surface. Similar white lines which will be seen more distinctly in this and some other bones in subsequent standards help one to distinguish the dorsal from the volar surface.

Centers of ossification are now present in all of the phalangeal epiphyses and, somewhat precociously, in the trapezium as well. An early onset of ossification in the trapezium and the occurrence of multiple rather than single centers in the proximal phalanx of the thumb are not uncommon.

The epiphyses of the proximal phalanges of the second and third fingers, which had already begun to thicken in the preceding standard, are now somewhat wedge-shaped, tapering toward their ulnar ends.

SKELETAL AGE: 4 YEARS AND 6 MONTHS

Skeletal Age of Individual Bones

Distal End of Radius	56 mo.	Proximal Phalanx I	50 mo.
Distal End of Ulna	56 mo.	Proximal Phalanx II	54 mo.
		Proximal Phalanx III	54 mo.
Capitate	54 mo.	Proximal Phalanx IV	54 mo.
Hamate	54 mo.	Proximal Phalanx V	54 mo.
Triquetral	54 mo.		
Lunate	63 mo.	Middle Phalanx II	52 mo.
Scaphoid	*	Middle Phalanx III	52 mo.
Trapezium	69 mo.	Middle Phalanx IV	52 mo.
Trapezoid	*	Middle Phalanx V	42 mo.
Metacarpal I	52 mo.	Distal Phalanx I	52 mo.
Metacarpal II	54 mo.	Distal Phalanx II	54 mo.
Metacarpal III	54 mo.	Distal Phalanx III	54 mo.
Metacarpal IV	54 mo.	Distal Phalanx IV	54 mo.
Metacarpal V	54 mo.	Distal Phalanx V	54 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.

The distal margin of the ulnar tip of the radial epiphysis, which will subsequently articulate with the lunate, has flattened slightly.

The ossification center of the trapezium is now a small, rounded nodule with fairly smooth margins. A faint white line just proximal to the capitate surface of the lunate indicates this portion of its volar margin. This feature becomes more distinct in subsequent standards.

The epiphyses of the second, third, and fourth metacarpals now show a comparatively flattened ulnar side and a more rounded distal margin. The thinnest part of the cartilage plate of the first metacarpal is now as thin as it will become until its epiphysis begins to fuse with the shaft.

The articular surfaces of the proximal phalangeal epiphyses of the second and third fingers have become slightly concave as they begin to shape to the heads of the corresponding metacarpals. The proximal phalanx of the thumb has an epiphysis which has not yet completely coalesced to form a single nodule. This center is, however, about three-fourths as wide as its metaphysis. The middle phalangeal epiphyses of the third and fourth fingers are now slightly more than half as wide as their shafts.

SKELETAL AGE: 5 YEARS

Skeletal Age of Individual Bones

Distal End of Radius	63 mo.	Proximal Phalanx I	60 mo.
Distal End of Ulna	63 mo.	Proximal Phalanx II	60 mo.
		Proximal Phalanx III	60 mo.
Capitate	60 mo.	Proximal Phalanx IV	60 mo.
Hamate	60 mo.	Proximal Phalanx V	60 mo.
Triquetral	60 mo.		
Lunate	72 mo.	Middle Phalanx II	60 mo.
Scaphoid	*	Middle Phalanx III	60 mo.
Trapezium	72 mo.	Middle Phalanx IV	60 mo.
Trapezoid	*	Middle Phalanx V	52 mo.
Metacarpal I	60 mo.	Distal Phalanx I	58 mo.
Metacarpal II	60 mo.	Distal Phalanx II	60 mo.
Metacarpal III	60 mo.	Distal Phalanx III	60 mo.
Metacarpal IV	60 mo.	Distal Phalanx IV	60 mo.
Metacarpal V	60 mo.	Distal Phalanx V	60 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.

Both a lunate and a hamate facet can now be distinguished on the triquetral. Its free (non-articular) surface remains convex.

The epiphysis of the first metacarpal is now more than half as wide as its metaphysis. The trapezoid facet on the proximal end of the second metacarpal is now slightly concave. In Standard I, the metacarpals have a fan-shaped arrangement: the bases of the fourth and fifth metacarpals now partially overlap. The five metacarpal-phalangeal joint spaces have become progressively smaller as the osseous epiphyses of metacarpal and proximal phalanges increased in size.

The partial flexion of the fingers in this standard makes it impossible to compare the amount of reduction which has taken place in the size of the inter-phalangeal spaces since the previous standard. The epiphysis of the distal phalanx of the fifth finger is now about two-thirds as wide as its shaft.

SKELETAL AGE: 6 YEARS

Skeletal Age of Individual Bones

Distal End of Radius	6 yr. 3 mo.	Proximal Phalanx I	6 yr. 0 mo.
Distal End of Ulna	6 yr. 10 mo.	Proximal Phalanx II	6 yr. 0 mo.
		Proximal Phalanx III	6 yr. 0 mo.
Capitate	6 yr. 0 mo.	Proximal Phalanx IV	6 yr. 0 mo.
Hamate	6 yr. 0 mo.	Proximal Phalanx V	6 yr. 0 mo.
Triquetral	6 yr. 0 mo.		
Lunate	6 yr. 8 mo.	Middle Phalanx II	6 yr. 0 mo.
Scaphoid	6 yr. 4 mo.	Middle Phalanx III	6 yr. 0 mo.
Trapezium	7 yr. 0 mo.	Middle Phalanx IV	6 yr. 0 mo.
Trapezoid	6 yr. 4 mo.	Middle Phalanx V	5 yr. 8 mo.
Metacarpal I	6 yr. 0 mo.	Distal Phalanx I	6 yr. 0 mo.
Metacarpal II	6 yr. 0 mo.	Distal Phalanx II	6 yr. 0 mo.
Metacarpal III	6 yr. 0 mo.	Distal Phalanx III	6 yr. 0 mo.
Metacarpal IV	6 yr. 0 mo.	Distal Phalanx IV	6 yr. 0 mo.
Metacarpal V	6 yr. 0 mo.	Distal Phalanx V	6 yr. 0 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.

The part of the radial epiphysis from which the styloid process develops is beginning to enlarge. The distal segment of the white line which outlines a portion of the volar surface of the radial epiphysis now extends to the distal surface of that epiphysis. Ossification probably began in the ulnar epiphysis shortly after the stage of development depicted in Standard 14. It is now somewhat farther advanced than the rest of the hand.

The capitate and hamate have increased further in size and their margins now show beginning regional differentiation. The triquetral has become more elongated, its ulnar margin somewhat less convex, and its hamate and lunate margins further flattened. The distinct curved white line which occupies part of the distal margin of the lunate represents a portion of its volar surface. This feature is first seen in Standard 13. The spaces between the hamate and triquetral, capitate and lunate, and lunate and radial epiphysis have been further reduced. The size of the osseous centers of both the trapezoid and the scaphoid suggests that they would have been visible shortly after the stage of development shown in Standard 14. The surface of the trapezium adjacent to the epiphysis of the first metacarpal has begun to flatten.

The base of the second metacarpal is now distinctly indented in the region which will later articulate with the trapezoid.

The epiphyses of the proximal phalanges are not yet as wide as the adjacent borders of their shafts. The future articular surfaces of the proximal epiphyses of the fourth and fifth fingers are now slightly concave.

SKELETAL AGE: 7 YEARS

Skeletal Age of Individual Bones

Distal End of Radius	7 yr. 2 mo.	Proximal Phalanx I	7 yr. 0 mo.
Distal End of Ulna	7 yr. 6 mo.	Proximal Phalanx II	7 yr. 0 mo.
		Proximal Phalanx III	7 yr. 0 mo.
Capitate	7 yr. 0 mo.	Proximal Phalanx IV	7 yr. 0 mo.
Hamate	7 yr. 0 mo.	Proximal Phalanx V	7 yr. 0 mo.
Triquetral	7 yr. 0 mo.		
Lunate	7 yr. 8 mo.	Middle Phalanx II	6 yr. 9 mo.
Scaphoid	7 yr. 2 mo.	Middle Phalanx III	6 yr. 9 mo.
Trapezium	7 yr. 4 mo.	Middle Phalanx IV	6 yr. 9 mo.
Trapezoid	7 yr. 4 mo.	Middle Phalanx V	6 yr. 6 mo.
Metacarpal I	7 yr. 0 mo.	Distal Phalanx I	7 yr. 0 mo.
Metacarpal III	7 yr. 0 mo.	Distal Phalanx II	7 yr. 0 mo.
Metacarpal II	7 yr. 0 mo.	Distal Phalanx III	7 yr. 0 mo.
Metacarpal IV	7 yr. 0 mo.	Distal Phalanx IV	7 yr. 0 mo.
Metacarpal V	7 yr. 0 mo.	Distal Phalanx V	7 yr. 0 mo.

Pisiform	*
Adductor Sesamoid of Thumb	*
Flexor Sesamoid of Thumb	*

* These centers are still cartilaginous at this stage of development.

Since the stage of development depicted in Standard 15, the radial epiphysis has increased in width and its future styloid portion has become thicker. The ulnar epiphysis has extended predominantly radialward from the site of its first appearance. Its proximal surface appears flattened.

The hamate surface of the capitate is now slightly concave, and the adjacent surface of the hamate has a corresponding convexity. The metacarpal margin of the hamate is now distinctly flattened, and a slight flattening has also occurred on the surface of the trapezoid adjacent to the capitate. The trapezium and trapezoid will overlap in all subsequent standards when the hand is properly positioned.

The proximal margin of the epiphysis of the first metacarpal is distinctly flattened. An articular concavity will subsequently develop in the same region.

The epiphysis of the middle phalanx of the fifth finger, which is here somewhat delayed in its development, is now slightly more than half as wide as its shaft. The central portion of its epiphysial cartilage plate is now as thin as it will become until fusion begins. As seen in this oblique view, there is now a distinct flattening of most of the articular surface of the distal phalanx of the thumb.