

RADIOGRAPHIC ATLAS OF
SKELETAL DEVELOPMENT
OF THE HAND AND WRIST

Dr. JOAN CARLOS BOVERI
BIBLIOTECA

SECOND EDITION

WILLIAM WALTER GREULICH

Professor of Anatomy, Stanford University School of Medicine

S. IDELL PYLE

*Research Associate, Departments of Anatomy, Western Reserve University
and Stanford University Schools of Medicine*

103

WE
168
763

STANFORD UNIVERSITY PRESS, STANFORD, CALIFORNIA
LONDON: OXFORD UNIVERSITY PRESS

CONTENTS

PREFACE TO THE SECOND EDITION	X
TO THE FIRST EDITION	xii
THE RATIONALE AND TECHNIQUE OF ASSESSING THE DEVELOPMENTAL STATUS OF CHILDREN FROM ROENTGENOGRAMS OF THE HAND AND WRIST	
The need for a dependable method of determining the physical developmental status of children	I
The inadequacy of height-weight-age tables for determining developmental status	I
The relationship of the developmental status of the skeleton to that of the reproductive system	2
(<i>a</i>) precocious puberty. (<i>b</i>) hypogenital states. (<i>c</i>) normal girls. (<i>d</i>) normal boys.	
The relationship of the developmental status of the reproductive system to the degree of general bodily maturity	13
Skeletal status and general bodily maturity	15
Some effects of illness on the developing skeleton	18
(<i>a</i>) delayed appearance of ossification centers. (<i>b</i>) scars of interrupted growth.	
The value and limitations of the X-ray film of the hand in appraising the physical developmental status of children	22
The genetically determined character and sequence of developmental processes	23
The concept of skeletal age	27
The close correspondence in skeletal status of the right and left hand	29
How the standards were selected	31
The interval between successive standards	32
Maturity indicators	34

How to proceed in assessing a hand-film	35
The assessment of hand-films which show marked imbalance in skeletal development	36
A graphic method of recording skeletal assessments	37
The applicability of the standards	40
The accuracy of skeletal assessments	43
What constitutes a significant deviation from normal	48
The skeletal age of individual bones and epiphyses	58
MALE STANDARDS	61
FEMALE STANDARDS	125
MATURITY INDICATORS OF INDIVIDUAL BONES AND EPIPHYSES	185
Maturity indicators of the distal end of the radius	188
Maturity indicators of the distal epiphysis of the ulna	191
Maturity indicators of the capitate and hamate	194
Maturity indicators of the triquetral and pisiform	197
Maturity indicators of the lunate	199
Maturity indicators of the scaphoid	201
Maturity indicators of the trapezium and of the epiphysis of the first metacarpal	203
Maturity indicators of the trapezoid and base of the second metacarpal	207
Maturity indicators of the epiphyses of the second, third, and fourth metacarpals	210
Maturity indicators of the epiphysis of the fifth metacarpal	212
Maturity indicators of the epiphysis of the proximal phalanx of the thumb	214
Maturity indicators of the epiphyses of the proximal pha- langes of the second, third, and fourth fingers	216
Maturity indicators of the epiphysis of the proximal phalanx of the fifth finger	219
Maturity indicators of the epiphyses of the middle phalanges	221

Maturity indicators of the epiphysis of the distal phalanx of the thumb	224
Maturity indicators of the epiphyses of the distal phalanges of the second, third, fourth, and fifth fingers	226

APPENDIX

Bayley & Pinneau's tables for predicting adult height from skeletal age: revised for use with the Greulich-Pyle hand standards	231
Radiographs of six skeletal areas of a girl at the time of her menarche	252
A device for increasing the safety of hand-radiography . . .	254