

# GROWING UP SUPER — PART FIVE

## A STUDY OF THE METAHUMAN LIFECYCLE FROM CONCEPTION TO DEATH

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**A**dolescence — the period of physical and psychological transition between childhood and adulthood — can be a very trying time for both the children involved and for their parents. The numerous body-wide changes a youth undergoes is accompanied by unstable emotions or a lack of emotional intelligence, and the development of a less innocent and more realistic view of the world; each change alone is major, but together they can be overwhelming. Throw superpowers into the mix, and the results can be explosive!

### **PUBERTUS ERUPTUS**

**Puberty** is the process of physical changes by which a child's body matures into an adult body

capable of reproduction. During puberty major differences in size, shape, composition, and function develop in many body structures and systems, the most obvious of which are the *secondary sex characteristics*, those that distinguish the two sexes, but are not directly part of the reproductive system (such as a deeper voice in boys and the development of breasts in girls). Growth accelerates in the first half of puberty, and reaches completion by the end.

Puberty is triggered when the hypothalamus (a region of the mammalian brain that regulates certain metabolic processes and other autonomic activity) begins to release pulses of GnRH (Gonadotropin-Releasing Hormone). This causes the pituitary gland (an endocrine gland the size of a pea situated at the base of the brain, which links the nervous system and endocrine system) to secrete LH and FSH (Luteinizing Hormone and Follicle Stimulating Hormone) into the blood, which begins the rapid maturation of the gonads (the girl's ovaries and the boy's testicles). These in turn begin to produce estradiol and testosterone, which produce the body changes of female and male puberty. Puberty appears to be related to body fat percentage, and in most Western countries, the average age of menarche (the first menstrual period, a central event in female puberty) has fallen over the last century, possibly because of improved nutrition and increased caloric intake. Other researchers propose a climatological connection and attribute the decreased average age of menarche in part to global warming, while some point to differences in the age of onset menarche correlating to stress and social factors. There is also evidence that certain chemical

pollutants can influence the onset of puberty. The debates are, predictably, politically charged, but whatever the case, it is clear that the age at which puberty occurs has dropped, and dropped significantly, since the 1840s. From 1840 through 1950, in each decade there was a drop of four months in the average age of menarche among Western European females; in Japan the decline happened later but was more rapid, dropping 11 months per decade from 1945-1975.

In a general sense, the conclusion of puberty is reproductive maturity. Criteria for defining the conclusion may differ for different purposes: attainment of the ability to

reproduce, achievement of maximal adult height, maximal gonadal size, or adult sex hormone levels. Maximal adult height is achieved at an average age of 14.5 years for American girls and 17.5 years for American boys. Potential fertility (sometimes termed *nubility*) usually precedes completion of growth by 1-2 years in girls and 3-4 years in boys.

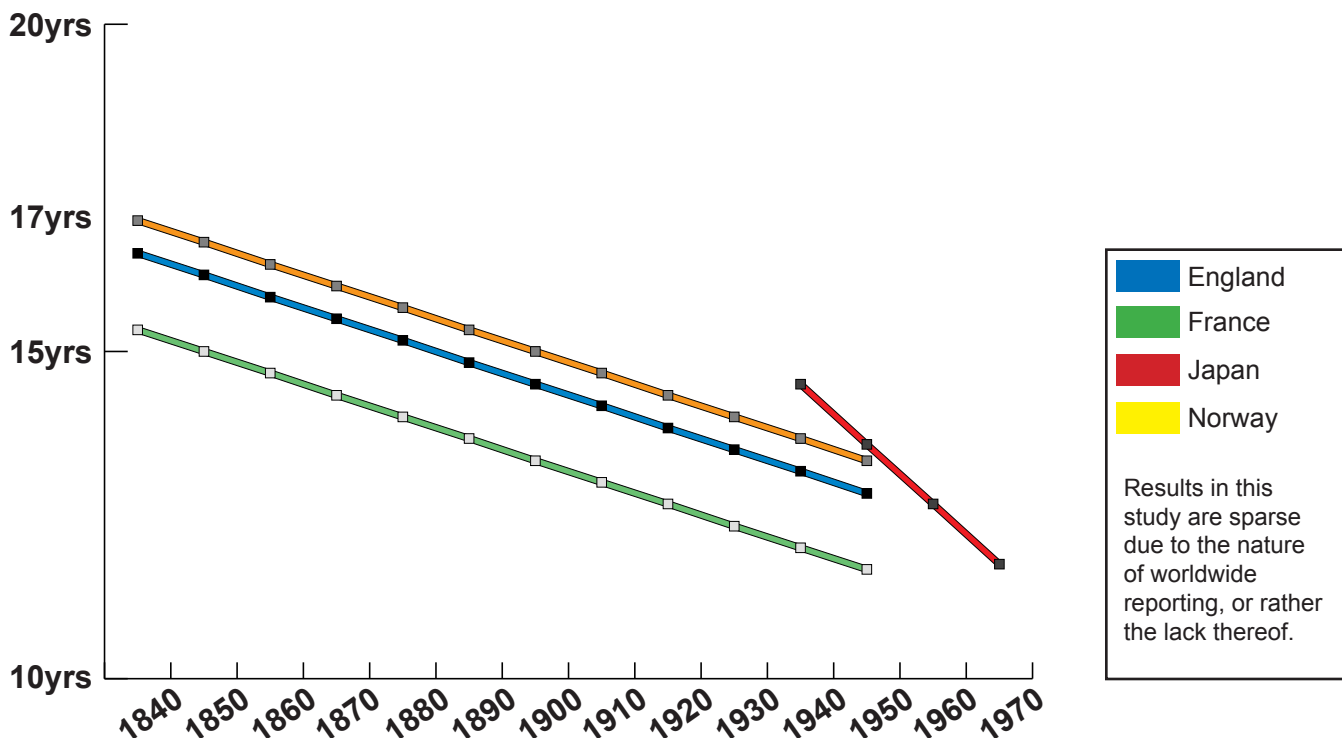
**Puberty in Girls**

The first physical sign of puberty in girls is usually a firm, tender lump under the center of the areola(e) of one or both breasts, occurring on average at about 10 years of age, and is referred to as the *thelarche*. Within 6-12 months, the swelling has clearly

begun in both sides and softened, and by another 12 months, the breasts are approaching mature size and shape. Pubic hair is often the second unequivocal change of puberty, though in about 15% of girls the earliest pubic hair appears before breast development begins; the first appearance of pubic hair is referred to as *pubarche*, and it takes approximately 6-12 months for the hairs to fully grow in. At the same time, the mucosal surface of the vagina also changes in response to increasing levels of estrogen, becoming thicker and a duller pink in color; in the next two years the uterus and ovaries increase in size.

The first menstrual bleeding,

**HISTORICAL SHIFTS IN THE AGE OF MENARCHE**



\*Data collected by the World Health Organizations