

# Sexual periodicity

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Mating and reproduction in many species occurs in a cyclical fashion, often only once annually, especially at higher latitudes. The seasonality of ovulation, spermatogenesis, and ultimately offspring production for these species has evolved to coincide with resource availability and the optimal timing for offspring survival. In mammals, the timing of sexual activity and reproduction is now understood to be controlled by melatonin production. Melatonin is a neurohormone secreted by the pineal gland that is released mostly at night. The eye acts a photoreceptor, processing increases in day length, decreasing melatonin production, and spurring responses in the endocrine system. For females, this produces changes in levels of estrogens, progesterone, follicle stimulating hormone (FSH), and luteinizing hormone (LH) and leads to ovulation and sexual activity. For males, increasing levels of FSH, LH, and testosterone lead to increases in testicular volume and function (spermatogenesis), causing sexual behavior that coincides with male-male competition for breeding territories and mates.

Humans and their close relative, the bonobo (or pygmy chimpanzee, *Pan paniscus*), are remarkable for engaging in sexual activity throughout the year and throughout the females' menstrual cycle. However, since human births tend to peak regularly in many societies and mostly at higher latitudes, some scholars argue that we are seasonally photoperiodic. Birth peaks are sometimes annually unimodal or bimodal and often correlate with seasonal changes in workload, food availability, temperature, or economic and cultural influences (Bronson 2004). The occurrence of seasonal reproduction in related nonhuman primates and other mammals suggests that seasonal effects on sexual behavior in humans are ancestral. Indeed, the photoreceptor molecules that process changes in day length and affect melatonin production are conserved in

humans and appear to be an important cause of seasonal affective disorder (SAD).

In general, human conceptions tend to cluster in the spring and in the fall. These are also times when peaks occur in other activities related to sex, such as sales of contraception, transmission of sexually transmitted infections, and rape. This appears to be caused by significant seasonal variation in the reproductive hormones of both men and women in the late spring and early summer. The spring peak in sexual activity and conceptions, especially at higher latitudes, is argued to be caused by decreases in our melatonin production brought on by increased day length, whereas at lower latitudes seasonal changes are thought to be due to the effect of temperature, since hot summer weather degrades sperm quality, preventing conception. However, there is still much debate on what causes cycles in human sexual activity and on the role of photoperiodicity and melatonin production (Wehr 2001).

The birth peaks that are seen in human populations have decreased since the industrial revolution, leading some to argue that our cycles of melatonin production and responses to seasonal changes in day length have been disrupted by exposure to artificial light. Another possible explanatory factor is that high levels of food availability year round may render us insensitive to the effects of melatonin, since seasonal breeding is most important to offspring survival when food is seasonally scarce. Our control of indoor temperatures may also have blunted any effect that this factor had on reproduction. In addition, there appears to be substantial variation between individuals in the correlation of melatonin secretion and daylight length, and there is some evidence that this correlation may be heritable (Wehr 2001).

Beyond the question of yearly cycles of sexuality in humans, other temporal periodicity is certainly present. For women, interest in sex and the production of sexual behavior varies monthly during their menstrual cycles. Sexual desire peaks in the middle of the menstrual cycle, in the days preceding ovulation (Stainslaw and Rice 1988), corresponding with the time when sexual

intercourse is likely to lead to pregnancy. At this time LH, FSH, and estrogen all decrease and progesterone begins to increase.

Cycles in sex hormones also occur in men, though these are not as pronounced as female cycles and have a daily rather than a monthly rhythm. For men, there appears to be a circadian rhythm to the daily production of testosterone and LH. Male testosterone secretion peaks in the early morning and tends to decrease over the day, reaching its lowest levels in the evening (van Cauter 1990), though again there is individual variation in how much. Sexual activity in men has not, thus far, been linked with this diurnal variation in sex hormones.

**SEE ALSO:** Birth (Primates); Bonobos; Fertility and Fecundity; Hormones (Primate Sexuality); Hormones and Human Sexuality; Human Sexual Response: Biological Perspectives; Loss of Estrus; Ovulation, Concealed

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## FURTHER READING

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