Biosocial Perspectives on Menstruation

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Menstruation refers to the discharge of blood and fluids from the uterus of reproductive-age females at approximately monthly intervals, the Latin word *mensis* meaning "month." Menstruation is usually detectable in Old World monkeys and apes as external visible bleeding, but human females have the most copious and salient menstrual flows (R. D. Martin 2007). Its evolutionary function is uncertain.

Because women combine highly visible menses with no subsequent overt sign of ovulation, menstruation became a sign of imminent fertility during human evolution (Power and Aiello 1997). This biological feature could underlie the widespread cross-cultural beliefs, practices, and taboos associated with menstruation on every continent. From a Darwinian perspective, men are expected to try to track female cycle states, for which menstruation or cultural behaviors connected to it may provide the best cues (Strassmann 1992). Rather as Lévi-Strauss pinpointed the incest taboo as the pivot between nature and culture, menstruation is a very material phenomenon present as an aspect of behavior and an aspect of belief. It links a Darwinian level of analysis with the symbolic cultural world.

Apart from anthropoid primates, the only other mammals reliably reported to show menstruation are certain bats and the elephant shrew. The menstrual cycle is a pattern of changes in the uterus when the female not pregnant that involves the regular sloughing off of the nutrient-rich womb lining—the endometrium. It occurs in species with a highly invasive placentation (R. D. Martin 2007). Several hypotheses have been proposed to explain the evolution of menstruation. One, the elimination of sperm-borne pathogens, has largely been discounted; the second, that cyclical shedding and regrowth of the endometrium is energetically less expensive than maintaining the endometrium in a well-developed state across the entire cycle (Strassmann 1996), has not been confirmed (R. D. Martin 2007). A third suggests that menstruation is a physiological side effect, a nonadaptive consequence of the evolution of an invasive association between the embryo and an adaptive inflammatory reaction of the endometrium. Another recent hypothesis looks at the evolution of menstruation in a framework of maternal–fetal conflict (Emera, Romero, and Wagner 2012). Menstruation occurs as a consequence of spontaneous decidualization (SD) of the endometrium. SD is understood as an adaptation protective of the mother where the fetus is highly invasive and takes control of the level of nutrient supply. In particular, SD may have evolved to enable the mother to sense embryo quality on implantation. This could be linked in anthropoid primates and other menstruating species to extended sexual receptivity, where fertilization by aging gametes could lead to greater risks of chromosomal abnormality.

The menstrual phase of a nonconceptive uterine cycle starts at the end of the luteal phase. With a decline of steroids, membranes in the endometrium break down, releasing enzymes that degrade cells. Whereas the endometrium is resorbed in other mammals, in anthropoid primates the innermost two-thirds of the endometrial lining and blood from the ruptured arterioles are expelled through the cervix and vagina as menstrual discharge.

In the course of evolution of genus *Homo*, women and their foremothers have lost overt cues of estrus or ovulation. There are some indications that men can discriminate between women in the follicular (coming up to ovulation) phase compared to the luteal (postovulation) phase, but it requires considerable attentiveness from the male. Overall, women appear to scramble information to males about their exact moments of fertility. This is in line with Darwinian expectations of sexual selection. If women require support or investment by mates beyond the time when they are fertile, they should not give away precise moments of fertility. To do so would allow dominant males to monopolize fertile matings; in evolutionary contexts this would reduce the amount of investment any female could expect to receive. By contrast, hiding ovulation rewards more attentive males with prospects of mating and reproductive success.

In natural fertility (noncontracepting) populations, women spend a large proportion of their reproductive years in stages of pregnancy or breastfeeding, with lengthy periods of lactational amenorrhea. Dogon women in Mali aged twenty to thirty-four spent an average of 15 percent of the time in menstrual cycling in a two-year period, compared to 29 percent being pregnant and 59 percent in postpartum amenorrhea (Strassmann 1992, 94). Among Kalasha women of the Hindu Kush, the average number of months when a woman would be menstruating in the time span from her first pregnancy to the end of lactational amenorrhea after her last one was 20.7, or 11 percent of the total time span (178.7 months) when cycling as against pregnant (40 percent) or amenorrheic (49 percent) (Maggi 2001, 135).

In such populations, menstruation clearly marks which females are currently cycling, as against those who are pregnant and lactating and are therefore not currently or imminently fertile. Even if ovulation is not perfectly predictable in relation to menstruation, this information would allow males to mate-guard recently menstrual females until they are pregnant. In other words, menstruation allows males to track female fertility and favors male monopoly. Individual females could use menstrual signals strategically to advertise their imminent fertility, attracting and concentrating paternity on particular males. In line with sexual conflict theory, we can predict that females would use these signals differently in different socioeconomic and cultural contexts, depending on the degree of sexual choice they have and whether or not males are able to control females.

Menstruation matters in human mating systems because it gives away vital information about fertility. It can be used by females (together with kin) to extract resources from potential mates; it alerts males to guard imminently fertile mates; but it also gives males who can establish priority the chance to monopolize fertile females. In this view, menstruation always is potentially a trigger for social and sexual conflict. This highlights why cultural practices surrounding menstruation are elaborated in cosmological systems with near ubiquity.

Dogon cosmology is noted for a severe negative view of menstruation, with women consigned to menstrual huts at this time. Yet, actually, a husband would spend his time talking with his wife in the evenings from outside the menstrual hut; failure to do so would show that he did not love her. In Dogon belief, a woman is most likely

to conceive in the first sex act following menses, hence the husband's attentiveness. Approaching from a Darwinian rather than cultural perspective, Strassmann (1992) proposed that Dogon menstrual taboos function as an anticuckoldry device, enabling husbands to keep track of a wife's reproductive condition. She verified that women who visited huts were reliable in indicating their menstrual state. Strassmann and colleagues (2012) have used genetic data to show that the practice of Dogon traditional religion and menstrual observances reduces cuckoldry compared to levels among Christian and Islamic Dogon converts. Muslim husbands were also notified by wives of menstruation and suffered lower cuckoldry than Christians whose wives were not obliged to notify husbands. What is uncertain is why it should be in the traditional Dogon husband's interest to have his wife signal her imminent fertility so visibly, given that the huts are central and public. Strassmann argues that, because men are polygynous, they may not be able to monitor menstruation in each of their wives. But what the menstrual hut visits do enable is monitoring by other men of the patrilineage. Key resources in the Dogon economy are millet fields held by patrilineages, so men of the village patrilineage have a serious concern in the legitimacy of fathers on inheritance and therefore surveillance of patrilineage wives' cycles. Sanctions of expulsion from the patrilineage and land loss strongly deter within-patrilineage cuckoldry.

A historic example of extreme control over women's fertility through tracking of menstrual state comes from imperial China. The harems of Tang dynasty emperors could number in the hundreds. These were organized by a "secretariat of elderly ladies"—the *nü-shih*—who kept careful records of the date of menstruation, the day and hour of successful sexual unions, and first signs of pregnancy. Concubines and court ladies used a cosmetic device of dots on the cheek to indicate to the emperor that they were menstruating, which later became a standard cosmetic feature.

These cases involve societies with significant resource defense polygyny, where men who can hold resources marry many wives at the expense of men who cannot. Signaling, practice, and beliefs around menstruation in these contexts had considerable effects on male fitness. In nomadic forager economies that more closely resemble evolutionary conditions, signaling associated with menstruation is predicted to arise as a female strategy advertising imminent fertility; in these conditions, men are far less likely to be able to control or coerce women's signaling.

Arnhem Land Aboriginals maintained a menstrual cosmology just as elaborate as the Dogon's, with strict prohibitions and taboos applying to women at menses. Oral narratives recurrently celebrated the failure of the elders to monitor women's movements at menstruation, singing of lovers' illicit assignations during their periods of supposedly strict seclusion. A Kalahari Ju/'hoan mother who had started to menstruate again smeared her inner thighs with fat and painted soot around her eyes, or cut a tonsure into the hair of her youngest child to paint it. A Ju/'hoan girl dressed her finest kaross with red ochre as a sign to men that she was menstruating. In these cultural contexts, individual women and girls were choosing to signal their imminent fertility; even

where there were strict taboos on contact between menstrual blood, hunters, and their weapons, men were clearly gathering information about female reproductive status.

Among Hadza hunter-gatherers, most men consider the time straight after menstruation as the best to get females pregnant, a belief that almost surely arises from the need to track menstruation in mates and guard them at the time. A similar belief is found among forest hunter-gatherers such as the BaYaka and the Mbuti.

In the above examples, from human mating systems ranging between more or less monogamous to extremely polygynous, menstruation demonstrably influences male behavior. The extensive ethnographic literature documenting ritual, taboos, and observances around menses substantiates the view that women readily advertise their condition and men are very interested in that information.

Taboos and rules of conduct most commonly associated with menstruation include prohibition of sex; husband and wife sleeping apart; wife not cooking for husband; exclusion of women from sacred precincts and ritual activities; prohibition of certain types of work; taboo on contact with husband's weapons and hunting gear; seclusion in a hut; restrictions on eating or washing; and special forms of dress and cosmetic adornment (Strassmann 1992). Few hypotheses that have been advanced to explain menstrual taboos provide a satisfactory account for this range of practices. While menstrual taboos and pollution beliefs have frequently been taken as indicative of oppression or discrimination against women, the effect of restrictions on others such as husbands is less often noticed (Buckley and Gottlieb 1988, 9). Withdrawal of sexual and domestic services may instead be on women's terms and experienced as special time. In her account of Kalasha women's attitudes to their *bashali* menstrual house, Maggi (2001,117–66) reveals its importance for women's community, cultural knowledge, and agency. Women at menstruation or at childbirth share experience, food, chat, ritual, and conspiracy. Their observance is responsible for maintaining the principles of cosmological order underpinning Kalasha life. Yet a woman who does not have her patrilineal kin's support for a marriage can use the *bashali* to elope with a lover.

Menstrual taboos do not associate with patrilineal and patrilocal groups in particular. Using cross-cultural statistical tests, Strassmann (1992) found that highly conspicuous taboos—seclusion in menstrual huts and adornment, such as painting with red cosmetics—associate with matrilineal and bilateral forms of kinship, while societies with matrilocal or uxorilocal residence were significantly more likely to have menstrual huts or adornment. This undermines an association with systems where men have dominance and kinship alliance.

In Western industrialized societies of Christian heritage, taboos surrounding menses are not formalized and consist in silence and absence from discourse. A woman is never supposed to discuss it in public or to reveal her condition. Given reproductive life histories with late age of first reproduction and far less time spent breastfeeding, women in industrialized countries tend to experience many more menstrual cycles than those in natural fertility contexts, yet they can hardly refer to them. Emily Martin (1988) discusses "premenstrual syndrome" (PMS) as a construct embodying the stress, pain,

and anger women experience under the discipline of industrial working hours, which pays scant regard to their regular changes of bodily, emotional, and psychological states. Menstruation becomes medicalized in an effort to flatten out women's "mood changes" in line with working week requirements. While Asian industrial powers including Japan, Taiwan, and Indonesia have legislated women's rights to menstrual leave, this sits uncomfortably with Western feminist agendas which tend to minimize bodily difference between women and men.

Perhaps the most pervasive metaphoric connection to menstruation in myth and language is the moon (Knight 1991, 327–73). This could be a chance association of a cycle length roughly similar to the lunar synodic cycle of 29.5 days, the time it takes the moon to pass through all its phases as seen from earth. But there are phylogenetic grounds for lunar periodic function as conservative in primate reproductive cycles generally. Women's menstrual cycle lengths vary with age, the mean hovering above twenty-nine days for young women close to peak fertility, while women in their thirties tend to twenty-eight days. Mean gestation length is also close to nine times the lunar cycle length.

One argument as to why there would be selection for an environmental cue to menstruation (or ovulation) is that ovulatory synchrony—most directly observable as menstrual synchrony—would have been an adaptive female strategy for preventing monopoly by harem males (Knight 1991; Power and Aiello 1997). There has been significant controversy as to whether menstrual synchrony exists as a phenomenon or is a statistical artifact. In the only natural fertility population where it has been investigated, the Dogon, no evidence was found. But, given the competitive relationships between Dogon co-wives, this is not surprising. Whatever the behavioral reality, the ideological assertion that woman synchronize with each other or with the moon is common among African hunter-gatherers including the Hadza, BaYaka, or Bushman groups. This is despite the fact that in small-scale nomadic forager camps few women would actually be likely to be menstruating at the same time.

Rather than starting with an examination of menstrual taboos among world religions (Guterman, Mehta, and Gibbs 2007) or farming populations, it is most informative to start from an evolutionary perspective by looking at the role of menstruation in the cosmologies of hunter-gatherers. Among the highly gender-egalitarian BaYaka of the Congo forests, the polysemic concept of *ekila* governs the moral and economic relations between men, women, and the animals of the forest (Lewis 2008). Its meanings revolve around moon, blood, sex, fertility, health, meat, taboo, hunting luck, and sharing properly. If a woman is *ekila* (menstruating) she affects the economic activities of men who sleep in her hut, her brothers or husband. Because they would take her "smell" and the animals would flee from the scent, they cannot go hunting or walk in the forest but must stay near camp. A man's *ekila* is ruined by too much sex. Even a great hunter who sleeps around would ruin his hunting (the animals will smell and get angry). BaYaka informants assert: "women's blood is one thing, men killing animals is another." To maintain strong *ekila*, a husband and wife must cooperate in observing

all the proscriptions affecting how they share his meat, what species they eat and with whom (and when) they have sex (Lewis 2008, 300–301). It appears that there is a delicate dependency between activities in the male productive and the female reproductive sphere. Rather than a form of pollution, *ekila* is described as a "medicine" sent by God to women when they "put in the moon." For the BaYaka, "women's biggest husband is the Moon" (Lewis 2008, 299).

Among African hunter-gatherer groups, the mystical intertwining of production (hunting) with reproduction (menstruation, pregnancy, and childbirth) amounts to an "ideology of blood" where two forms—menstrual blood on the one hand and the blood of game on the other—must never be allowed to mix (Knight 1991, 396–98). Frequently, the idiom is one of smell arousing anger, and reversal. A man hunting when his wife menstruated would cause the animal to attack and the hunter to be hunted. Menstruation destroys arrow poison, yet girls who menstruate for the first time are described as hunters: "she has shot an eland" (Ju/'hoan) or "she has shot a zebra" (Hadza). Menstrual taboos have been explained simply in terms of a functional requirement to avoid any odors actually interfering with the hunt, but here that practical injunction is elaborated metaphorically into moral discourse on the interchange of the roles and powers of each gender.

Knight (1991) proposed an original cultural configuration of sex strike signaled collectively by women and their kin at menstruation, offering a comprehensive account of the source and antiquity of menstrual taboos. His ideal model invokes a menstrual–lunar cosmology with dark–waxing moon as the time for strike action to send men to join the collective hunt. Prohibition on marital sex is associated with menstrual taboo potency, raw food–hunger, and kin or blood relations. By the full or waning moon, hunters should have returned with game. The menstrual spell is lifted as cooking fires remove blood from the meat; women return to husbands; flesh—female and animal—can be consumed by all.

Following Durkheim and Frazer in rooting menstrual taboos in an original experience of the sacred or setting apart, Knight also explains how women thereby became excluded from the sacred. With a collapse of big-game hunting economies, which forced women to become more dispersed in foraging activities, men usurped the symbolic potency of female reproduction. To do this, men had to simulate ritual menstrual synchrony. The innermost secret of male initiation became this knowledge of ritual menstrual solidarity, while real menstrual women were excluded. Analyzing one of the fundamental cosmologies of Aboriginal Arnhem Land, Knight (1991, 449–79) demonstrates how the Rainbow Snake, central to male initiation ceremonies, reveals all the features of the menstrual sex strike: antagonism to cooking; incest or kin relations; smelling out women's blood; engulfing them in floods; and lunar periodicity. The main circumcision ceremony of boys involves enactment of the myth of the Wawilak sisters, with elders cutting themselves to bleed collectively as the ancestral sisters did. Yolngu initiates observed: "But really we have been stealing what belongs to them (the women), for it is mostly all women's business ... all the Dreaming business came out

of women ... In the beginning we had nothing, because men had been doing nothing; we took these things from women" (Knight 1991, 479).

SEE ALSO: Adolescence; Initiation; Blood; Ochre and Human Evolution; Sexual Conflict Theory; Cults, Male and Female; Pollution; Rites of Passage; Hunter-Gatherer Cosmologies

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