

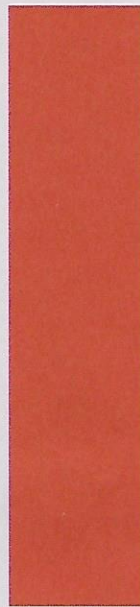


THE POINT OF A PERIOD

Age-old taboos against menstruation have led to a lack of research on how women's cycles work, with serious consequences for their health

By Virginia Sole-Smith

Photographs by Jamie Chung



IN 2007 SUSAN BROWN ENCOUNTERED THE REPELLING POWER OF PERIOD BLOOD. While studying what menstrual fluid might reveal about a woman's health, she wanted data from a cross section of subjects beyond the student volunteers at the University of Hawaii at Hilo, where she worked as an evolutionary psychologist. Brown's team members set up a booth near the entrance of a Walmart in downtown Hilo and hung a sign that said, "Menstrual Cycle Research." Then they waited. All afternoon women and men would spot the sign, then gingerly skirt past without making eye contact.

About six months later Brown and her Hilo colleague Lynn Morrison presented their findings at the annual meeting of the American Association of Physical Anthropologists. A wave of "nervous twittering" broke out when Morrison described carrying menstrual blood samples down the hallway of their laboratory to analyze hormone levels and other biomarkers. "The audience was fine discussing a woman's cycle in the abstract," Brown explains, "but not menstrual blood itself."

That aversion has influenced women's relationships to their own bodies as well as how the medical establishment manages women when things go wrong with their reproductive health. "Our menstrual taboo is at the core of how this science is getting done," Brown says of research on menstruation.

Or not getting done, as the case may be. It is hard to measure how much money is spent on period research, but experts agree the subject is underfunded. "It's a chicken-and-egg situation, where there's not much funding for research, so there's also not much quantifying of that lack of research," says Elizabeth Yuko, a bioethicist at Fordham University.

Yet period disorders are incredibly common. When Saudi Arabian researchers surveyed 738 female college students in a 2018 study, they found that 91 percent reported at least one menstrual problem: some got their periods irregularly or not at all; others reported excessive levels of bleeding and pain. Different studies show that as many as one in five women experiences menstrual cramps severe enough to limit her daily life. About one in 16 worldwide suffers from endometriosis, a disease where menstrual blood and tissue migrate outside a woman's uterus and form

painful lesions in her pelvic cavity. And one in 10 women has polycystic ovarian syndrome, a hormonal imbalance that disrupts a woman's cycle and is a leading cause of infertility. "You can argue we need to put our resources toward researching the life-and-death stuff," Yuko says. "But that argument falls apart because we've had no problem funding erectile dysfunction research."

Menstruation, of course, is essential to human reproduction and therefore survival. It is also one of the biological processes that makes us special because humans, chimpanzees, bats and elephant shrews are among the only animals on earth that go through it. The vast majority of mammals signal fertility through estrus, the period when females are ovulating and display their sexual receptivity via genital swelling, behavioral changes or pronounced alterations in body odor. The female human body, however, conceals this critical window. Instead our most visible sign of potential fertility is menstrual blood, which, ironically, appears after the fertile period has closed. The endometrial lining of the uterus thickens over the course of a woman's cycle as her estrogen level rises. If none of the eggs she releases at ovulation joins with a sperm and implants in that lining as a fertilized zygote, then levels of estrogen and another hormone called progesterone drop, triggering the uterus to shed the thickened endometrium so it can start fresh in the next cycle.

But beyond this basic picture, scientists are still struggling to understand fairly fundamental questions: Why do we share this process with at least six species of bats, for example, but not monkeys? And just what is menstrual blood, exactly? "It's quite different from regular blood," Brown notes. "We know it



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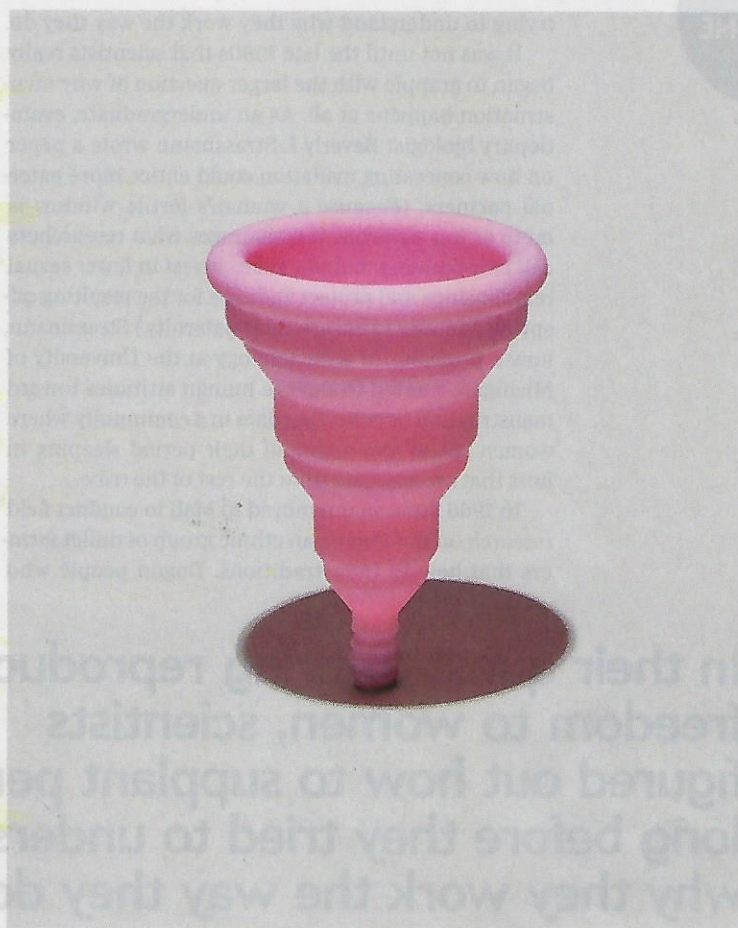
can't clot and is full of immune agents, but we don't know much about what they do." It is also unclear why we shed this biological tissue so dramatically when most mammals that experience estrus appear to reabsorb their endometrial linings at the end of each cycle. Even less is known about why so many women—up to 80 percent by some estimates—experience cramps, bloating, fatigue, anger or other symptoms just before the onset of menstruation. "We know so little about menstruation," says Tomi-Ann Roberts, president of the Society for Menstrual Cycle Research and a professor of psychology at Colorado College, and what scientists do know is often badly communicated with the public. "Because of this, our attitudes toward menstruation are overwhelmingly negative. This has real consequences for how we can begin to understand healthy menstruation, as well as menstruation-related disorders and the treatment options available."

MASKING MENSTRUATION

THE TABOO has taken many forms. In 1920 a Hungarian-born pediatrician working in Vienna named Béla Schick published a collection of anecdotal observations: When he asked a menstruating woman to handle flowers, they wilted within minutes. When he compared the bread dough made by several women, the loaf made by the one having her period rose 22 percent less. Schick concluded that menstrual blood contained a kind of poison. By the early 1950s Harvard University scientists were referring to "menotoxins" and injecting menstrual blood into animals to observe the effects. Some of those animals died, most likely because the blood samples carried bacteria and other contaminants. Not much came of these experiments in terms of useful data, but the notion that menstrual blood contains mysterious and even dangerous properties has persisted in the scientific literature and our cultural imagination.

By the late 1950s research around menstruation had shifted to center almost entirely on preventing unplanned pregnancies at a time when maternal and infant mortality was troublingly high, especially in poor communities. In 1923 Margaret Sanger, the activist, nurse and founder of the organizations that would later become Planned Parenthood, wrote that "Birth Control means liberation for women and for men." In 1951 she met a physiologist named Gregory Pincus, who had performed what was considered at the time to be the first in vitro fertilization of rabbits. With Sanger securing funding, Pincus set up a lab to test formulations of synthetic versions of hormones that regulate the menstrual cycle and teamed up with John Rock, a Boston obstetrician-gynecologist, to run clinical trials of the drug.

After a study of almost 60 women in and around Boston, Pincus and Rock turned to Puerto Rico to run the first large-scale trial of the drug that the U.S. Food and Drug Administration would approve in 1960 as the first oral contraceptive. They recruited 265 Puerto Rican



women, many of them poor, to the study without the level of "informed consent" required today. Twenty-two percent of the participants dropped out after reporting side effects such as nausea, dizziness, headaches and vomiting. The study's medical director argued that the pill "caused too many side reactions to be generally acceptable." Nevertheless, it went to market.

The pill was, of course, celebrated as a huge breakthrough. "It was the first form of birth control separate from sex that women could completely control," notes Elizabeth Kissling, a professor of women and gender studies at Eastern Washington University. It is impossible to overstate the freedom the pill represented for women, whose reproductive lives were otherwise largely under male control. But liberation came with a price. By the late 1960s patients across the U.S. were reporting the same symptoms documented during the Puerto Rican trial. Despite many reformulations over the ensuing decades, side effects remain a problem for many women on the pill; risks for breast cancer, blood clots and stroke may also be higher. In their quest to bring reproductive freedom to women, Sanger, Pincus and Rock appear to have ignored the implications of shutting down a woman's natural cycle, Kissling explains. In other words, scientists figured out how to supplant periods long before they began

MENSTRUAL CUPS can be a reusable, environmentally friendly alternative to tampons and pads.

trying to understand why they work the way they do.

It was not until the late 1980s that scientists really began to grapple with the larger question of why menstruation happens at all. As an undergraduate, evolutionary biologist Beverly I. Strassmann wrote a paper on how concealing ovulation could entice more paternal partners. (Because a woman's fertile window is more or less invisible, it encourages what researchers call pair-bonding: human males invest in fewer sexual relationships and protect and care for the resulting offspring as a way to ensure their paternity.) Strassmann, now a professor of anthropology at the University of Michigan, wanted to explore human attitudes toward menstruation by collecting data in a community where women spend five nights of their period sleeping in huts that are separate from the rest of the tribe.

In 1986 Strassmann moved to Mali to conduct field research on the Dogon, an ethnic group of millet farmers that hew to their traditions. Dogon people who

Other religious practices around menstruation, such as the Orthodox Jewish purification ritual of sending menstruating women to mikvah baths, can also be traced to men's need to track female fertility and schedule sexual activity accordingly. And although the advent of the pill means that many women can now control their reproductive life in ways that render the purpose of such practices moot, the taboos still persist, Roberts says. "We still think of menstruation as something that women have to keep hidden and separate."

PERIOD EVOLUTION

ALTHOUGH STRASSMANN'S WORK was primarily about understanding the biological underpinnings of menstrual taboos, her data also revealed important characteristics about the process of menstruation itself. Perhaps her most oft-cited finding was published in 1997 in *Current Anthropology*: across human history, menstruation has been a rather infrequent event. That is because women tend to get pregnant earlier, have more babies and spend more time breastfeeding in communities where birth control is unavailable or difficult to access than they do in communities with high rates of birth-control usage. "We think of periods as happening 12 times a year, but if you're pregnant and then nursing for extended time frames, that's a stretch of two or three years for each child when you're not menstruating," Strassmann explains. Her data showed that in the 1980s the average Dogon woman menstruated only around 100 times in her life, compared with the average American woman's experience of as many as 400 periods in her lifetime. And Dogon women's experience is closer to what all women would have experienced throughout history before the development of the pill.

This historical infrequency of menstruation helps to explain why humans evolved to do something as potentially disadvantageous as releasing blood—losing iron, protein and other nutrients and probably attracting predators in the process. It could also help explain why periods and the week before their onset can be so unpleasant for many women. Michael Gillings, a professor of molecular evolution at Macquarie University in Australia, became interested in women's experiences of premenstrual symptoms (PMS) when premenstrual dysphoric disorder (PMDD) was added to the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* in 2013.

PMDD is defined as severe irritability, depression or anxiety in the week or two prior to menstruation, with symptoms easing two or three days after menstruation begins. But Gillings, along with many feminist scholars, balked at the characterization of mood swings as disordered. "Up to 80 percent of women re-

In their quest to bring reproductive freedom to women, scientists figured out how to supplant periods long before they tried to understand why they work the way they do.

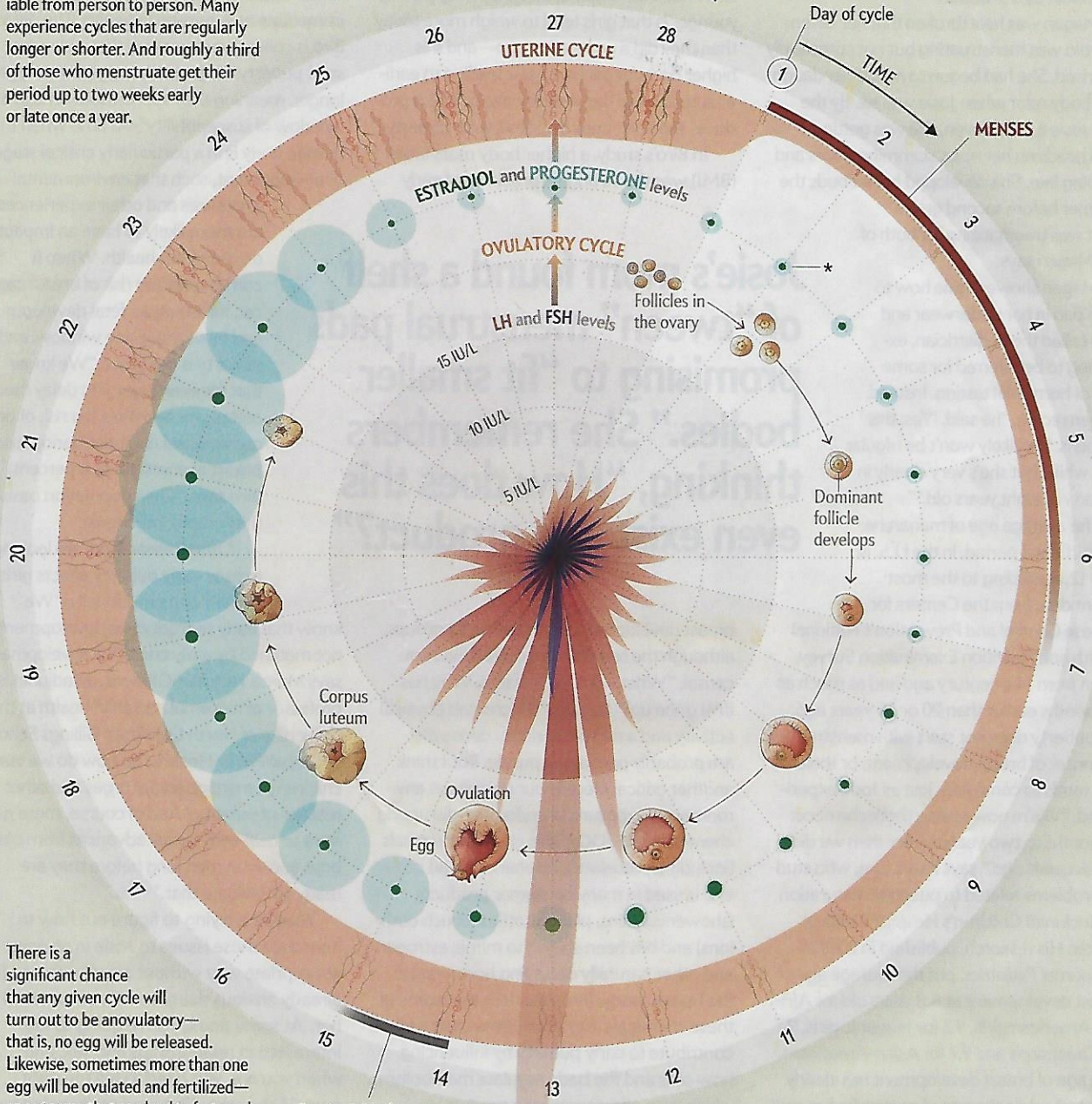
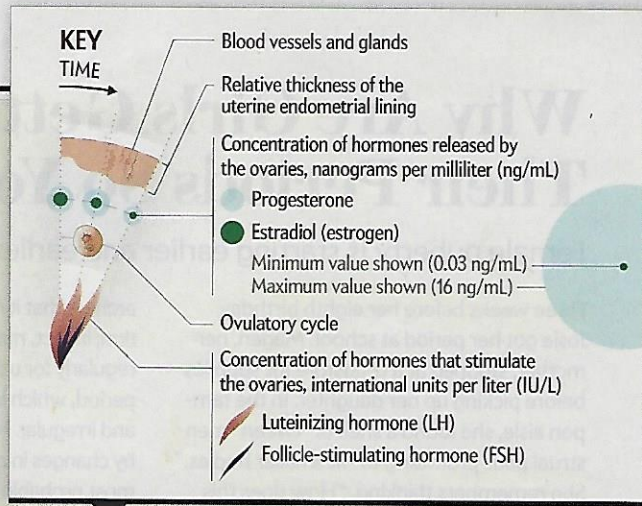
continue to practice their indigenous religion believe that a menstruating woman's presence would desecrate the religious objects in the family compounds. Researchers had not previously considered that these religious beliefs were rooted in any kind of reproductive agenda. But, as Strassmann explains, she hypothesized that this was "a cultural pattern embedded in religion that did directly serve reproduction." Although research on modern indigenous communities can offer only clues about how humans lived thousands of years ago, Strassmann hoped to show that long-standing cultural taboos around menstruation had developed to support our larger evolutionary goals.

During her initial fieldwork, Strassmann studied the community's use of menstrual huts for almost three years, collecting urine samples from 93 women to test hormone levels and prove that their use of the huts correlated with actual menstruation patterns. She also observed how quickly most of the women got pregnant again after their visits to the huts. Although the practice was ostensibly about keeping menstruation sequestered, the huts themselves were located in full view of a shade shelter used by men in the community. So the huts made a woman's fertility status clear to her husband and his family whether she liked it or not. (As noted earlier, women enter their "fertile window" after their period.)

The Menstrual Cycle

Humans are among the very few species to experience a period. The menstrual cycle starts in the brain, which sends signals to the pituitary gland (*not shown*) to produce hormones that stimulate the ovaries. The ovaries house egg-containing follicles that release an egg during ovulation. The ovaries also secrete hormones to help prepare the uterus to host an embryo, which results if the egg is fertilized by a sperm. If no embryo implants, the uterus disposes of its lining, and the cycle begins again.

The average menstrual cycle is 28 days long, but the length is surprisingly variable from person to person. Many experience cycles that are regularly longer or shorter. And roughly a third of those who menstruate get their period up to two weeks early or late once a year.



There is a significant chance that any given cycle will turn out to be anovulatory—that is, no egg will be released. Likewise, sometimes more than one egg will be ovulated and fertilized—an outcome that can lead to fraternal twins or higher-order multiples.

*Low levels of hormones may persist, even when the ovaries are not actively producing them.

SOURCE: "CIRCULATING IMMUNOREACTIVE INHIBIN LEVELS DURING THE NORMAL HUMAN MENSTRUAL CYCLE," BY R. I. M. GLACHAN ET AL., IN JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM, VOL. 65, NO. 5, NOVEMBER 1, 1987. (Hormone level data); JERILYNN C. PRIOR, University of British Columbia, Center for Menstrual Cycle and Ovulation Research (consultant)

Why Are Girls Getting Their Periods So Young?

Female puberty is starting earlier and earlier, with worrying consequences for women's health

Three weeks before her eighth birthday, Josie got her period at school. Magen, her mother, stopped at a drugstore for supplies before picking up her daughter. In the tampon aisle, she found a shelf of "tween" menstrual pads promising to "fit smaller bodies." She remembers thinking, "How does this even exist as a product?"

Magen was heartbroken that her seven-year-old was menstruating but not completely surprised. She had begun to notice her daughter's body odor when Josie was six. By the time Josie turned seven, she was getting blackheads on her nose, slamming doors and sleeping late. She developed breast buds the summer before second grade.

"That was traumatizing for both of us," Magen says.

Magen showed Josie how to put a pad in her underwear and then called the pediatrician, expecting to be referred for some kind of hormonal testing. Instead, Magen recalls, "he said, 'Yes, this happens. She likely won't be regular for a while, but she's very clearly in puberty at eight years old.'"

The average age of menarche, or a girl's first period, in the U.S. is now 12, according to the most recent data from the Centers for Disease Control and Prevention's National Health and Nutrition Examination Survey, down from 14 a century ago and as much as six months earlier than 20 or 30 years ago. But puberty does not start with menstruation. The onset of breast development, or thelarche, tends to come first, just as Josie experienced. "We're now seeing thelarche occur 18 months to two years earlier than we did a few decades ago," says Frank Biro, who studies problems related to pubertal maturation at Cincinnati Children's Hospital Medical Center. His research, published in 2013 in the journal *Pediatrics*, put the average age of breast development at 8.8 years old for African-American girls, 9.3 for Hispanic girls, 9.7 for Caucasians and 9.7 for Asian-Americans. "The age of breast development has clearly dropped, while the age of menarche has drifted down. They are both concerning," he says.

One popular misconception about men-

arche is that it represents the onset of ovulation; in fact, most girls do not begin ovulating regularly for up to two years after their first period, which is why early ones can be light and irregular. Menarche is instead triggered by changes in a girl's estrogen levels. The most probable explanation for why periods and breast development might be happening younger is that girls tend to weigh more today than they did a generation ago—and this higher body fat percentage is leading to earlier activation of the pituitary gland, which produces the hormones responsible for puberty.

In Biro's study, a higher body mass index (BMI) was the strongest predictor of early

Josie's mom found a shelf of "tween" menstrual pads promising to "fit smaller bodies." She remembers thinking, "How does this even exist as a product?"

breast development across all racial groups, although the relation was correlative, not causal. "What we need to ask is, Why has BMI gone up?" he says. "Decreased physical activity and a more calorically dense diet are probably part of the puzzle. But I think another critical piece is our ubiquitous environmental exposure to endocrine-disrupting chemicals," or EDCs. This class of chemicals (including phthalates, bisphenol A and others) is used in many consumer products (shower curtains, plastic bottles, couch cushions) and has been shown to mimic estrogen and other naturally occurring hormones in the human body. Biro theorizes that some of these chemicals may promote weight gain or contribute to early puberty by influencing how cells and the body regulate metabolism, which then affects estrogen production. He is currently leading a study tracking the growth and development of 379 girls from

age six onward that has been examining relations between their pubertal development and environmental exposures. Trauma could be another explanation: "Stress can also change your estrogen levels," Biro says.

To Magen, the more pressing question is not why Josie started puberty so early but rather what this means for her daughter's immediate and long-term health. The data Biro is collecting now show that girls who start puberty early tend to stay in the stage longer, meaning they spend more time in a "window of susceptibility"—a time when the human body is in a particularly critical stage of development, such that environmental

exposures and other experiences are more likely to have an impact on their later health. When it comes to future risk of breast cancer, for example, fetal development and infancy are one window, and puberty is the other. "We know that for every year you delay menarche, you decrease the risk of premenopausal and postmenopausal breast cancer by 4 to 8 percent," Biro says. "On a population basis, that's really important."

Other researchers are looking at how early puberty affects girls socially and emotionally. "We know that early reproductive development is not matched by early cognitive development," says Marcia Herman-Giddens, an adjunct professor of maternal and child health at the University of North Carolina's Gillings School of Global Public Health. "So how do we teach children to manage sexual urges and other realities of puberty? And of course, these girls have to deal with sexual advances from older boys and even men long before they are ready to navigate that."

Magen is trying to figure out how to introduce these issues to Josie in an age-appropriate way without overburdening her already anxious daughter. "I've had to tell her, 'At some point, you're going to feel interested in relationships and sex, and when you are, you need to tell me right away,'" she says. "But am I really going to have to put a 12-year-old on birth control to make sure she's safe?"

—V.S.-S.

port these symptoms; that makes PMS normal, not a psychological disorder," he says. "So we have to ask, Was there, at some point in history, an advantage to having these symptoms?" In 2014 he published a paper in the journal *Evolutionary Applications* arguing that PMS offered a selective advantage because it caused tension between pair-bonds and therefore might help women dissolve relationships with infertile men. "It is difficult to prove a hypothesis like this," he acknowledges. And the media response characterized him as insensitive to the suffering of women. "I was burned in effigy on five continents," he says. Some researchers counter Gillings's claim that PMS is a product of evolution—and contend that its roots are more cultural than biological because it manifests differently around the world. Roberts sees the concept mostly as one influenced by the menstrual taboo and a way to dismiss women's emotions.

Scientists are also divided over whether the act of bleeding itself serves an evolutionary purpose. "It's never made sense to me that we have this free-flowing blood, while other animals reabsorb it," Brown argues. Many evolutionary biologists now think that the essential feature of women's cycles is not the bleeding but rather the ability of the uterus to thicken its lining in preparation for implantation and then dispose of the endometrium when it is not needed. "A healthy endometrium requires constant metabolic support, so it is less energy-intensive for the female body to tear down and rebuild it each cycle than it is to maintain it in a constant state of readiness for embryo implantation," Strassmann explains. Human circulation happens to result in a particularly bloody endometrium. "Our physiology doesn't permit reabsorption, so much of the blood gets discharged as menstruation," she says. Bleeding may therefore be an insignificant by-product of evolution rather than an advantage.

A WORLD WITHOUT PERIODS?

IF THE ACT OF SHEDDING menstrual blood poses no clear health benefit or evolutionary advantage and if, historically, women have not even done it all that often, then why, in this postpill era, do women continue to do it all? The answer: some do not. In January the Royal College of Obstetricians and Gynecologists in London released new guidelines that approved skipping the placebo pills in birth control to reduce the frequency of periods or avoid them altogether.

Although this formal acknowledgment is new, the practice is not. Medical menstrual suppression has long been embraced by clinicians, the media and women frustrated by the pain, mood swings or inconvenience of their menstrual cycle. The pharmaceutical industry also took notice: as the researcher who first measured and quantified the frequency of human menstruation, Strassmann has been asked to present her data to drug manufacturers, who have offered several versions of the pill and other forms of contraception that are formulated to let women skip their



periods more often, if not avoid them altogether.

Skipping that monthly ordeal can mean avoiding debilitating pain, prolonged heavy bleeding, migraines and other symptoms that can dramatically impair a woman's quality of life. The approximately 25 percent of reproductive-age women and girls who struggle with additional kinds of severe menstrual pain may be at increased risk for developing other chronic pain conditions. "We suspect the cyclical experience of monthly menstrual pain somehow alters how some women process all kinds of pain," explains Laura Payne, who directs pain research for a pediatric program at the David Geffen School of Medicine at the University of California, Los Angeles.

To many doctors faced with patients whose periods cause problems, "the pill is the closest thing we have to a panacea in women's health," says Jonathan Schafir, an associate professor of obstetrics and gynecology at the Ohio State University. But is it? "The pill isn't a treatment for these conditions," Kissling says. "It's a way of refusing to treat them." It can take up to a decade or longer from disease onset for a woman to be diagnosed with endometriosis, for example, in part because doctors are so quick to prescribe the drug to teenagers reporting bad cramps without investigating to see if there is an underlying cause, says endocrinologist Jerilynn Prior of the University of British Columbia. And where one version of the pill may succeed in masking a woman's symptoms, another may exacerbate them. "You can spend years jumping from one

PHONE APPS, such as Clue (shown), help women to keep track of their monthly cycles.