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The Premenstrual Phase of the Menstrual Cycle

Rudolf F. Vollman

NATURAL FAMILY planning requires knowledge of the critical events in woman's reproductive physiology. Long ago three clinical signs and symptoms were described that were observed to occur with a particular regularity in the course of the menstrual cycle: the cervical mucorrhea, the intermenstrual pain, and the rise of the basal body temperature.

1. When Pouchet (1847) described the different stages of the menstrual cycle he wrote: "From the 10th to the 15th day another phenomenon can be observed regularly. During these days the utero-vaginal mucus which had become thick and of a non-glary white gets to be more and more liquid and more abundant than ever. Often there is such a quantity of discharge that it moistens the genital organs and that it overflows the adjacent parts." This sign entered into the French gynecologic literature as "glaire filante," and it was later designated as "spinnbarkeit" of the cervical mucus or cervical mucorrhea.

2. Sorel (1886 and 1895) published a continuous record on the menstrual cycle and the intermenstrual pain kept by one woman over nineteen years, from maturity to menopause. Sorel characterized the intermenstrual pain with the following words: "It is an acute pain starting in the lower abdomen, on one side or on the other, soon irradiating all over the hypogastrium, with heaviness in the lumbar region and pressure in the perineum. The pain is not aggravated by pressure but it may cause nausea and it may become severe enough to make it impossible for the woman to stand erect. . . . The interval between the onset of the pain and the following menstruation is more constant than the interval between the pain and the onset of the preceding menstrual period." Levy (1880) observed that the intermenstrual pain disappears during pregnancy, and Addinsell (1898) "cured" the intermenstrual pain in four women by castration.

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3. Mary Putnam Jacobi (1876) described the biphasic course of the basal body temperature between two successive menstrual periods. She studied eleven menstrual cycles in six healthy women. "We find in the majority of cases the temperature rises just before menstruation, to fall during the flow, but at this time rarely reaches the (low) point of the intermenstrual period." Jacobi's observations were confirmed and extended by van de Velde (1905).

During the first thirty years of this century the skeleton of the hormonal interactions between the pituitary and the ovaries and between the ovarian hormones and their target organs (oviducts, uterus, and vagina) was established. These researches simultaneously made the clinical signs of cervical mucorrhea, intermenstrual pain, and biphasic basal body temperature accessible to experimental verification. Small doses of estrogens were demonstrated to hydrate and thus liquefy the cervical mucus. Larger doses of estrogens induce peristaltic smooth-muscle contractions in the oviducts, uterus, and uterine ligaments. In some women these contractions are experienced as intermenstrual pains. Progesterones were shown to have a thermogenic effect via thermo-regulatory centers in the hypothalamus. Thus, the cervical mucorrhea, the intermenstrual pain, and the biphasic basal-body-temperature curve became correlated with the hormonal events of the periovulatory phase in the menstrual cycle (fig. 1).

Although the clinical signs and symptoms are related, physiologically as well as in time, to the hormonal processes that control ovulation, they do not permit pinpointing the occurrence of ovulation by the day or by the hour. To avoid confusion I shall not use the evasive term "ovulation." Instead I shall divide the menstrual cycle into a postmenstrual and a premenstrual phase. The intercept between the two phases will be the onset of cervical mucorrhea, intermenstrual pain, or the rise of the basal body temperature. For example, the postmenstrual phase by intermenstrual pain lasts from the first day of menstruation through the day before the onset of the pain. The premenstrual phase by intermenstrual pain extends from the day of onset of the pain through the day before the beginning of the next menstrual period (fig. 1 and table 1).

I shall describe certain characteristics of the premenstrual phase based on a long individual record. The original data stem from the observations of a healthy, parous woman (case 562: 1906: 13) with 258 successive menstrual cycles, reported from age 31 to 52 years (table 2). The length of her premenstrual phases by BBT varies between 8 and 18 days, with a modal value at 13 days (29.4 percent). The length of her premenstrual phases by intermenstrual pain stretches between days 10 and 21, mode at day 15 (36.4 percent). For the cervical mucorrhea the length of her premenstrual phases extends from day 12 to day 22, mode at day 16 (23.4 percent). The range of variability of the length of her premenstrual phases is nearly identical for the three clinical signs, about 10 days (fig. 2). The centers of the observations, however,

are regularly displaced by two days, from 12.9 days for the BBT to 14.8 days for the intermenstrual pain and to 17.0 days for the cervical mucorrhea.

The same observations displayed in time of occurrence by successive scores of menstrual cycles produce three parallel, horizontal curves at levels of 12.9 days for the BBT, at 14.8 days for the intermenstrual pain, and at 17.0 days for the cervical mucorrhea (fig. 3). The stability of these three curves over many years indicates that the length of the premenstrual phases of a mature woman is independent of her age. In this woman a typical cervical mucorrhea was observed only during her last six scores of cycles before menopause. During all the preceding years of observation no episodes of clear, stretchy mucus could be identified. Repeated gynecologic examinations did not reveal any pathology.

The findings reported on the characteristics of the premenstrual phase in this woman are not unique or peculiar to case 562. They are fully corroborated by identical observations made in 621 women (Vollman 1977).

Discussion

At present no specific, non-operative test for the timing of ovulation in woman, by the hour or by the day, is available. Therefore, the event of ovulation cannot be estimated prospectively. This statement holds true, also, for the hormone studies in women which demonstrate changes in the concentration of estrogens, progesterones, follicle stimulating hormone (FSH), and luteinizing hormone (LH) around the presumptive period of ovulation. If the results of measurements of hormone concentrations are correlated with the day of peak cervical mucorrhea, the presumed day of ovulation as defined by Billings, the peak of the estrogens was observed between 4 days before and 2 days after the day of peak cervical mucorrhea (fig. 4). The LH surges were reported between 3 days before and 3 days after the day of peak cervical mucorrhea. The rise of pregnanediol occurred between 1 day before and 5 days after the day of peak cervical mucorrhea. Finally, the rise of the BBT was noted between 1 day before and 6 days after the day of peak cervical mucorrhea.

This variability between the hormonal tests and the day of peak cervical mucorrhea is not astonishing at all. It only reflects the old experience that all biological processes carry a specific degree of natural variability. Therefore, any statement that ovulation must occur at a fixed time with the observation of a clinical sign—peak cervical mucorrhea, intermenstrual pain, or rise of the BBT—or with the result of a hormone test—necessarily contradicts biological experience.

Note

For references, see R. F. Vollman, *The Menstrual Cycle* (Philadelphia: W. B. Saunders Company, 1977).

BASAL BODY TEMPERATURE IN A 26-DAY MENSTRUAL CYCLE

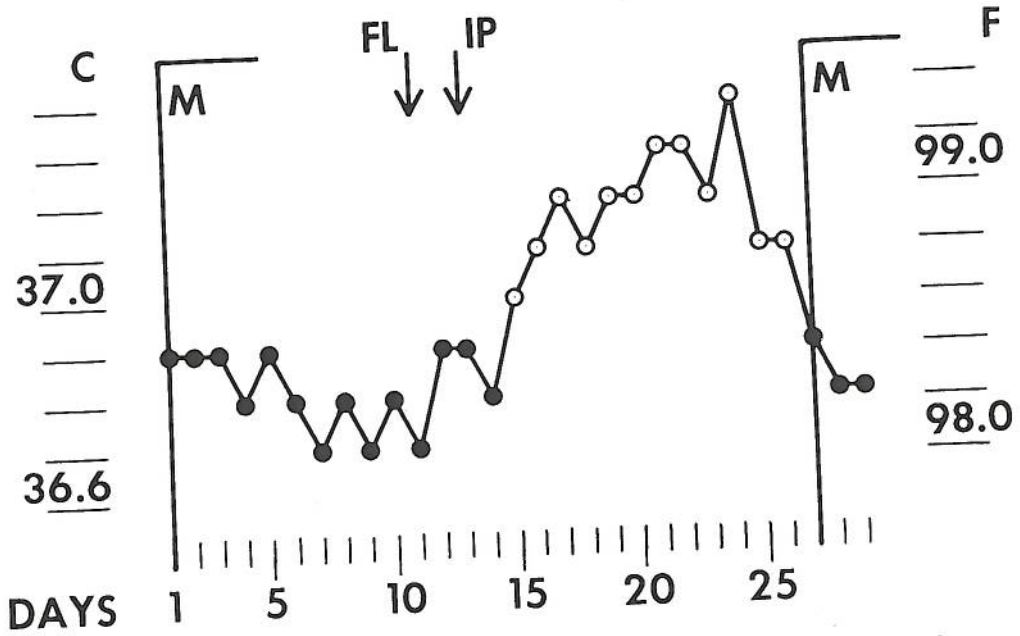

Figure 1. Rectal basal body temperature in a 26-day menstrual cycle. Full circles, low postmenstrual temperatures; open circles, elevated premenstrual temperatures. FL, cervical mucorrhea; IP, intermenstrual pain; M, menstruation.
From Vollman, *The Menstrual Cycle*, 1977. Reprinted with the permission of the publisher, W. B. Saunders Company, Philadelphia.

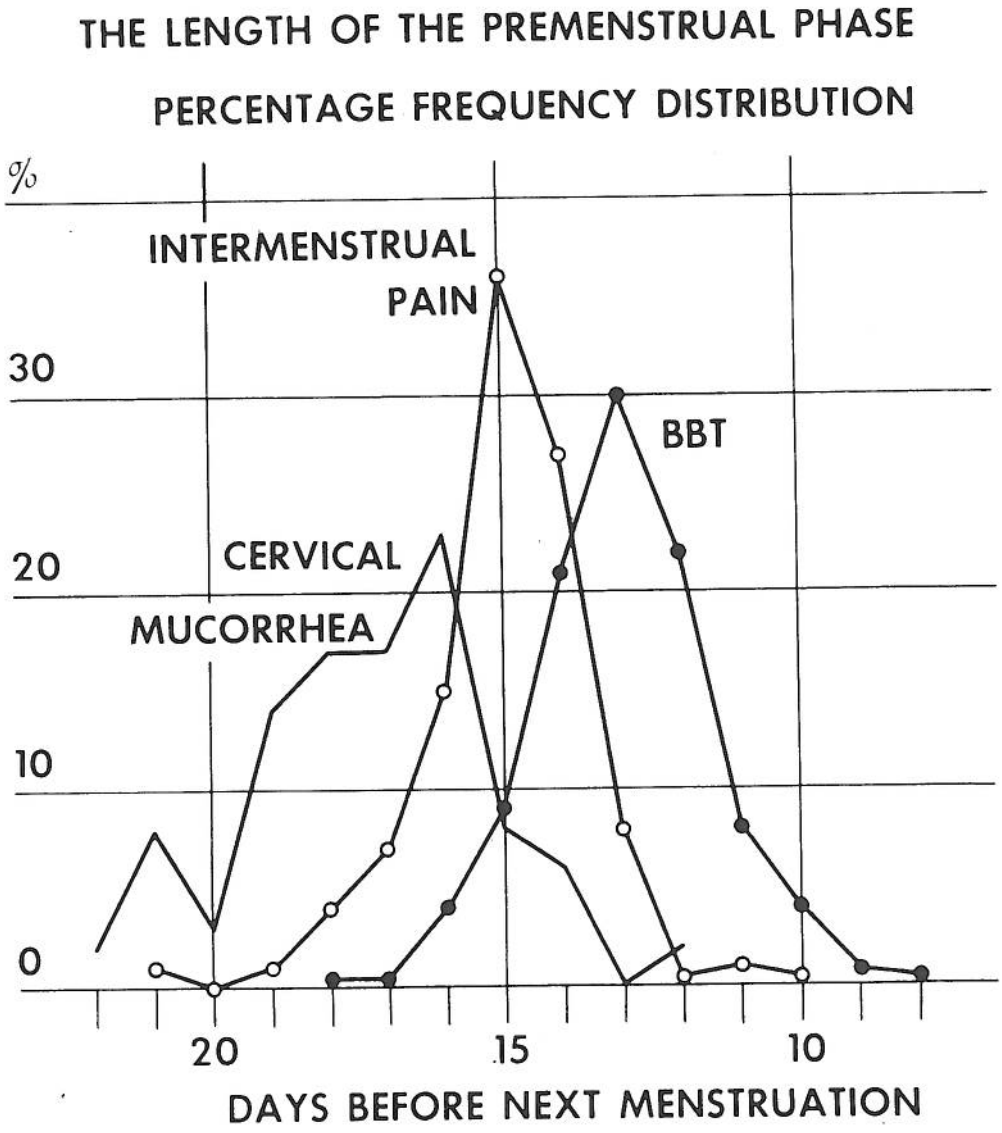

Figure 2. Percentage frequency distributions of the length of the premenstrual phase by cervical mucorrhea, intermenstrual pain, and basal body temperature (BBT).
Case: 562: 1906: 13. See table 2.

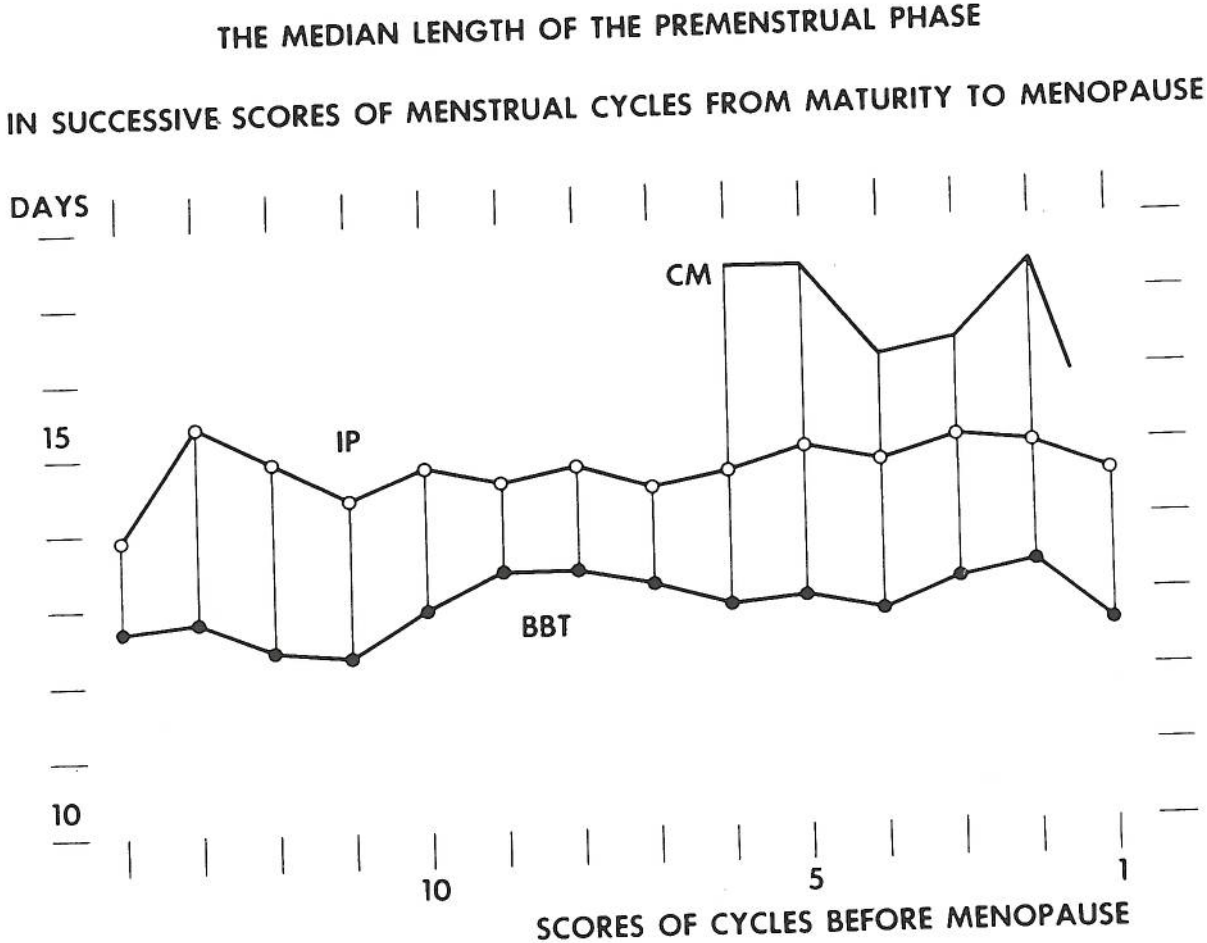

Figure 3. Comparison of the median length of the premenstrual phase by BBT, intermenstrual pain (IP), and cervical mucorrhea (CM) in successive scores of menstrual cycles from maturity to menopause. Case 562: 1906: 13.

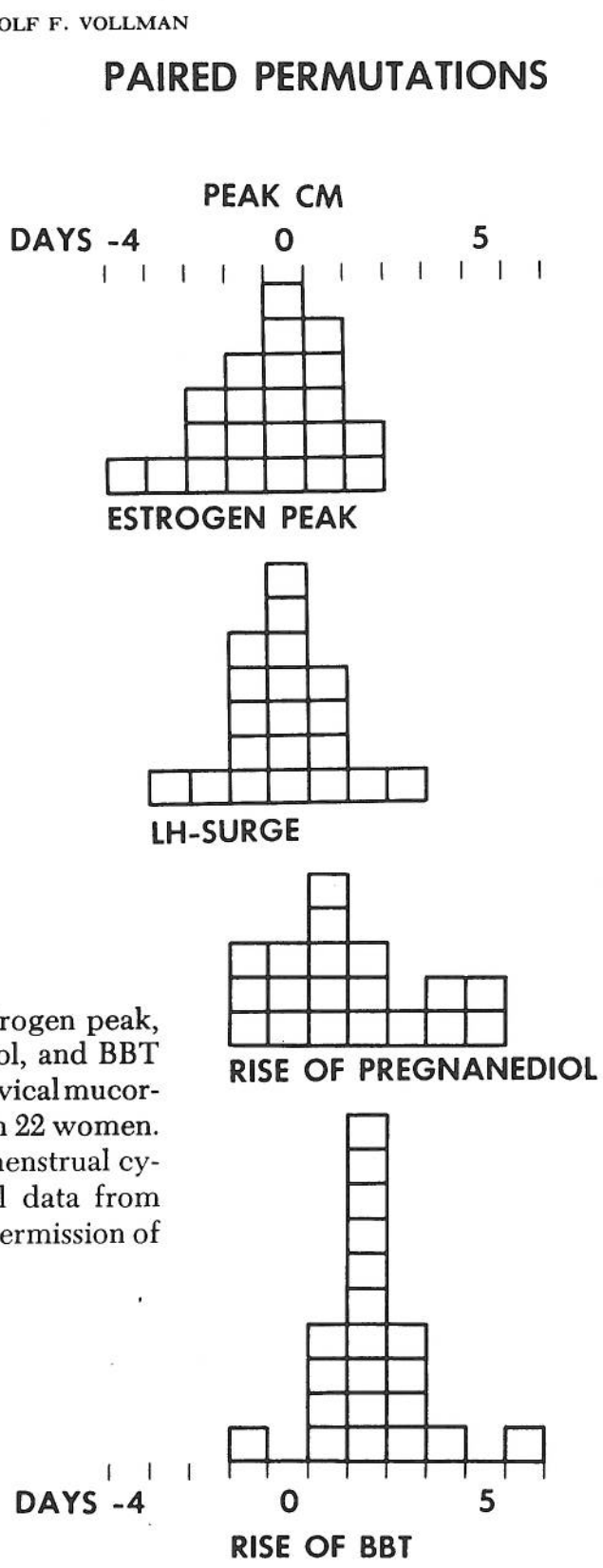

Figure 4. The scatter of the estrogen peak, LH surge, rise of pregnanediol, and BBT rise around the day of peak cervical mucorrhea; 22 menstrual cycles from 22 women. Each square represents one menstrual cycle. Drawn after the original data from Billings et al., 1972, with the permission of the authors.

Table 1
The Phases of the Menstrual Cycle in Days*

Test	Phases		Menstrual Cycle
	Postmenstrual	Premenstrual	
Cervical mucorrhea	10	16	26
Intermenstrual pain	12	14	26
BBT	14	12	26

*See figure 1

Table 2

The Length of the Premenstrual Phase by Different Methods

Author	Method	♀ Menstrual Cycles	Premenstrual Phase in Days before the Next Menstruation 22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	M	Total %
Knaus	Oxytocin reaction	13 "more than 50"								K																100 ?
Ogino	Corpus luteum histology	118 81							O	G	I	N	O													100
Vollman	BBT	258					0.4	0.4	4.3	8.9	21.3	29.4	22.5	7.7	3.9	0.8	0.4									100.0
	Intermenstrual pain	1 247		0.8	-	1.2	3.6	6.9	15.0	36.4	26.7	7.7	0.4	0.8	0.4											99.9
	Cervical mucus	63	1.6	7.8	3.1	14.1	17.2	17.2	23.4	7.8	6.2	-	1.6													100.0