Supplemented BBT and Regulation of Conception

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Summary

THE "SUPPLEMENTED" basal body temperature method includes self-observation of cervical mucorrhea during the periovulatory phase of the cycle. The woman is able to evaluate the temperature rise more easily and more securely by doing so in conjunction with the cessation of cervical mucorrhea. The method of self-observation proposed here was practical for 90.5% of the women of demonstrated fertility under study.[1]

The supplemented basal body temperature method has an effectiveness equivalent to that of the Pill. The method also takes into account the individual peculiarities of the preovulatory (postmenstrual) phase of the cycle: we have so far observed no method failure from use of the postmenstrual days (the first six days of a cycle beginning with "true menstruation" are presumed infertile; no bleeding is called "true menstruation" unless it occurs at the end of the high-temperature phase of a biphasic cycle).[5] A group of 180 women observed 3,542 cycles; there were 26 intended and 2 unintended pregnancies, for a pregnancy rate (Pearl Index) of 2/(3,542/1,200) or 0.68 per 100 women per year—user failures being included in this figure.

Introduction

Recent literature demonstrates a growing consensus that only about four days of the menstrual cycle are actually fertile. KNAUS laid the foundation for later efforts by his pioneering and historic contributions to the original

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rhythm method (41-44). HARTMAN summarized the pertinent literature in his 1962 work (35). And a host of other authors present similar data (3, 5, 9, 10, 16, 23, 25, 27, 33, 36, 37, 47, 51, 54, 56, 58, 76, 82, 85, 86). RAUSCHER's work with simultaneous investigation of vaginal smear and cervix has to date provided our most precise definition of the timespan within which ovulation occurs; the work by Rauscher and ULM (69) is an impressive illustration of the accuracy of Rauscher's thesis.

For all practical purposes the basal body temperature (BBT) curve is the most useful of the many procedures at our disposal for estimating the approximate time of ovulation. In our own research we have "supplemented" the BBT record by making the interpretation of the rising-temperature pattern dependent on the cessation of the cyclic cervical-mucus flow, which the woman observes herself by a special procedure described below.

It is well known that contraceptive failures are a contributory factor in the procurement of criminal abortions. Any measure, therefore, that allows us to avoid pregnancy with certainty will deserve our attention. All current birth-control measures have a failure rate; the following numbers of unintended pregnancies per 100 years of method use have been reported: coitus interruptus, 10-38; vaginal douche, 36; diaphragm with spermicidal cream, 4-36; vaginal creams, 8-36; condom, 9-19; calendar rhythm (Ogino-Knaus), 6-14; "strict" BBT (using only the premenstrual high-temperature phase), 1; the Pill, 1. "User" failures are included in these figures, e.g., forgetting to take a pill or interpreting incorrectly the onset of the absolutely infertile time associated with the high-temperature phase. (See 27, 39, 58, 80, 81, 84.)

The application of local contraceptives and the continuous practice of coitus interruptus noticeably impair marital intimacy and, humanly speaking, are experienced as reducing substantially the possibilities for expressing marital love in conjugal relations. Because the use of contraceptives is in fact unnecessary during the infertile days of the cycle, it seems only logical that we should make every effort to determine accurately the certainly infertile times of the cycle. And with regard to the fertile phase of the cycle, during which every birth-control measure has a failure rate of some sort, we have, in the words of Dr. Gerhard DOERING of Munich, "no contraceptive that can boast of the absolute harmlessness of periodic abstinence" (28).

The medical advisor must be willing to take time to provide adequate instruction, and the married couple willing to take an active part in learning, if the information and motivation required for effective periodic abstinence are to be realized. But the fact that this is so is hardly a defect if, with PALMER (55), we recognize that conception regulation is more a human problem than a technical one and that no simple panacea can realistically be expected now or in the future to solve that problem. Periodic abstinence has its own difficulties, but one could say that these very difficulties have educational

value in themselves, because they challenge the couple to grow in their marriage relationship by learning to express their love for each other in a variety of ways other than genital activity.

BBT and the Cyclic Changes in Cervical-Mucus Secretion

There are reports showing that only 1-2% of all cycles are monophasic (or at least not clearly biphasic), provided the woman has received careful instruction in appropriate temperature-taking technique; it is the physician who is at fault when the percentage is higher than that (4, 46). A World Health Organization (WHO) report has also indicated that vague and insufficient instruction in temperature-taking technique is a cause of failure in the use of the temperature method (10).

For some time, sterility studies have paid considerable attention to the cyclic changes in cervical-mucus secretion (7, 15, 16, 26, 60, 72, 73). The functional peak of cervical activity, with liquefaction and abundant secretion of cervical mucus, is known to be preovulatory; some authors have even called this part of the cycle the "water phase" (5). The flowing cervical mucus provides optimal conditions for sperm transport and survival, allowing sperm to retain their viability for as long as 3-4 days.

The flood of estrogen responsible for this liquefaction and abundant secretion of cervical mucus never fails to occur during biphasic cycles and is manifest in a sharply defined steep peak of the estrogens (HAMMERSTEIN 34). KAISER et al. (38) observed a 3-4-day timespan during which the relatively steep rise and fall of the estrogens occurs. A second, less pronounced, rise in the estrogen level may occur during the luteal phase of the cycle and may occasion a slight opening of the cervix as well as some cervical-mucus flow (the woman may observe this for herself); the same phenomenon may occur just before and after menses as well. But these factors do not affect the practical utility of the method of self-observation described below.

Correlating the day of ovulation with the BBT curve is possible with some precision only if a simultaneous histological study of the ovaries is undertaken. On the basis of this procedure (13, 14, 22, 61, 63, 64) it has been established that ovulation may occur as early as the fourth (rarely the sixth) day before, or as late as the second day of, distinctly elevated temperatures. If pregnancy is desired, the optimal time for intercourse to occur is the day that the mucus shows its maximum "Spinnbarkeit" (ability to be stretched into stringy, ropy threads); the day of maximum Spinnbarkeit usually occurs shortly before the temperature rise (15-18, 75). As a rule, conception may result from intercourse occurring as late as the first day of distinctly elevated temperature or as early as the sixth day beforehand (1, 18, 27, 37, 47, 54, 82, 86). A single successful artificial insemination on the second day of the high-temperature phase (74) and two reported cases involving the ninth day before the first distinctly elevated reading (40, 86) are exceptions to that

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general rule. In the case reported by VOLLMAN (86) it is not clear on which day of the cycle the fertile coitus occurred; he mentions only that the earliest cycle day the use of which resulted in conception was Day 8. There must have been a relatively late temperature rise, therefore, in the cycle in question. The other case (40) involved a successful single artificial insemination on Day 14, nine days before the first distinctly elevated reading. There is evidence that in some cases, despite the presence of a corpus luteum, the temperature rise may be significantly delayed or fail to occur altogether (5, 12, 32, 34).

The woman exhibits "spontaneous" ovulation. ("Spontaneous" does *not* mean "induced" or "provoked" by external sources; the phrase "spontaneous ovulation," identically expressed in German, English, and French, refers to an autonomously controlled event representing the culmination of a phase of follicular development that is variable from woman to woman and from cycle to cycle; in order for spontaneous ovulation to occur the follicle must grow and ripen until it is mature enough to rupture.) It is conceivable that extreme external stimuli of some sort might hasten the process of follicular maturation. And the studies of BICKENBACH et al. (8) seem to indicate that a slight acceleration of the process leading to ovulation might in some cases be induced by stimulating the cervix [Cervixreizung]. Otherwise, no one has ever demonstrated a provoked or a violent or a paracyclic ovulation (STIEVE 78, 79); nor has anyone ever demonstrated "second" or "additional" ovulations involving the release of fertilizable ova (19, 31, 35, 68).

The "lifespan" of the ovum, during which it is capable of being fertilized, is generally assumed to be about 6-8, or at most 24, hours; sperm may remain viable for as long as 2-3 days in favorable cervical mucus (35, 43, 52-54, 66). Sperm motility may last as long as 7-8 days (1, 2, 50, 54, 57, 77, 83), but in any case viability, the ability to fertilize the ovum, is of shorter duration. Extensive and precise investigation of eight species of mammals and numerous species of invertebrates indicates the duration of sperm viability to be only about half that of sperm motility (Hartman 35, pp. 73-74).

CORNER et al. (20) used Farris's rat-ovaries hyperemia test (30) to estimate the time of ovulation in human subjects and established from subsequent operations that in 6 out of 36 cases ovulation had failed to occur even though the hormonal profile typically associated with ovulation had been observed. These investigators hypothesized that the histological data could best be explained as due to the regression of mature but unruptured follicles. Rauscher (65) also observed that mature follicles sometimes become atretic rather than rupturing: "*If a follicle is mature enough to rupture, its rupture customarily occurs* after *the drop in estrogenic activity, but it is also possible for the follicle to fail to rupture.*" That may explain why prolonged low-temperature phases are sometimes observed in association with multiple

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phases of heightened estrogenic activity (34); the occurrence of an estrogen peak is of itself no proof for the occurrence of ovulation (11). Conceptions have been reported in conjunction with the temperature rise at the end of prolonged low-temperature phases of 56 and 58 days (45), as well as of 111 days (6).

The periovulatory basal body temperature curve frequently fails to show a sharp and unmistakable rise from one day to the next, making it more difficult to interpret the rising-temperature pattern. Real progress was made when HOLT (37) introduced his so-called Datometer and the rule of "*three higher than six*": Watch for three consecutive readings all higher than any of the six readings immediately preceding the first of those three; as soon as the third such higher reading is recorded, conception is impossible for the remainder of the cycle. The research summaries by DOERING (24) and OBER (51), among others, and in particular Doering's small manual (25), popularized the temperature method in the German-speaking world. Doering made the important distinctions between "Calendar Rhythm" (Ogino-Knaus) and "Temperature Rhythm" on the one hand, and between the "strict" and "combined" BBT methods on the other (28). The "combined" method allowed the use of both pre- and postmenstrual days (Pearl 3.1), but the "strict" method allowed intercourse only from the third day of high temperature until the onset of menses (Pearl 0.8, all user failures). The "strict" method is therefore as reliable as the Pill, whose "user" failure rate (due to forgetting to take a pill) lies between 0.7 and 1.7 (27, 58). Studies in France (54, 82, 85) showing equally good results led Palmer (55) to rate the effectiveness of the strict BBT method as equivalent to that of the Pill.

The available literature, therefore, shows no conceptions occurring from the use of any day of the cycle beyond the second day of distinctly elevated temperature and, with very few exceptions, no conceptions from the use of any day of the cycle earlier than the sixth day before the first distinctly elevated temperature.

Intermenstrual Flow

Knaus (43) devotes an entire chapter, "The Intermenstrual Crisis," to physiological symptoms observed by certain women during the periovulatory period. He discusses intermenstrual pain at length but mentions intermenstrual mucus secretion, on the basis of a single woman's personal observation, only in passing (p. 151).

Other investigators have frequently observed the presence of a small amount of whitish mucous discharge noticeable during vaginal rinsing [Vaginalspuelungen] occurring about the time of intermenstrual pain (87). Asked to record subjectively appreciable ovulatory symptoms, some women notice a slight discharge lasting 1-3 days (48, 88). One study reported no subjectively appreciable ovulatory signs apart from occasional intermen-

strual pain and, rarely, intermenstrual bleeding (21). SHETTLES (72, 73), however, reports that it is not uncommon for women to notice a small amount of clear "midcycle" mucous discharge; others have reported similar results (17, 18). In fact, once their attention is drawn to the fact, women frequently notice a vaginal discharge lasting 1-3 days at "midcycle" and having either a serumlike mucous or a blood-tinged appearance (59, 60).

Vollman (86) studied 74 women and found that 23 of them were able to notice "intermenstrual flow"; he considers this flow to be the human equivalent of the pronounced estrus flow in many mammals but gives no indication of how the observations were made or by what criteria the women proceeded when making self-observations. Holt (37) speaks of a "syndrome of ovulation" manifest in a multitude of symptoms, one of which is the occurrence of an ovulatory discharge. Hartman (35, pp. 144, 222) mentions that the mucus secretion may at "midcycle" be so abundant that the woman herself will notice it. According to Palmer (54), some women are able to observe a stringy intermenstrual mucus, provided it flows downward to the vulva in sufficient quantity and remains there for 2-3 days; he gives the advice of a woman physician from England to insert two well-washed fingers into the vagina and, after removing them, to spread them apart in order to determine whether any mucus is present with the capacity to be stretched into threads. BILLINGS (9) devotes a considerable amount of attention to the charting of the ovulatory flow and believes that, in conjunction with other ovulatory symptoms, about 70% of all women are able to make useful observations; he presents no statistics, however, and gives no instructions specifying the procedure for self-observation.

Personal Investigations

a. *Self-Observation of Cervical Mucus*

None of the available literature addresses itself directly to any or all of the following items: (1) What percentage of women will be able, after systematic instruction, to make useful self-observations of cervical mucorrhea? (2) What kind of procedure, if any, will make such self-observation useful to the highest possible percentage of women? and (3) What possibilities does self-observation of cervical mucorrhea afford to permit easier evaluation of the basal body temperature curve, particularly when the temperature, as it often enough does, shows only a very gradual rising pattern?

The author's own practice, located in a small town in the vicinity of both agricultural and industrial communities, provided the opportunity for such an investigation. The population included couples from a broad spectrum of educational and socioeconomic backgrounds. Stimulated in particular by Rauscher's work, which precisely delineated the final day of the pre-ovulatory phase of the cycle (61, 62), the author provided each woman under

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study very careful and thorough instruction. It was deemed insufficient merely to mention to the woman that she must expect during the periovulatory phase of the cycle to notice an increased discharge of some sort [vermehrter Fluor], or at least a sensation of increased wetness [Gefuehl eines vermehrten Feuchtwerdens]. Each client was instead repeatedly instructed in the following procedure:

Every woman visits the bathroom several times a day and must, after voiding, wipe herself with toilet tissue. She should not, however, discard the tissue without taking at least a few seconds to look at it. If she does so, she will discover without fail certain days during her cycle on which a unique mucous discharge adheres to the surface of the tissue. (If, even apart from her usual visits to the bathroom to void, she perceives at the vaginal entrance the start of a feeling or sensation of wetness that previously was not present, and can go immediately to the bathroom to perform the tissue examination, she will be able to evaluate her observations of what is on the tissue more clearly.) She then tests the discharge for the presence of cervical mucus by folding and opening the pad of tissue, noting whether the discharge remains internally cohesive and draws threads while clinging to the surface of the tissue as it is opened. It is the capacity to draw threads [elastisch-fadenziehende Eigenschaft] that distinguishes the cervical mucus associated with heightened estrogenic activity from any continuous pathological discharge that might otherwise be present. Variable traits of the mucus (more or less transparent, cloudy, whitish to yellowish) are discussed individually with each woman, but in all cases it is the above-mentioned capacity to draw threads that is the normative criterion for identification of the cervical component within a discharge. The typically mucous and generally somewhat tenacious discharge is charted with an "M" (for "Mucus") on every day on which it is observed, using the appropriate column on the temperature graph (see fig. 1). The occasionally encountered obvious reluctance of a few women to carry out such a procedure must be considered a relic from the prudery of the past. Toilet paper is ordinarily used several times a day by every woman; routine personal care, therefore, provides the opportunity to perform in a matter of seconds and without anxiety the procedure described above. About 90% of all women of demonstrated fertility can make useful self-observations with two slogans in mind: "Be alert to the start, at the vaginal entrance, of a sensation of wetness previously not present [vermehrtes Feuchtwerden]" and "Check with toilet tissue."

b. *Taking the Waking Temperature*[2]

When one is instructing women in the procedure for taking their basal body temperature, it is preferable to use the term "waking temperature." Taking the temperature immediately upon waking has proved to be a more

significant variable than the time at which the temperature is taken. A variation of up to 1½ hours between earliest and latest waking-temperature time makes no significant difference in the reading itself.

The author recommends the rectal route to his clients, because it provides the most reliable readings. An ordinary fever thermometer is used, being kept in place for at least five minutes. It is conceivable that the vaginal route might, in virtue of the proximity of the thermometer bulb to the cervix, provide a premature, misleading temperature rise coincident with the rising temperature of the cervix itself during peaking estrogen production (49). The oral route has proved to be more vulnerable to external variables, manifesting a choppier temperature pattern. Axillary temperatures are worthless, but some women continue to try their luck with them.

We have compiled a brief, practical manual,[3] easily comprehended by the layman but containing all the pertinent instructions and information necessary for the married couple as well as for their physician (70). Fig. 1 illustrates how sample charts accompanied by brief commentary afford a simple instructional format.

c. *Interpreting the Basal Temperature Curve*

In view of the fact that about 90% of women are capable of observing the cyclically recurring appearance of cervical mucus by using the procedure described above, it seems justifiable to urge clients to attempt such self-observation. It is this self-observation of the mucus symptom that is primarily designated by the expression *"supplemented* basal temperature-taking," although it is of course possible, according to circumstance, to include other subjectively appreciable ovulatory symptoms along with the mucus symptom when evaluating the temperature curve. Cervical mucorrhea reflects a cycle phase dominated by estrogen; ovulation may, but need not, follow such an estrogenic phase; should, however, a rising-temperature pattern accompany the cessation of cervical mucorrhea, absolute sterility is present, starting with the third day of high temperatures lying after cessation of cervical mucorrhea, until the end of the high-temperature phase. Self-observation of the mucus symptom is a valuable tool for identification of fertile days during the course of the cycle, guarding against erroneous interpretation of temperature patterns disturbed by external factors such as common colds. In the author's own practice no mistaken interpretations have as yet been made as a result of concurrent illness.

The extent to which the temperature chart itself may become a small diary, in which the extraordinary circumstances of daily living, such as illness, fatigue, vacations, and so on, are recorded, is illustrated in fig. 2. Here "nervous excitement" led to a series of elevated temperature readings before the mucus phase; the presence of the mucus clearly indicated, however, that the fertile time was not yet past. Using self-observation to supplement

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temperature-taking enables women to trust their own interpretation of the temperature record, as well as making it easier for them to interpret otherwise-ambiguous temperature patterns.

The simple basic rule[4] applicable in all biphasic cycles, regardless of cycle length, is as follows:

> Look for 3 consecutive readings, all of which lie after the cessation of M and each of which, taken by itself, is higher than any of the 6 readings immediately preceding the first of those 3; encircle the 3, and number in reverse the preceding 6 (see fig. 1).

Conception is impossible from evening on the day of the third encircled reading until the end of the cycle. Days 1–6 of every new cycle are presumed infertile (the reasons for this rule are discussed below). Whether additional postmenstrual days may be considered infertile depends upon the individual woman's cycle range.

Results

a. *Self-Observation of the Mucus Symptom*

One hundred eighty women of reproductive age (average parity 2.7) submitted 3,542 cycle charts for evaluation; 17 (9.5%), with 336 cycles, could notice no cervical mucus at all, or could do so only rarely and with uncertainty; the remaining 163 (90.5%), with 3,206 cycles, carried out self-observation successfully, charting a typical cervical-mucus discharge in 3,083 (96%) of the 3,206 cycles. The 17 women who were unable consistently to notice cervical mucorrhea were forced either to rely upon the temperature record alone or to evaluate the temperature record in conjunction with the occurrence of intermenstrual pain.

b. *Pregnancies*

The present results reflect the fact that most of the data came from women who desired to avoid further pregnancy; the number of attempted pregnancies is therefore relatively small. Young married couples who for months or even years had failed to achieve a desired pregnancy were excluded from the study.

Some of the couples under study, desirous of pregnancy, expressed willingness to forego immediate conception and agreed to test the margins (the first and last days) of the presumed fertile time or to restrict themselves to a single intercourse during the presumed fertile time, in order to see whether or not pregnancy would occur. It is unfortunate that more couples are not willing to perform such experiments. There were in addition some couples who habitually practiced coitus interruptus during the fertile time, while admitting that they both understood and were willing to take the risk of pregnancy associated with that method of birth control.

The group of those who systematically tested the margins of the fertile

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time or isolated days within the fertile time, or who practiced habitual coitus interruptus as described above, produced 5 pregnancies:

1. From the 17 women without self-observation: *1 pregnancy*, a postmenstrual conception from use of Day 7, which was the fifth day before the first elevated reading. The woman's shortest previous cycle was 24 days. The final infertile day according to Knaus would have been Day 6; according to Ogino, Day 5. By either calendar calculation Day 7 was a potentially fertile day.

2. From the 163 women with self-observation: *1 pregnancy*, a postmenstrual conception, before the first fertile day as determined by both the Knaus and Ogino calculations. Normal coitus took place up to and including Day 13 (as in previous cycles). Day 13 was the fifth day before the first elevated reading. The woman's shortest cycle (based on more than one year's cycle data) was 32 days. The final infertile day according to Knaus would have been Day 14; according to Ogino, Day 13. *One pregnancy*, from an isolated fertile coitus during the presumed fertile time. *Two pregnancies*, from habitual coitus interruptus during the presumed fertile time.

The entire group of 180 women produced 26 intended pregnancies and 2 *unintended pregnancies*. Both unintended pregnancies resulted from erroneous application of the method rather than from the method itself, which seems to be theoretically foolproof, as does also the Pill, although both have a practical failure rate associated with patient error.

1. From the 17 women without self-observation: *1 pregnancy*, a postmenstrual conception from the use of Day 8, one day before the first fertile day as determined by the Ogino calculation, two days before the first fertile day as determined by the Knaus calculation. The woman's shortest previous cycle was 27 days. The temperature record was incomplete; it is uncertain where the rise occurred.

2. From the 163 women with self-observation: *1 pregnancy*, due to a failure to await the third encircled reading; the fertile coitus occurred at the start of a slight temperature rise; the temperature was not taken for the next few days; thereafter a definite high-temperature phase was present. The couple recognized and acknowledged the error.

The entire group of 180 women contributing 3,542 cycles and using both post- and premenstrual infertile days produced two unintended pregnancies, resulting in a Pearl Index of $2(3,542/1,200) = 0.68$, a pregnancy rate of 0.7 per 100 woman-years of use by fertile women in their reproductive years. (Premenstrual infertility was presumed from evening on the third day of encircled readings, as described above, until the end of the cycle; postmenstrual infertility was presumed from Day 1 of a true menstruation through

Day 6, or through Shortest Cycle Length minus 20, whichever came later.)

Discussion

When the rising-temperature pattern is evaluated in conjunction with the mucus symptom, a series of three readings after cessation of cervical mucorrhea, each about 0.1°C higher than the highest of the six immediately preceding the first of those three, suffices to determine infertility.[4] When the temperature pattern is evaluated without reference to the mucus symptom, the more stringent requirements of the World Health Organization rule are to be observed (10): "A significant shift is one that occurs in 48 hours or less, and in which three consecutive daily temperatures are at least 0.2°C [0.36°F] higher than the last six daily temperatures prior to [the start of] the shift" (29).

The basal-temperature level usually starts dropping shortly before the onset of menses; 97% of high-temperature phases longer than sixteen days are associated with pregnancy (1). A complete temperature record makes it possible to identify pregnancy soon enough to avoid the possibly teratogenic effects of some medications.

It is extremely rare for the high-temperature phase of one cycle to be followed immediately by the follicular phase of the next cycle without intervening menses. Fig. 3 illustrates such a case. The couple continued to chart daily temperature readings and identified the end of the high-temperature phase and the beginning of the new cycle; they proceeded correctly with a view to the avoidance of pregnancy. Couples otherwise tend inevitably to presume that they are pregnant when menses fails to occur; they conclude that "from now on nothing makes any difference anyway" and continue to have intercourse. Whenever pregnancy, therefore, is absolutely contraindicated, continued daily temperature-taking is required. BARTON and WIESNER (1) used the term "non-menstrual ovulatory cycle" to designate the condition illustrated by the temperature pattern in fig. 3.

In the author's own practice, couples are advised to presume Cycle Days 1-6 to be infertile. The literature contains data pertaining to conceptions from intercourse before "Day 7" (e.g., SEITZ-AMREICH 71), but so far no charts, and above all no temperature records, have been published that would indicate that these conceptions occurred from the use of Days 1-6 of a cycle beginning with true menstruation. There are phenomena such as breakthrough bleeding following a monophasic temperature pattern or ovulation spotting so profuse that women chart it as "menses"; whether charted "bleeding" may rightly be called "menses" can be determined only through reference to the temperature pattern of the previous cycle. It is possible for conception to result from intercourse shortly before, during, or even after episodes of bleeding other than true menstruation. Only when a normal high-temperature phase precedes the onset of bleeding are Days 1-6 of the new

cycle presumed infertile.

On theoretical grounds it is difficult to believe that follicular maturation could be so advanced, and follicular rupture occur so early, as to permit pregnancy to result from coitus on Day 6 of a cycle preceded by a normal biphasic cycle. Available data pertaining to the estrogen level in short cycles indicate no estrogen profiles on Day 6 sufficient to cause those changes at the cervix required for sperm survival and transport (12, 34, 38); this finding seems to be true even in cycles in which ovulation might have been possible on Day 8. Only further experience will tell us whether the first six days are in fact always infertile.[5]

Ogino (52, 53) assumed a 12-to-16-day luteal phase as the basis for his popular "19/10" calendar calculation: Shortest Cycle Length (based on at least one year's data) minus 19 = the final postmenstrual infertile day; Longest Cycle Length minus 10 = the first premenstrual infertile day. Knaus (42, p. 1047; 43, p. 415ff) assumes fewer fertile days than does Ogino and uses a simple formula: Shortest Cycle minus 15 minus 2 = the first fertile day; Longest Cycle minus 15 plus 2 = the final fertile day (44). Knaus's formula yields the first and final *fertile* days, whereas Ogino's formula yields the final postmenstrual and first premenstrual *infertile* days.

Couples may begin with the advice that the first six days of the cycle are presumed infertile. They may use either Knaus's or Ogino's calculations to define infertility beyond Day 6, but both these calculations have a failure rate. In the author's own practice no pregnancies have resulted from the application of a modified Ogino calculation of Shortest Cycle minus 20 = the final postmenstrual infertile day.[6] Even this modified rule might result in an occasional unintended pregnancy, particularly if the woman usually has long cycles. Correlation of the mucus pattern with the temperature rise would in such a case prove interesting. The temperature rise, which would occur relatively late in the cycle, would be preceded by a prolonged follicular phase, possibly associated with a continuous, prolonged period of estrogenic activity and a prolonged episode of cervical mucorrhea.

In the present study whenever a woman with long cycles regularly noticed, on the basis of self-observation, the presence of a prolonged pattern of cervical mucorrhea before the temperature rise, she dispensed with the calendar calculation altogether and was instructed to watch for the earliest appearance of the cervical mucus as the marker identifying the start of the fertile time. The extensive clinical investigations and hormonal studies reported in the literature have for the most part been conducted on women who either had difficulty achieving pregnancy or at least had relatively regular cycles. Hartman (35, p. 218) rightly claims that investigators have singled out for inclusion in their surveys the 75% of women with fairly regular cycles and made women with irregular cycles, as well as those who conceive easily,

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the neglected stepchildren of research. We need to know more about these categories of women than we do; as it stands now, the university hospitals associated with medical schools [die Klinik] have been concentrating the bulk of their efforts on studies of subfertile women.

The temperature pattern may itself be used as a basis for calculating the postmenstrual infertile period. According to Doering (27, 28), the earliest cycle day that, on the basis of a woman's previous cycle history, was the sixth day before the first distinctly elevated reading in that cycle is to be considered the first fertile day of the present cycle. Doering's calculation of postmenstrual infertility (failure rate, about 3) apparently does greater justice to the individual peculiarities of the woman's cycle than does the Ogino calendar calculation (failure rate, about 7) (28).

In his own practice the author constantly reminds his clients to pay no heed to the widespread but mistaken myth of the "28-day cycle" and its "midcycle" "day of ovulation" fixed at Day 14; this unfortunate myth prevents proper understanding of the variable location of the fertile days within the cycle. Each woman must instead learn to follow the progress of her own cycle on a day-to-day basis and to recognize at any given time where she stands within her cycle. As time goes on, she knows the range of cycle days during which her own particular fertile time may occur. She discovers for herself that about two weeks or so elapses between the end of her own fertile phase in a given cycle and the onset of the subsequent menses, which is to be expected about twelve days after the temperature rise. She also notices that from time to time ovulation may be delayed, because she receives strict instructions to await the cessation of cervical mucorrhea before attempting to evaluate any temperature rise as a sign of impending premenstrual infertility. It becomes evident to her that it is possible to conceive late in the cycle when ovulation is delayed. One still hears women who use only calendar rhythm saying that they conceived "just before menses" (that is, just before the *expected* date of menses as predicted by the calendar calculation); a basal-temperature record would, however, in such cases, show a delayed temperature rise accompanying the fertile coitus and refute the occasionally repeated claim that a "second ovulation" occurred.

Author's Notes (1979) to English Version of Original German Text

1   The fact that 9.5% of the women of demonstrated fertility under study were "unable to notice M" was due to the fact that at the time of the study a number of women were reluctant to make mucus observations, particularly some of the older women. Since then we have refined our pedagogical techniques for explaining the mucus symptom and motivating women to make the necessary observations, and we find that almost 100% of younger fertile women are able regularly to notice some form of M during the cycle.

2   An ordinary fever thermometer may be used, but only in countries such as Austria, Germany, and Switzerland, where there are stringent legal standards governing the manufacture and testing of fever thermometers. In the United States a special "basal" or "ovulation" thermometer, obtainable at any pharmacy, should be procured. The statement that a 1½-hour difference in waking-temperature-taking time makes no difference in the reading is true, provided the woman retires by midnight and takes all readings before 7:30 A.M. With few exceptions this regimen was the practice common to the author's clients under study.

3   The book *Kinderzahl und Liebesehe* [Family size and married love], reference 70, went through nine editions between 1965 and 1978, and is now out of print. It is being replaced by a revised and expanded manual, *Natuerliche Geburtenregelung: Der partnerschaftliche Weg* (proposed English title: *Natural Birth Control: Partnership in Family Planning*), currently in print, in which the latest results are presented, together with the most recent refinements of the method.

4   Since the publication of this article the author has observed two pregnancies from use of the *third* day of "higher" readings after cessation of cervical mucorrhea, that is, after cessation of what we now call "*more*-fertile type M" (in 1968 the kind of mucus secretion that we now call "*less*-fertile type M" was not recorded on the chart). In both cases of pregnancy, oral temperatures were being taken, and all three encircled "higher" readings were exactly 0.1°C above the highest of the preceding six—a very unusual pattern. It would therefore be wise to require a *fourth* "higher" reading if the third is not at least 0.2°C (0.36°F) above the highest of the final six lower readings preceding the rise to sustained higher temperature.

5   So far only one pregnancy has resulted from the use of Day 6 in more than 8,500 cycles.

6   The 1968 statement that the modified S-20 Ogino rule has thus far yielded no surprise pregnancies remains true in 1979. That is, all days up to and including S-20 are presumed infertile provided the woman has neither perceived a sensation of increased wetness [Gefuehl eines vermehrten Feuchtwerdens] nor observed by tissue examination an increased discharge of some sort [vermehrter Fluor] with a capacity to be drawn into threads.
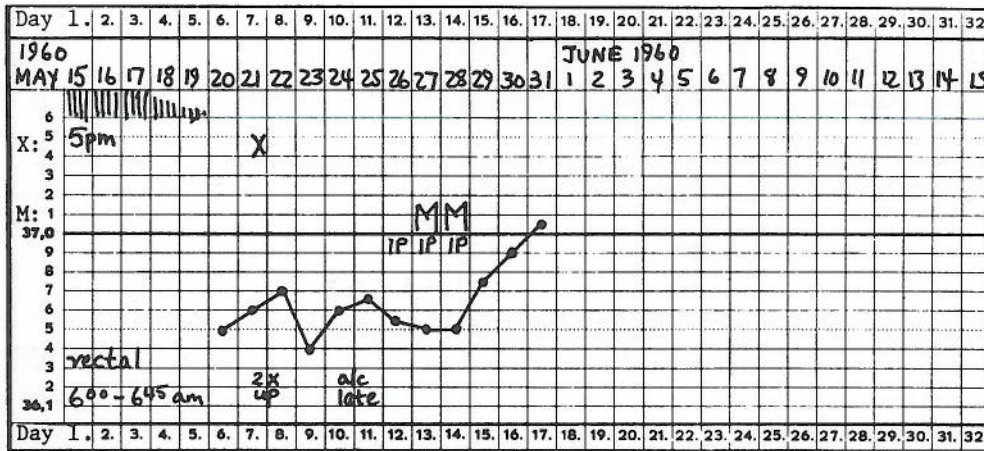
Fig. 1-a. Cervical mucorrhea ("M" for "Mucus") followed by a rise in the waking temperature. Intermenstrual pain ("IP") was also observed. The conjunction of "M" and "IP" directly indicates the most fertile time of the cycle. On the basis of the temperature pattern itself, the most fertile time of the cycle is the days of the final six low readings; fertility is sometimes still present on the first day of high readings; conception is only rarely possible from use of the second day of high readings after cessation of cervical mucorrhea. "X" stands for complete intercourse.
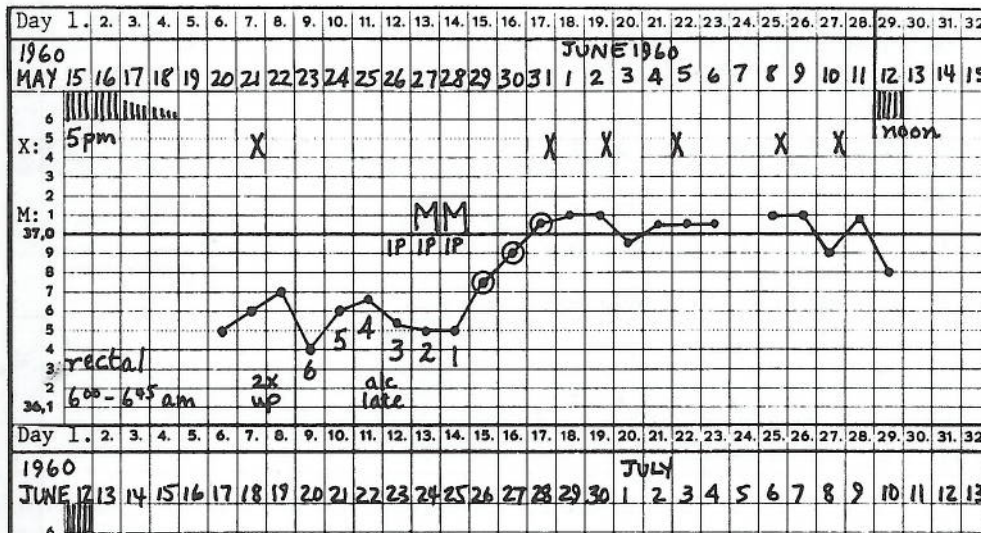

Fig. 1-b. A continuation of the temperature record from fig. 1-a until the onset of the subsequent menses. The day of the definite onset of menstrual flow becomes Day 1 of the new cycle. The vertical line between column Day 28 and column Day 29 separates the final day of the first cycle (Day 28) from the first day of the new cycle. The day before the onset of menses is the final day of the cycle. Intercourse (X) took place in the evening on Cycle Days 7, 17, and 19; in the morning on Day 22; and in the evening on Days 25 and 27. (Taken from Roetzer, J., *Kinderzahl and Liebesehe: Ein Leitfaden zur Regelung der Empfaengnis* [Family size and married love: A guide to conception regulation], reference 70.)
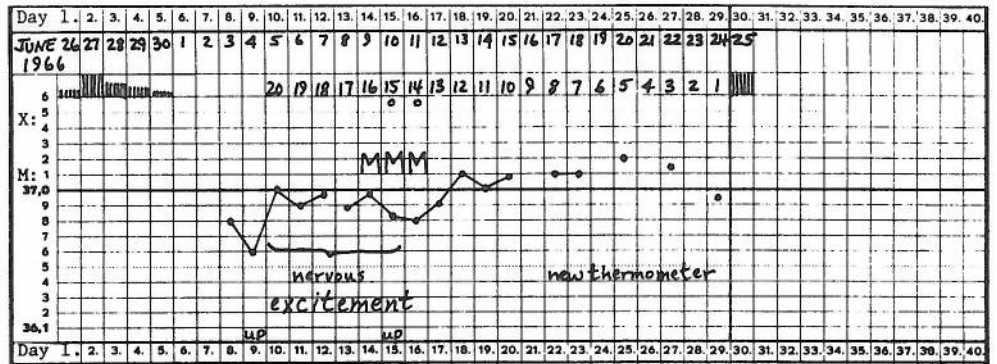
[Plate - 14a]

Fig. 2. Premature temperature rise (explained by the charted notation "nervous excitement"). The presence of cervical mucorrhea (M) indicates fertility. The temperature pattern by itself might wrongly be construed as indicating a 20-day luteal phase. The couple's charted record of intercourse (X) makes it evident that they correctly interpreted their temperature pattern in conjunction with their other signs.
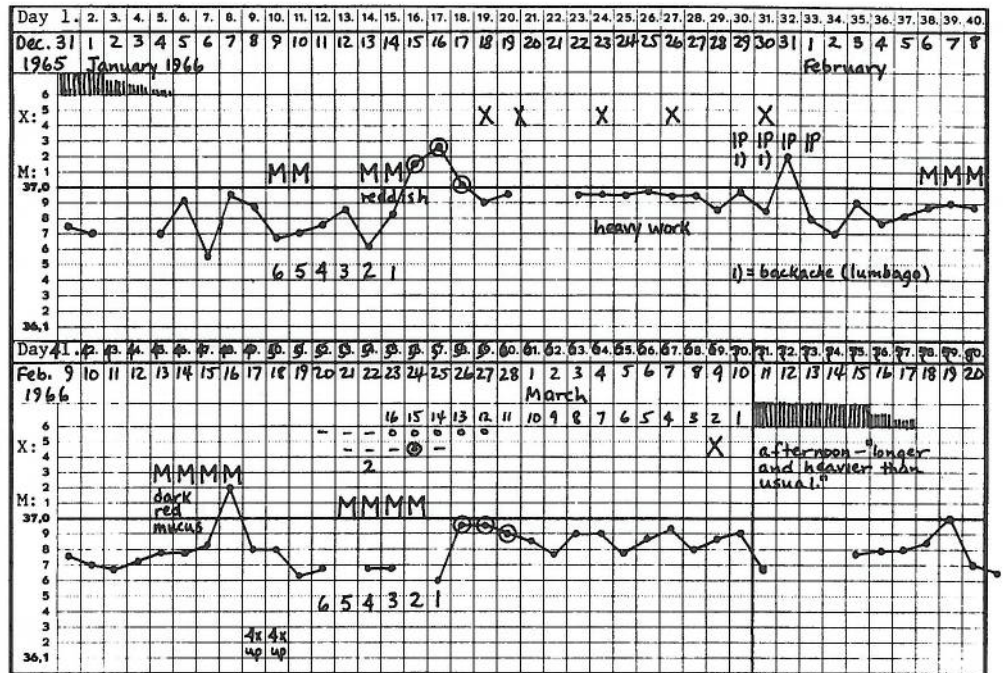

Fig. 3. A high-temperature phase followed by a return to the low-temperature level on Day 33, without subsequent menses. Another high-temperature phase begins on Day 58. The "2" above the M on Day 54 indicates that the cervical mucus on the toilet tissue could be stretched 2 inches before breaking. When the mucus can be stretched into threads more than about an inch long, as occasionally happens, it may be so recorded; the customary ½–¾" stretch is not recorded. The small circles under Days 55–59 identify the potentially ovulatory days according to Ogino's reckoning (12–16 days before the onset of menses); the preceding dashes indicate the presumed 3-day duration of sperm viability. The double circle under the fifteenth-from-the-last day of the cycle corresponds to the day of ovulation according to Knaus's reckoning. The differences between Knaus's and Ogino's interpretations are evident.

[Plate - 14b]

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