

The Sympto-Thermal Method: Ten Years of Change

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None of us could be here if, in 1968, the American bishops had not voted to launch a research and educational foundation directed towards Natural Family Planning (NFP). Therefore, let us express our deep gratitude for this far-reaching decision. I, personally, would like to thank the Foundation for a two-year grant period. Without this financial support I would not have been able to carry out systematic investigations in this field.

In order to understand the effectiveness of the different rules of application given by different groups who use a sympto-thermal method of some sort, let me deliver a short survey about a few aspects of the biology of the cycle.

Basal Body Temperature (BBT) and Ovulation

Greulich (1941, 1946),^{1, 2} then Buxton and Engle (1950)³ in the United States were the first to provide usable data on the time of ovulation in relation to the BBT because they performed operations on the ovary, and reported the microscopic observation of excised corpora lutea. They concluded that the rise in BBT may produce an error of as much as four days in determining ovulation time (references to my booklets *Fine Points of the Sympto-Thermic Method of Natural Family Planning, No. 1* and *No. 2*, will be given as *Fine Points* with pages and figures). Buxton and Engle are cited in *Fine Points 1*, p. 13, figure 8.⁴

The next author to make the same approach was Rauscher⁵ in Vienna. At all international meetings, he was called "the world's hormonal conscience" because of his critical approach on how to determine the "day of ovulation." With the aid of what he called "simultaneous examination of smear and cervix" he was able to determine the beginning of a period of time lasting one and one-half days during which ovulation usually occurred, or did not occur at all. He published excellent histologic pictures of the ripe follicle and of the ruptured follicle.⁶ For determining the "day of ovulation" he only used corpora lutea which were younger than 24 hours. The women concerned had to take their waking temperature rectally at home. In 1958, Rauscher himself described the possible days of ovulation in the following way: "The rise in temperature can take place within a period of time lasting from one day prior to ovulation up until four days after it, or in extreme cases even up to 6 days after it."⁷ The few cases with an interval of six days which Rauscher found were infertile women. Maybe this long interval indicates a reason for infertility. The long delay in temperature rise could indicate a defective ovulation of some sort, maybe without release of an egg, or a defective corpus luteum of some sort which is not able to produce an endometrium suitable for implantation. If there really were convincing data — such data is not yet available — that intercourse several days before the "shift" more often leads to spontaneous abortion, then one must first try to answer the above mentioned question before assuming aging sperm.

It is a very important fact that Hilgers,⁸ without citing the papers by Rauscher, gave a description which is, in practice, identical to Rauscher's: "It has been shown that the time of ovulation may occur from at least four days prior to two days following the shift in temperature. This six-day variation in the ability of the basal-temperature shift to pinpoint the day of ovulation is far too excessive to reach conclusions regarding the age of gametes and the role this may play in spontaneous abortion or neonatal abnormalities."

A few months ago, I discussed this problem in Vienna with Rauscher who has been retired for some years. He also declared it absolutely impossible to draw conclusions with regard to aging gametes by using a reference point in the course of the temperature curve. He could not believe that anyone with personal experience in this field could make such an attempt which is destined to fail. The papers by Guerrero⁹ dealing with spontaneous abortion and aging of human ova and sperm are completely false from the very beginning. Many failures in NFP derive from the erroneous assumption that it is possible to pinpoint ovulation. *Couples can use NFP more successfully if they are taught not to look for a day of ovulation but to determine the beginning and the end of the potentially fertile period.*

It is an important part of proper teaching to stress the fact that we cannot determine the "day of ovulation."

Cervical Mucus Symptoms and Ovulation

The relationship between ovulation and mucus symptoms was investigated by Billings¹⁰ and co-workers in 22 women, and the findings were published in 1972. Ovulation occurred with a range of from three days after to two days before the peak day (see later). A manuscript by James B. Brown and co-workers was delivered to some of the participants in the International Symposium on NFP at St. John's University, Collegeville, Minnesota: "Markers of the fertile phase of the menstrual cycle." A correlation in 43 cycles gives a range of variation in ovulation time from at least three days after the peak day to two days before. In the same diagram, Brown demonstrated that the rise in temperature can occur from two days before ovulation to six days after it. At the same International Symposium, Hilgers reported an identical range of variation of the peak day according to his own investigations.

Development of the Sympto-Thermal Methods in the Last Ten Years

Ten years ago, many groups throughout the world were already teaching various sympto-thermal methods. The pertinent symptoms were charted to indicate the fertile period. When there was a temperature rise after the mucus symptoms, a woman could be confident that the temperature shift was a true one. This increased the reliability of the waking temperature although the temperature rise was interpreted in accordance with rules referring only to the temperature curve itself without making the interpretation dependent on the mucus pattern.

Ten years ago, in 1968, I published a paper with an English summary in which I made the following remark on the interpretation of the temperature rise in conjunction with the mucus symptoms: that a rise in temperature should not be recognized before the cessation of the cervical mucus flow.¹¹

Since the early seventies, some groups have been trying to check the interpreted temperature rise against the mucus symptoms and/or against the changes in the cervix which Keefe¹² reported in 1962. In the short time available, it is impossible for me to mention all the groups which have contributed to the development of the sympto-thermal methods. There are several teaching programs in existence which are very effective, allowing women to avoid pregnancy when it is necessary to avoid it. The so-called ovulation method according to Billings¹³ has been drawing attention to the fact that important differentiations can be made in the appearance of the mucus symptoms. This has also contributed to a further development of the sympto-thermal methods.

Cervical Mucus Secretion

The most important sign indicating the fertile period is the increased cervical mucus secretion. Proper instruction helps the woman to become aware of the different types of mucus. The duration of this learning process depends on the teaching material provided and on the opportunity for its repeated discussion with a teacher or teacher-couple. At any rate, the woman must be repeatedly instructed.

It seems to be easier for women in developing countries to learn to recognize the different secretions at the entrance to the vagina. In the western civilized countries, it is helpful to use toilet paper. On each visit to the bathroom the woman notices how her vulva feels — is it dry, moist, or wet? Using her fingers or wiping herself with a piece of toilet tissue at the vaginal opening, she can easily find out whether the vaginal entrance is dry or whether the tissue slides over the opening very easily. She readily distinguishes the mucus by checking the tissue paper. The whole observation takes only a few moments.

By folding the tissue one can test whether the mucus is elastic, stretchy, or stringy (“spinnbarkeit”). The cervical mucus secretion can look like the white of a raw egg (“egg-white mucus”). In the charts the capital letter M stands for mucus, and EW means “egg-white mucus.” Some women prefer the expression “glassy” or “glary” to describe this fertile-type mucus (in this case, the small letters gl are written above M). When a woman marks neither EW nor gl, then it is less-fertile-type mucus which is often sticky and cloudy (cl stands for “cloudy”). The last day of fertile-type mucus is called peak day. It is marked with a large dot ● above EW. If a woman cannot observe typical fertile-type mucus, then the last day of her personal mucus secretion (capital letter M) is counted as peak day.

A few notes on other symptoms: Some women can feel an abdominal pain at about ovulation time (chart letter P = “pain”). After ovulation time, particularly in the sustained high temperature phase, some women have a breast symptom — a tenderness, a fullness of the breast — which is helpful in cases where there is a very slow rise in temperature, because it indicates a functioning corpus luteum (chart letter B = “breast”).

Interpretation of the Temperature Rise In Conjunction with the Mucus

A true high-temperature phase is about to be established if the temperature rises after cessation of the fertile-type mucus secretion. An earlier rise in temperature should not at first be interpreted as the beginning of the shift, as it may be due to some disturbing factor, or that a premature rise is a special feature in the woman concerned. The three “higher” readings after the peak day which are higher than the six preceding lower ones are marked by drawing small circles around them.

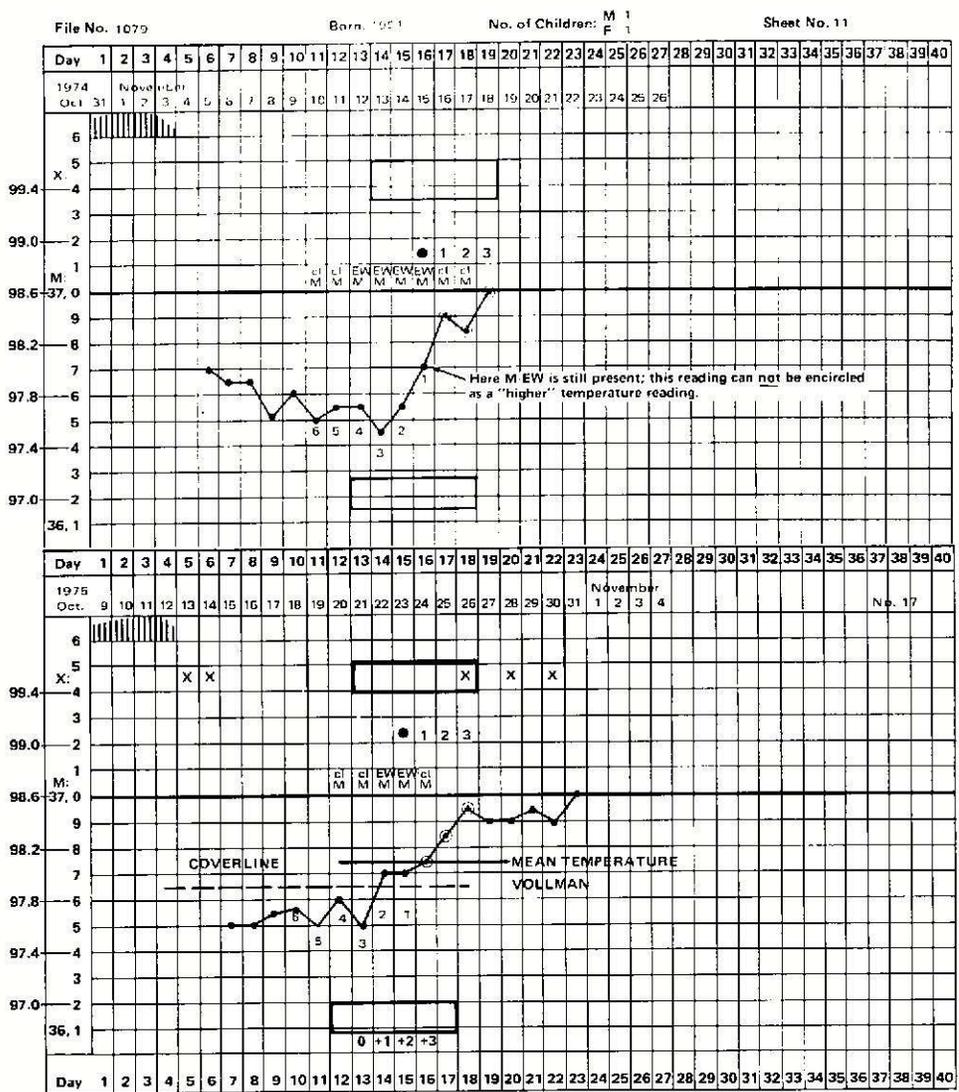


FIGURE 1

- cl = cloudy
- X = intercourse
- EW = egg-white mucus
- = peak day (last day of fertile-type mucus)
- 1, 2, 3 = peak day rule (3 days past the peak are potentially fertile)

The rectangle above the peak day indicates the range of variation of possible ovulation days according to the peak. The rectangle below the temperature curve indicates the possible ovulation days according to the temperature. The two rectangles can be situated on different days of the cycle, and in a different relationship to one another depending upon the interval between the first "higher" temperature reading and the peak day. There is no reference point in the course of the temper-

ature curve which is closely related to ovulation. For practical reasons, the definition of the "day of the shift" is not at all possible because the shift is a process, a movement, lasting for several days during which the temperature ascends from the low to the high level. For determining the beginning and the end of the fertile period, it is not necessary to define the day of the thermal shift. On the contrary, the search for a theoretical definition of the shift distracts from an appropriate interpretation of the temperature curve, the mucus symptoms, and other signs of the fertile period. Equally, doctors and couples should stop dating ovulation because that is impossible and the attempt hinders an appropriate interpretation of the temperature rise. *Over and over again, women stick at a presumed day of ovulation and make serious mistakes in determining the limits of the potentially fertile period.*

It is not necessary for the woman to know exactly about the variability of ovulation time, but she has to be well-informed about the rules which must be applied correctly.

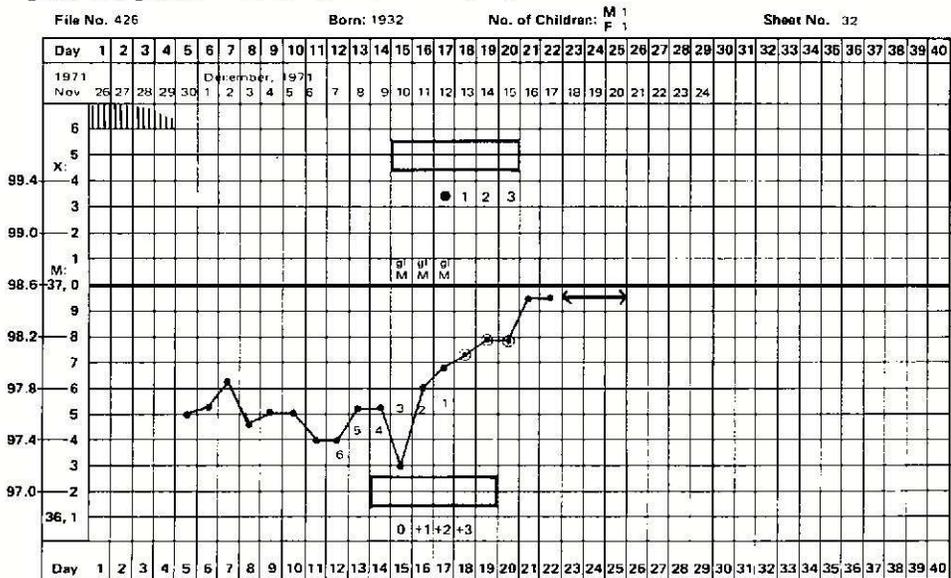
The figures 1, 2, and 3 after the large dot ● which marks the peak day indicate the possible ovulation days after the peak. The peak day rule demands that these three days after the peak should be considered fertile. Infertility may be assumed on the fourth day past the peak.

On the other hand, infertility may be assumed in the evening of the third higher temperature reading after the peak. Little circles are drawn around the three "higher" temperature recordings. In this combination in both the cycles of this chart, ovulation is very unlikely to occur on the third day past the peak. In this chart, the third day past the peak is situated on the margins of the fertile period. Intercourse in the morning of such a third higher reading can lead to pregnancy in very rare cases only. Up until the present time, I have not observed a pregnancy resulting from intercourse in the evening of such a day. Up until the present time I have not seen an increase of spontaneous abortions resulting from intercourse on the margins of the fertile period on either side, and neither did Vollman¹⁴ in his abundant material.

In both cycles the menstrual period occurred at the expected time, that is, about two weeks after the possible days of ovulation. Menstruation is not charted in order to show that the interpretation of the temperature shift in conjunction with the mucus symptoms is possible without knowing the onset of menstruation, or in other words, without knowing the outcome. By applying the pertinent rules, there is always only one single interpretation possible. We can call such a procedure "blind coding." The rule which must be applied reads as follows: *Only then when you are past the peak, look for three "higher" temperature readings which are higher than the six preceding ones.*

In the lower cycle we can compare different methods of interpreting the temperature shift. On the bottom of the lower cycle you can see "Day 0" according to Guerrero,¹⁵ then his days +1, +2, and +3. Day +3 is situated one day past the peak, that is one of the most probable days of ovulation. Conception may be possible even on day +4. In this case, the coverline approach results in the same interpretation, thus explaining a biological failure rate. Vollman¹⁶ demands three higher readings after the mean temperature and he is right. In my experience, his system is always right; however, in many cases the time of abstinence is longer. If you have to interpret difficult temperature curves, please apply the mean temperature according to Vollman. John Marshall¹⁷ would either say that "in case of a slow or step-like rise in temperature, the point for the commencement of coitus is when five temperatures from the foot of the rise have been recorded" (that is, in this case, the third encircled recording), or he would wait for three points in the sustained high phase, as would Doring¹⁸ or the Rendus.¹⁹ The third encircled point is the first recording in the sustained high temperature phase; this system is highly reliable in avoiding pregnancy, but demands longer periods of abstinence in many cases. Therefore, Guerrero²⁰ is not right when he compares his day +3 to the third high point according to Doring or John Marshall. But only when one applies the strict rule of the three readings in the true high temperature phase can it be said that conception on the third point "is very unlikely to occur."²¹ When one applies Guerrero's system a woman can even become pregnant on a day +4 or +5.

It is not difficult to find charts on which day +3 is situated one day past the peak,²² as in the following figure 2a:



Even day +5 can be situated one day past the peak, as in the following figure 2b (menstruation occurred 13 days after the peak) which is almost identical to the "step like rise" in figure 1 of Guerrero's paper in 1970: 23

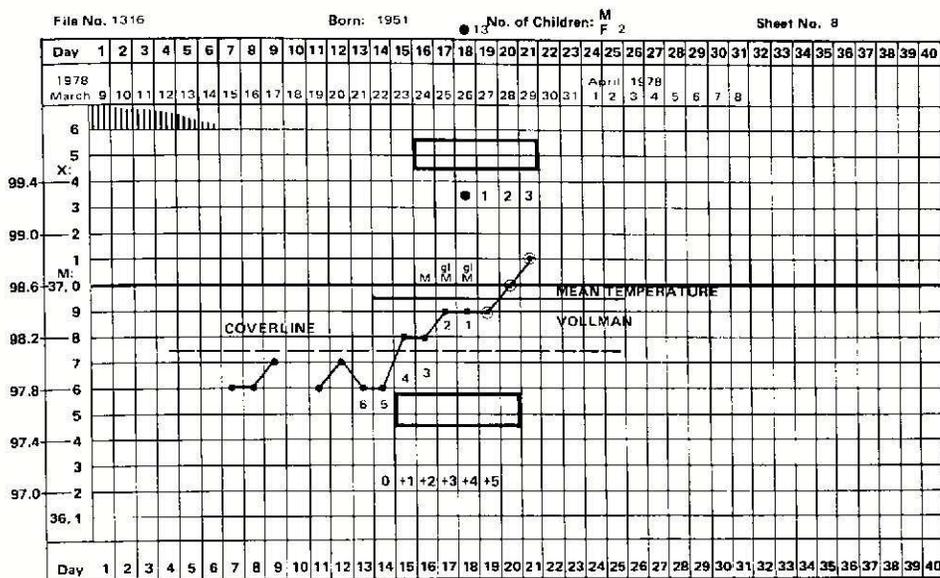


FIGURE 2b

Another example of day +3 one day past the peak can be seen in the following figure 2c:

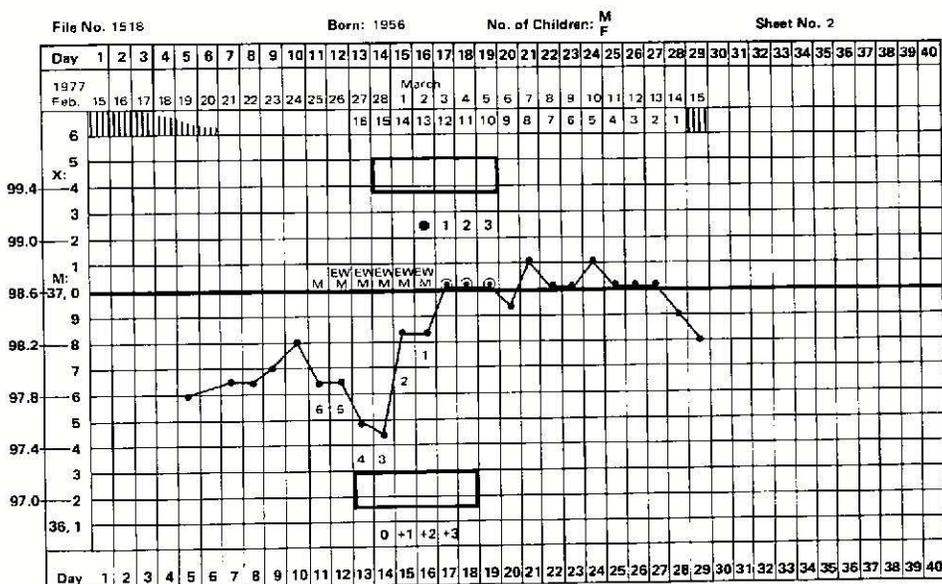


FIGURE 2c

It depends upon the relationship between possible ovulation days according to the peak, and according to the first "higher" reading, whether or not the fourth day before the peak, and the fifth day before the first "higher" temperature reading is situated in the *less-fertile time*.

Besides which, a longer lasting "fertile-type" mucus patch can be the reason why the *highly-fertile time* begins on an earlier day before the peak, or before the first "higher" reading.

It is not possible to draw conclusions with regard to the time of fertilizability of sperm and the egg since the range of variation between the above-mentioned symptoms of the fertile period and ovulation is about four to six days, but other investigations should be made to find out the limits of the fertile period in as many cases as possible.

I have been giving the following advice for years:

As soon as a couple is willing to have the first child, or another child, they should do experiments of some sort: they should try to find out the limits of the personal fertile period in this particular woman by having intercourse on the margins of the fertile period. Then, the couple will not only find out how long it takes to become pregnant in the *less-fertile time*, but they will also be astonished how long it really takes to conceive. This personal experience of the couple increases the confidence in the sympto-thermal method using an interpretation of the temperature shift in conjunction with the mucus symptoms. At the same time, it provides a valuable personal experience with regard to the correct application of the sympto-thermal method. A few cases are published in the *Fine Points No. 1*.²⁴

A thick and cloudy yellow mucus after the peak (small letter y above M) indicates that the fertile period is coming to an end. This couple wanted to find out whether or not the second day past the peak was already infertile, while such a mucus was present. The strict rule demands waiting for the third higher point after the peak. A few weeks later, the couple reported that the next menstrual period occurred on April 21, 1978.

Postmenstrual Infertile Days

For determining postmenstrual infertile days, a combined procedure should be recommended:

1. The days from the first day of a "true" menstrual period up to and including the sixth day of a cycle are considered infertile, regardless of the cycle length, as indicated by the thick line between the sixth and seventh day.

A "true" menstrual bleeding is recognized by the fact that it was preceded by a high-temperature phase. On the other hand, it is possible to have a "cycle" without a temperature rise (which

could mean that no ovulation took place) but nevertheless with bleeding. Such bleeding is not "true" menstruation; within and after such bleeding no infertile days may be assumed. It is possible that ovulation could occur in association with it.

Until June 30, 1977 — this was the end of my research project for The Human Life Foundation of America — I had observed only one pregnancy resulting from intercourse on the sixth day of the cycle in 8,532 cycles in which the couples always assumed infertile days at the beginning of the cycle; that would mean a pearl index of less than 0.2.

The pregnancy resulting from intercourse on the sixth day of the cycle occurred in a woman with very short cycles who for seven years had been able to assume infertility through the fifth day. The range of cycle variation was 22-27 days.

2. It is possible to consider more than six days infertile if the bleeding stops before the seventh day and dry days can be observed after the sixth day. Dryness is not only an absence of perceptible mucus but a positive sensation of dryness at the entrance to the vagina, often a disagreeable feeling, sometimes associated with itchiness.
3. If a woman has lost the feeling of dryness but does not yet feel moist, this interim might indicate to her that "something is happening." If she can observe such an interval between the end of the dry days and the beginning of the mucus symptoms (in the chart figure 4 marked by "zero crossed out" Ø), she can consider

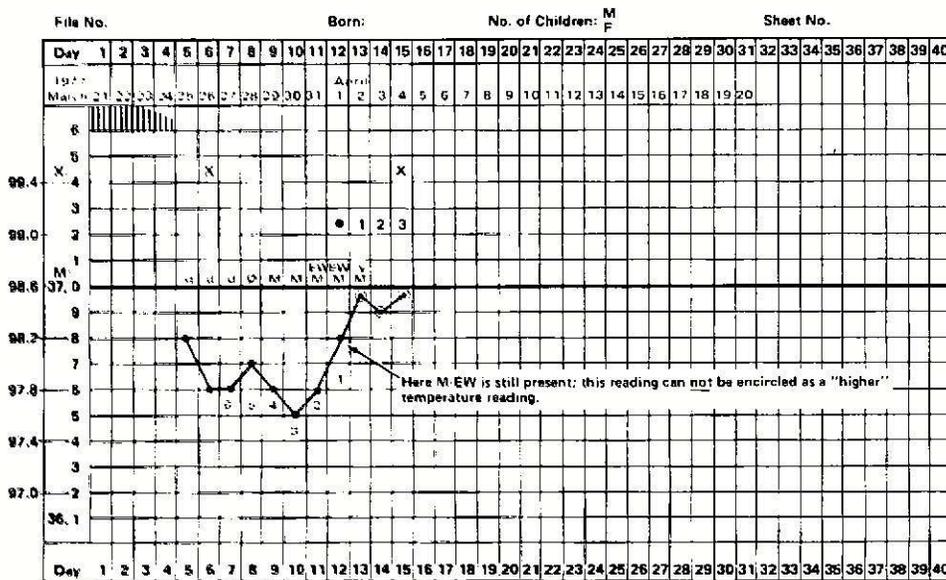


FIGURE 4

all the dry days infertile. Correct recognition of the dry days is only possible after a certain learning process during which the woman is to become aware of the different observations at the vaginal opening.

4. Another approach for determining infertile days at the beginning of the cycle consists of applying a calculation rule, for example "shortest cycle minus 20." In my experience, this rule determines the last infertile day post-menstrually, of course, with the exception of the first six cycle days (see above). In order to gain relevant knowledge about the shortest cycle, a woman should have observed at least 10 cycles.
5. As soon as a woman is in the course of her cycle beyond the sixth day, especially careful self-observation is necessary in order not to overlook the beginning of the mucus symptoms. The same is true when the woman is in a cycle day beyond the border line "shortest cycle minus 20." In both cases the woman must take into consideration the possibility of an immediate beginning of mucus symptoms. In case a woman cannot observe any mucus symptoms at all she must take into consideration the possibility of impending ovulation.

Many couples are satisfied since they were allowed to use the six infertile days at the beginning of the cycle. Then, they wait for the three "higher" temperature readings before resuming intercourse. The extremely high reliability of infertility during the first six days of the cycle is of great advantage to the couples.

Let me present the pertinent figures up until June 30, 1977, which were, at the same time, my final report to the Human Life Foundation:

Table I
PRACTICABILITY OF CERVICAL MUCUS OBSERVATION
(HLF 1975/1977: 311 fertile women)

4.8%	15 women without any perceptible mucus secretion.
1.9%	6 women without "egg-white mucus" or "glassy mucus"; only "less-fertile-type mucus"; the last day of this type of mucus is then considered the "peak day."
93.3%	290 women observing M-EW or M-gl: the last day of this "fertile-type mucus" is the "peak day."

Table II
OVERALL FIGURE OF FEMALE PARTICIPANTS
(HLF 1975/1977: 335 women)

Ages 18—44	14,070 cycles
744 children, 61 miscarriages, 2 stillbirths	
Monophasic cycles	191 (1.35%)

Using an appropriate technique of taking the “waking temperature,” it is uncommon to find monophasic cycles in fertile women.

Table III
BIOLOGICAL (THEORETICAL EFFECTIVENESS)

1. Three “higher” points after the “peak” (X in the evening)
Pearl index: 0
2. Infertility of the first six days of the cycle:
One pregnancy in 8,532 cycles
Pearl index: less than 0.2

Table IV
OVERALL USE-EFFECTIVENESS
USING POST- AND PRE-MENSTRUAL DAYS
(Trial 1967 and HLF 1975/1977)

491 fertile women
17,026 cycles
12 surprise pregnancies
Pearl index: 0.8

Gaining Additional Data Through the Use of Auto-Palpatation (Keefe²⁵)

It is possible for the woman to touch her cervix with her forefinger. At about ovulation time the cervix is soft and can be as wide as the tip of the finger. Women say that the cervix is as soft as the lips, whereas it is closed and as hard as the tip of the nose during the infertile time. In the pre-ovulatory infertile period the cervix is not as tightly closed as after ovulation. You can see charts with observations in the *Fine Points 1*, p. 20: 2, p. 19.²⁶

In figure 5, small circles at the bottom of the temperature chart indicate the widening of the cervix. You can see slightly larger circles on three days with the small letter “s” which means “soft.” On the

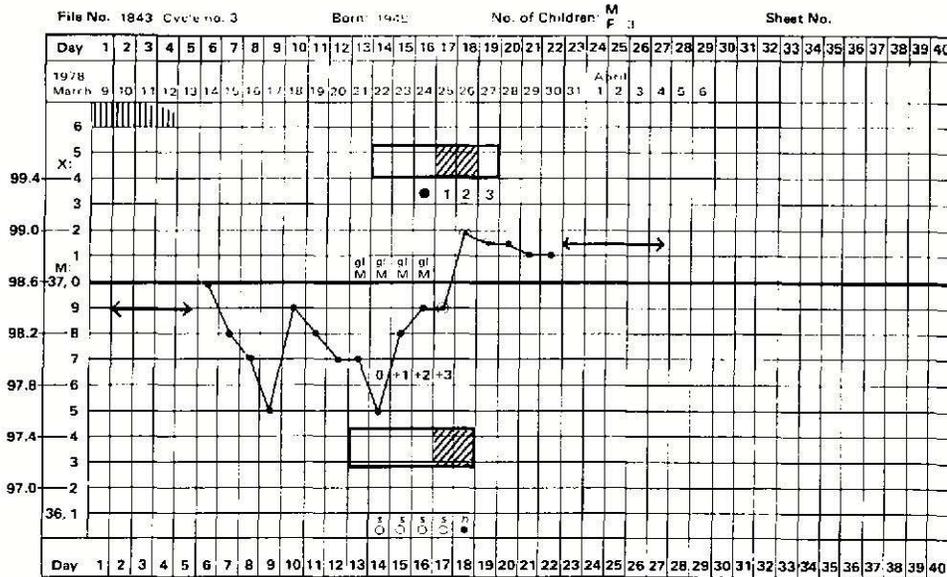


FIGURE 6

phase is about 98.8° F and higher. The rule for the interpretation of the temperature curve given by Holt²⁹ in the fifties reads as follows: "Look for 3 higher temperature readings which are higher than the six preceding ones." This rule gives very reliable results for avoiding pregnancy. There are only rare cases when intercourse in the third higher reading according to Holt can lead to pregnancy. In this case, Holt's system would have worked, the coverline approach would have worked, the mean temperature according to Vollman would have worked. Doring and John Marshall would not have allowed intercourse until the true infertile period was present. On the other hand, Guerrero's system does not work. The people who use the nadir as reference point tell us that the range of variation of ovulation is from +4 to -4 days.³⁰ In this case ovulation time could lie within this range because the two most probable days of ovulation are day +3 and +4 after the nadir.

If women chart these three markers of the fertile period, it might be possible to gain additional data with regard to the viability of sperm and of the egg.

Conclusions

If we take into consideration our experience with regard to the day of intercourse which can lead to pregnancy on the one hand, and the possible ovulation days according to the temperature rise in conjunction with the mucus symptoms on the other, we have never had any difficulty explaining a pregnancy by assuming not more than three to

four days' viability of the sperm and one day of the egg.

If fertilization takes place on the margins of the fertile period, no increase of spontaneous abortions or birth defects can be observed.

It is a rare event when intercourse seven days before the first "higher" reading leads to pregnancy. It is also a rare event when intercourse six days before the peak results in pregnancy (*Fine Points 1*, p. 33, figure 19).³¹

In conclusion, let me say a few words with regard to an important general attitude towards NFP. We must be open minded to any change in methodology of observation or interpretation which might provide a better understanding and a better determination of the fertile period in the human female. For example, I am waiting for instructions on the new grading system of Hilgers which he first reported one year ago at St. John's University in order to teach couples his approach.

Certainly, there are different needs in different countries, in different populations, and in different field trials which want to achieve different goals. If someone wants to use a combination of appropriate parameters, let him use the desired combination. If others are satisfied with using only one marker, they may do so. The main point is that the chosen system works. A famous German professor of gynecology once said that the future of family planning belongs to natural conception regulation. In this sense, I would like to call upon all of you to cooperate in this field as well as possible.

REFERENCES

1. Greulich, W. W. and Morris, E. S., "An Attempt to Determine the Value of Morning Rectal Temperature as an Indication of Ovulation in Women," *Anatomical Record* 79 (1941), suppl. 27, p. 27.
2. Greulich, W. W., "The Reliability of 'Basal' Body Temperature Changes as an Index of Ovulation in Women" (Trans. Am. Soc. for Study of Sterility, 1946), pp. 76-77.
3. Buxton, C. L. and Engle, E. T., "Time of Ovulation," *American Journal of Obstetrics and Gynecology*, 60 (1950), pp. 539-551.
4. Roetzer, J., "Erweiterte Basaltemperaturmessung und Empfängnisregelung" [Supplemented basal body temperature and regulation of conception], *Archiv für Gynaekologie* 206 (1968), pp. 195-214. *Fine Points of the Sympto-Thermal Method of Natural Family Planning*, No. 1 and No. 2 (Collegeville, Minn.: The Human Life Center, St. John's University, 1977). "Further Evolution of the Sympto-Thermal Methods," *International Review of Natural Family Planning*, Vol. 1, No. 2, Summer 1977.
5. Rauscher, H., "Vergleichende Untersuchungen über das Verhalten des Vaginalabstrichs, der Zervixfunktion und der Basaltemperatur in Zweiphasischen Zyklen," *Geburtshilfe u. Frauenheilkunde* 14 (1954), pp. 327-337. "Die Ermittlung der Präovulatorischen Phase Durch die Simultanuntersuchung von Vaginalabstrich (Smear) und Zervix," *Geburtshilfe und Frauenheilkunde* 16 (1956), pp. 890-906.
6. Rauscher, H., "Die Grundlagen Unseres Vorgehens zur Ermittlung des Konzeptionsoptimums," *Proceedings of the Second World Congress on Fertility and*

Sterility (Naples, 1956), pp. 625-635. "Der Histologische Befund als Beweisgrundlage für Schlussfolgerungen auf das Verhalten am Inneren Genitale um die Zeit der Befruchtung," *Archiv für Gynaekologie* 198 (1963), pp. 249-253.

7. Rauscher, H., "Untersuchungen über die Länge der Beiden Zyklusphasen in Relation zur Gesamtdauer des Zyklus bei Frau mit Kinderwunsch," *Geburtshilfe und Frauenheilkunde* 18 (1958), pp. 575-579, at p. 579.

8. Hilgers, Th. W., "Human Reproduction: Three Issues for the Moral Theologian," *Theological Studies* 38 (1977), pp. 136-152.

9. Guerrero, R. V., and Rojas, O. I., "Spontaneous Abortion and Aging of Human Ova and Spermatozoa," *New England Journal of Medicine* 293 (1975), pp. 573-575 (see ref.). "Aging of Fertilizing Gametes and Spontaneous Abortion," *American Journal of Obstetrics and Gynecology* 107 (1970), pp. 263-267.

10. Billings, J. J., et al., "Symptoms and Hormonal Changes Accompanying Ovulation," *Lancet*, i, 1972, pp. 282-284.

11. Roetzer, *op. cit.*

12. Keefe, E. F., *Fine Points of the Sympto-Thermic Method of Natural Family Planning No. 1* (see ref. 4), p. 40.

13. Billings, J. J., *Atlas of the Ovulation Method*, 3rd edition (Melbourne, Australia: Advocate Press, 1977).

14. Vollman, R. F., *The Menstrual Cycle* (Philadelphia: W. B. Saunders Co., 1977).

15. Guerrero, *op. cit.*

16. Vollman, *op. cit.*

17. Marshall, J., "A Field-Trial of the Basal-Body-Temperature Method of Regulating Births," *Lancet*, ii, 1968, pp. 8-10.

18. Doering, G. K., "Ueber die Zuverlaessigkeit der Temperaturmethode zur Empfaengnisregelung," *Deutsche Medizinische Wochenschrift* 92 (1967), pp. 1055-1061.

19. "Amour et Famille," *Fiches Documentaires du C. L. E. R.*, No. 94 (1975); No. 104 (1977).

20. Guerrero, *op. cit.*

21. Guerrero, *ibid.*, p. 575.

22. Roetzer, *op. cit.*

23. Guerrero, *op. cit.*

24. Roetzer, *op. cit.*

25. Keefe, *op. cit.*

26. Roetzer, *op. cit.*

27. Guerrero, *op. cit.*

28. Guerrero, *ibid.*

29. Holt, J. G. H., *Geburtenregelung auf Biologischem Wege* (Wien: Franz Deuticke, 1959). *Marriage and Periodic Abstinence* (London: Longmans, 1960).

30. Morris, N. M., et al., "Temporal Relationship Between Basal Body Temperature Nadir and Luteinizing Hormone Surge in Normal Women," *Fertility and Sterility* 27 (1976), pp. 780-783.

31. Roetzer, *op. cit.*