Letters

Rhythm Method

May I be permitted a word in reply to Potter's criticism (*1*) of my article "Child spacing: The mathematical probabilities" (*2*).

The problems of mothers of two, three, or four children who wish to avoid further pregnancies during a risk period of 10 years or more have been well dramatized in Potter's published work (*3*). The monthly security factors needed here, 99.9+ percent, put this situation outside the attainable reach of the rhythm method.

The period of postpartum amenorrhea is not necessarily infertile (*4*). Tietze's (*5*) equation for the monthly security factor (*2*, Eq. 3) is valid for random coitus. It is also valid in a rhythm situation when the expected date of ovulation *cannot be known with accuracy*. The application of Tietze's equation would not be valid, as Potter correctly points out, after ovulation *is known with certainty* to have occurred during the current cycle (however, I have evidence of one pregnancy which occurred by isolated coitus 4 days *after* the temperature rise).

My article pointed out that Tietze's equation was "too pessimistic, from the standpoint of spacing births, when couples can be reasonably certain that ovulation will occur regularly in the middle of the cycle" (*2*, p. 1631). Even if the monthly risk of pregnancy predicted by Tietze's equation is cut down by half, it still takes only four to seven acts of coitus per cycle to get down to the 93-percent monthly security level at which spacings of more than 18 months between births become improbable.

Tietze and Potter's (*6*) theoretical analysis of the calendar method is based on statistical *models* of the menstrual cycle. These models account only for normal variations in the day of ovulation. They take no account of erratic variations which can result from sickness or emotional stress or of delayed ovulations which can be triggered by coitus.

The cautious Ogino-Knaus calendar proposed by the Planned Parenthood Federation based on make-believe cycles of 23 to 33 days would not have been proof against the following two facts, personally known to me, of conceptions which occurred by isolated coitus, one on the 4th day, another on the 33rd day of the cycle. Furthermore, such a calendar hardly leaves room for more than two acts of coitus in the cycle, and that at times when coitus is psychologically and aesthetically least desirable. I have evidence of cycles varying erratically between 19 and 74 days!

Nothing in Potter's criticism invalidates my conclusion that "the natural variations in the fertility and sterility of man and of woman will have to be learned and mastered, so that mankind can, in Pius XII's own words [*7*], take advantage of them."

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References

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2. A. J. Bethune, *ibid.* **142**, 1629 (1963).
3. R. G. Potter, Jr., *Milbank Mem. Fund Quart.* **38**, 255 (1960).
4. Centre d'Études Laennec (Paris Catholic Medical Study Centre), *La Regulation des Naissances* (Lethielleux, Paris, 1961).
5. C. Tietze, *Fertility Sterility* **11**, 485 (1960).
6. ——— and R. G. Potter, Jr., *Am. J. Obstet. Gynecol.* **84**, 692 (1962).
7. Pius XII, *Acta Apostolicae Sedis* **50**, 736 (1958).

The Trouble with Technological Forecasting

Technological forecasting is receiving increased attention in industry, in the Department of Defense, and in many other quarters. Forecasts, formal and informal, are fairly plentiful; their common fault, as I see it, is a reluctance on the part of forecasters to specify what science and technology are *working toward.* Forecasts are sometimes written as if the future growth of science and technology cannot be controlled, as if *laissez faire* will prevail in the future as it has, in great measure, in the past. The resistance of scientists, or any other group, in a nonregimented society to a directed or planned future is understandable, but it would seem that, in the interest of concreteness and coherence in forecasting, the assumption could be made that the needs of definable areas of scientific interest are broadly, if not in particulars, known today. Methodical forecasting could then have a framework of these basic steps:

1) Estimates of future requirements within definable areas (energy conversion, genetic control of biological organisms, and so on).

2) Predictable scientific discoveries pertinent to these definable areas.

3) Concepts, developed by applied research, looking toward applications.

4) Expected advances in technology that will permit the implementation of these concepts.

The imminence of scientific discoveries, fortunately for the forecaster, is often preceded by portents. Looking back to the discoveries that led to television, we can see that the promise of success was in evidence well ahead of the final victory. One phase of forecasting is, therefore, the identification of portents—no easy task but made easier if an application, however vague, can be visualized. Today, probably more than in the past, these "vague applications" are comparatively easy to find. They lie within definable areas—better physical materials, improved methods of energy conversion, novel means of transportation, the control and improvement of biological organisms, the extension of mental powers by mechanical means. The journals are replete with portents of advances in all these areas. Their identification and definition could conceivably be systematized.

In predicting the direction of applied research, the forecaster may have not a discovery, but only the prediction of a discovery. He then has to build the second story of his structure on top of a first story composed of gossamers (fortunately, the forecasts of applied research can also be composed of gossamers). Once a scientific discovery or set of discoveries has been made, identifying the type of research required to exploit the findings is a more clearcut, if not an easier, task. If the finding lies in the area of energy conversion, for example, the vague applications have moved along into much more concrete ones. But if the research