

nourished and well-nourished populations in which no deliberate birth control is practiced (12).

As I have noted elsewhere (12), large sudden reductions in weight are certainly associated with disturbances of menstruation and ovulation patterns. This is observed during famines but also among otherwise well-nourished women who go on a starvation diet. However, the question of interest to demographers and nutritionists is whether ovulation and conception rates are affected by the chronic moderate malnutrition that prevails in many of the poorest developing countries. Studies of women in Bangladesh (17) and Guatemala (15) found no relation between conception rates and levels of nutrition. Apparently, disturbances of ovulation do not occur in women with relatively stable weights even if these weights are low.

Finally, birth intervals and marital fertility rates in 18th-century Canada and in the laboring classes of 19th-century England are virtually the same as in the Hutterite population, despite wide differences in nutritional status (12). Hutterites are healthy and well nourished (25), while diets were poor in 19th-century England (22). Nutritional data for 18th-century Canada are not available, but mortality was high (26), and it is unlikely that nutrition levels would approach that of the Hutterites.

On balance, I see no reason to change my conclusion (12) that chronic moderate malnutrition of mothers has only a minor effect on their fertility.

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Eye Movement Patterns in Infants

Birnholz (1) has reversed historical fact and thereby misrepresented my concepts of sleep which underlie my current research efforts. He asserted that "Rapid eye movement activity during sleep in infants was . . . rediscovered by Aserinsky and Kleitman." The publication by Aserinsky and Kleitman (2) cited by Birnholz makes absolutely no reference to rapid eye movements or REM activity in infants, and neither does any other publication bearing my name. Indeed, an excerpt from my thesis (3), which underlies all my earliest publications on sleep is as follows:

A new type of eye movement was discovered to occur in the sleep of adults and a child but not in infants. Motion pictures confirmed the presence of these eye movements, which were binocularly synchronous, rapid and jerky. It was suggested that they be termed "rapid" eye movements in contrast to the slow eye movements previously reported.

By definition, the term "rapid eye movement" (REM) signifies two conditions. (i) The ocular activity must occur during sleep, and (ii) it must be of a saccadic type. Inasmuch as a saccadic movement can occur in either waking or sleeping, the critical factor in determining whether an eye movement is a REM or not is predicated on recognizing the concurrent state of consciousness. How does one distinguish between sleep and waking? In general, skeletal muscle tone is considerably lower during sleep than in waking, but as any sleep investigator quickly learns, this is not a foolproof guide. A more practical guide is through examination of the pattern of ocular activity. This is predicated on previous investigators having successfully corre-

lated the pattern of ocular movement with other physiological or psychological measures to denote the concurrent state of consciousness. For adult subjects, the normative pattern is distinct and demarcation of defined REM periods is well established. In infants, however, especially those younger than 4 weeks, reliance on ocular pattern to discriminate REM from waking is diffuse, and their shifts from one state of consciousness to another seem erratic. Moreover, while in older subjects the REM state has the invariant characteristic of being preceded by sleep without eye movements, what might tentatively be termed the "REM state" in young infants is preceded by the waking state. The commonly used criteria for identifying REM in an adult are thus no longer tenable in the young infant.

Birnholz's statement that the ocular activity in a 23- or 24-week fetus is REM activity must be a speculation, since it is not known whether the fetus is asleep, or for that matter awake. One might surmise that the fetus is in a primitive, nether state of consciousness and that the primordial ocular activity is not REM but rather the progenitor for both waking eye movements and REM.

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