of those patients" to ensure the diagnoses of schizophrenia. However, he did not utilize the more detailed criteria described by Schneider and Fish (*5*), which is the only guarantee of selecting a similar sample. Melges also expressed the view, not shared by me, that research in "schizophrenia per se" should not be undertaken as the diagnostic category is too broad and inclusive. The use of Schneider and Fish's criteria increase the homogenicity of any sample of schizophrenics.

Melges and I agree that the problem of chronicity is pertinent to the difference in our samples. Practically all the women he studied were having an acute, short-lived psychotic episode, whereas my sample included only chronically ill individuals (hospitalized more than 3 years following the postpartum psychoses). Protheroe (*6*) reports the long-term outcome to be poor in process schizophrenia developing in the postpartum period.

These differences in diagnostic criteria and in chronicity of illness may have resulted in Melges' selecting a patient sample not comparable to my own, that is, reactive (psychological) instead of process (organic) schizophrenics. Whether a variable offspring sex ratio could result from such a sample difference must await further investigation.

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Regarding Periodic Phenomena

The opening statement in the report of Morley and Stohlman (*1*) illuminates the usually unstated but prevailing assumption about the operation of physiological systems—to wit, that most of the system variables come to a constant state when disturbances cease. Their report discusses the periodic nature of red cell concentration that they measured in dogs. To introduce their work, they state: "Many body parameters are known to be actively controlled in such a way as to oppose disturbances and result in a more or less steady state. A commonly assumed and expressed corollary to this concept of active regulation is that a perfectly steady state results when no external disturbances are acting. However, clear exceptions to this corollary exist." The authors go on to suggest that oscillating steady states are rare and refer to a few instances known to them as introduction to their own work.

For many years I have been actively developing a contrasting thesis, namely, that living systems, and in fact all systems, can operate in no other way but through epochs of periodic (cycling) "steady states" and aperiodic switch states. Cyclic theories of systems are as old as man's written thought, and investigators such as Huntington, van der Pol, and the many who study circadian rhythms in biosystems have all actively pursued the importance of particular periodic phenomena. Nevertheless, I know of few besides Richter and me who have tried systematically to extract a variety of cyclic data from the biological system and to put forth hyopotheses about the underlying causes of these individually distinctive cycles. Such investigations are essential, because there is a regrettable paucity of information about sustained, unperturbed normal operation of living organisms. So far, there has been virtually no systematic biospectroscopy.

The sharp issue that lies ahead is not merely the question of whether few or many systems are known to vary up and down, but rather of how regulation in the biological system is achieved dynamically. The common view is that biosystems react to wipe out the causes of disturbances. My view is that active, nonequilibrium (but not far removed from equilibrium) thermodynamic processes are involved in a large spectrum of autonomous oscillators in the living system and that the regulated average state emerges from adjustments in the parameters determining the operating points of these oscillators. This difference in viewpoint is fundamental and has in it the germ of a revolution in biology (*2*).

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Orientation by Pigeons

In his report (*1*) entitled "Orientation by pigeons: Is the sun necessary?" Keeton presents, at length, data that he feels will make necessary a major reformulation of a principal hypothesis. However, after critically examining Keeton's data and conclusions, we feel he has given insufficient consideration to evidence obtained by other investigators and provided only a modest addition to their work. We would like to make the following comments.

Keeton reports a total of 21 scores from two one-sample experiments in which normal birds were released (his Figs. 1 and 11). One might add 31 scores of control birds from the two-sample experiments with clock-shifted birds. Both vanishing and homing data were no different from data obtained under sunny skies. Similar releases under overcast have previously been published by Hichcock, Kramer, Matthews, Schmidt-Koenig, and Wallraff providing several times the number of scores now published by Keeton. Randomization or deflection of initial orientation was observed about as often as apparently undisturbed orientation [for reviews see (*2*)]. Keeton does not present enough scores to change this balance either way. As discussed in the literature, randomized or deflected initial orientation and poor homing are commonly observed in sunny conditions (for example, Keeton's Fig. 9.) Thus it is very difficult to demonstrate the effect of overcast in one-sample experiments, particularly with only a few experiments with small sample sizes. The major problem remains to define overcast in some rigorous physical way, that is, assurance of continuous invisibility of the sun for pigeons over the entire area covered by a homing flight.

Keeton defines skies as "overcast" when clock-shifted birds were not deflected in two-sample experiments. This sky condition cannot be extrapolated from one time and location to other times or days or locations (for one-sample experiments) without some physical definition. Although Keeton criticizes Matthews for using this unsatisfactory procedure, he uses it himself. Again, Keeton is not the first to report releases of shifted birds under overcast. He reports three such releases, one of which was not entirely under overcast. In one of the other two releases, no birds homed the same day. This leaves only 11 control and 10 experimental homing scores for an assessment