appearance of this alteration in Lead II of the E.C.G. for a 3ma current.

Our first thought was that this resulted from a direct effect on the course of polarization of the myocardium. However, further contemplation leads us to believe that this is an electrical impedance effect, in which the electrocardiograph registers, superimposed on the electrocardiogram, alterations in the field distribution which result when the central body impedance changes coincident with ventricular ejection of blood. This is essentially the same effect, generally measured on peripheral body segments, as in electrical impedance plethysmography.

The effect is proportional to the amount of current being passed through the body. With the smaller currents being used in the investigations reported in your *Journal*, one would expect a smaller effect. This effect might possibly cause misinterpretation of clinical electrocardiograms done on subjects who are being electrically polarized. It is also conceivable that, by applying the upper electrode on the base of the neck and underneath clothing, an individual might use the passage of an electrical current through his thorax in an effort at malingering.

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INVOLUTIONAL PSYCHOSIS: SOME NEW AETIOLOGICAL CONSIDERATIONS

DEAR SIR,

Dr. P. R. J. Burch's equation (1) in his paper "Involutional Psychosis: Some New Aetiological Considerations" which appeared in your November, 1964, issue (pp. 825–829) does not follow from his postulates.

Dr. Burch's postulates are simply that, for each individual in the population at risk (*a*) there are a large number, L, of cells at risk and (*b*) the gene somatic mutation rate per cell at risk is m_s. It is required to find the probability that an at risk individual has n or more cells which have had a somatic mutation. This situation is a standard textbook example of a Poisson process (see W. Feller (1950), *An Introduction to Probability Theory and Its Applications*. New York: J. Wiley and Sons, pp. 366), and its analysis may proceed as follows: write $p_r(t)$ for the probability that the individual has accumulated exactly r "somatic mutations generating r genetically identical forbidden clones" at age t then

$$p_r(t+dt) = p_r(t)\,[1-kdt]+p_{r-1}(t)\,kdt$$

$(r \geqslant 0,\ dt \to 0,\ k = Lm_s,\ p_0(0) = 1,\ p_{-1}(t) = 0$ for all t), that is, the probability that there are exactly r forbidden clones at age t+dt equals the sum of (i) the probability that there are exactly r forbidden clones at age t × the probability that no mutation occurs in the age period t to t+dt, and (ii) the probability that there are exactly r−1 forbidden clones at age t × the probability that a mutation occurs in the period t to t+dt.

The above stochastic equation may be written:

$$dp_r(t) / dt = -p_r(t)k+p_{r-1}(t)k$$

which has the well-known solution

$$p_r(t) = e^{-kt}(kt)^r/r!$$

This means that the age specific prevalence (Dr. Burch's equation (1)) at age t is

$$N_t = P_o \sum_{i=n}^{\infty} e^{-kt}(kt)^i/i!$$

This fact was pointed out in the correspondence on Dr. Burch's paper on "Inflammatory Polyarthritis" (1, 2, 3), by Mr. J. Maynard Smith and Mrs. S. Maynard Smith (4, 5), by Drs. R. Augustin and J. A. Spiers (6), and by me (7). Dr. Burch's equation (3) is similarly in error.

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REFERENCES

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3. —— (1964). *Ibid.*, *ii*, 479.
4. MAYNARD SMITH, J., and MAYNARD SMITH, S. (1963). *Ibid.*, *ii*, 357.
5. —— —— (1963). *Ibid.*, *ii*, 738.
6. AUGUSTIN, R., and SPIERS, J. A. (1964). *Ibid.*, *i*, 1280.
7. PIKE, M. C. (1964). *Ibid.*, *ii*, 151.

DEAR SIR,

Dr. Pike is a victim of a widespread fallacy. This fallacy involves the failure to distinguish between independent *trials*—described by binomial or Poisson equations—and independent *events*—described by the calculus of independent probabilities. The problem of independent events was correctly analysed by Yule, in the context of evolutionary theory, in 1924 (see also Irwin, 1964).

A good textbook example of "independent trials" is the sequential throwing of a dice. If we throw a dice T successive times ("trials") and if we wish to