PERUTZ, M. F. 1954. *Roy. Soc. London Proc.* **225A**:264.
WORTHINGTON, C. R., and A. E. BLAUROCK. 1968. *Nature (London).* **218**:87.
WORTHINGTON, C. R., and A. E. BLAUROCK. 1969. *Biophys. J.* **9**:970.

C. K. AKERS
D. F. PARSONS
Biophysics Department
Roswell Park Memorial Institute
Buffalo, New York 14203

Nerve Radiation and the Dipole Model

Dear Sir:

In a recent letter published in the *Biophysical Journal*, Moisescu and Mărgineanu (1) attempted to rule out the dipole model (2) for nerve excitation by comparing a rough calculation of the radiated energy when a dipole shifts its orientation by 180° to the radiated energy measured by Fraser and Frey (3) for active crab nerves. By assuming Wei's (2) values for the dipole moment and the electric field in the vicinity of the dipoles they obtain a radiated wavelength of 60 μ. Since the measured radiated band was 2–20 μ, they state that the electromagnetic emission of the active nerves cannot be explained by the dipole theory.

We are presently doing electrodiffusion calculations for the electric dipole model (4). We have so far successfully fit the potassium iso-osmotic rectification data of Gilbert and Ehrenstein (5) and the normal rectification data of Hodgkin, Huxley, and Katz (6) for the squid giant axon. The energy difference between the postulated two dipole orientations is a parameter in the fits; it assumes values between 20 and 100 mev (wavelength: 62–12 μ) depending on the ion concentration on both sides of the membrane. (Our dipole moments range from 140 to 290 Debye.) Moisescu and Mărgineanu estimated the energy difference to be 20 mev. Our calculations were done with a crude constant-electric-field assumption. We are doing the calculations without this assumption now, and the energy difference could change considerably. Our calculations are for the squid axon. It would be desirable to have radiation data for the squid.

It should be emphasized that rough calculations of physical parameters in any physical system must be, at least, one or two orders of magnitude different than the corresponding experimental quantities in order to rule out a model.

Received for publication 16 July 1970.

REFERENCES

1. MOISESCU, D., and D. MĂRGINEANU. 1970. *Biophys. J.* **10**:482.
2. WEI, L. Y. 1969. *Bull. Math. Biophys.* **31**:39.
3. FRASER, A., and A. H. FREY. 1968. *Biophys. J.* **8**:731.
4. ARNDT, R. A., J. D. BOND, and L. D. ROPER. 1970. Virginia Polytechnic Institute Preprint. Virginia Polytechnic Institute and State University, Blacksburg. VPITBP-2(70).

5. GILBERT, D. L., and G. EHRENSTEIN. 1969. *Biophys. J.* 9:447.
6. HODGKIN, A. L., A. F. HUXLEY, and B. KATZ. 1952. *J. Physiol.* (*London*). 116:424.

RICHARD A. ARNDT
JAMES D. BOND
L. DAVID ROPER
Department of Physics
Virginia Polytechnic Institute
and State University
Blacksburg, Virginia 24061