

letters

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been considerable effort in the direction of obtaining physical models, and the main problem is the paucity of physical information about the behavior of the ionic channels. The thermodynamic approach suggested in Strandberg's 1976¹ paper is very reasonable, and has been pursued by a number of biophysicists. Examples are the use of a Boltzmann distribution of states to explain the behavior of ionic channels in lipid bilayers² and a probabilistic model of the sodium channel.³

Most of the ten questions listed by Strandberg are quite interesting. His statement that they all remain to be answered, however, is incorrect. For example, question 5 asks whether the displacement current produced by polarization is observable. Armstrong and Bezanilla have, in fact, observed such a current.⁴ This displacement current is usually called "gating current" because it probably affects the gating of ionic channels. Question 7 asks about the mechanism of blockage by TTX. This question was also answered by Bezanilla and Armstrong.⁵ They found that TTX does not interfere with gating current, and concluded that it acts by blocking the

sodium channel, rather than by affecting the gating mechanism. There are other questions Strandberg raises whose answers are not yet known. A number of physicists and biologists have been addressing these questions, and Strandberg is certainly welcome to join us.

References

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4/4/77

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Emotional experiences

I am in the process of compiling examples of scientists experiencing an ecstatic or mystical feeling from arriving at a scientific insight into the workings of nature. Such experiences are usually characterized by feelings of awe, wholeness, and

profound significance. If your readers know of accounts already published, I would appreciate knowing the references; or your readers may be able to relate instances from their own experience or the experience of colleagues.

There is a widespread notion that scientists are coldly rational and insensitive to the sublime emotions. Perhaps your readers can help me gather some data on the other side of this question.

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2/18/77

Nuclear R&D

I respond to your editorial in February (page 88). You are of course entirely free to be in favor of nuclear energy and to say so. But it is disingenuous for the magazine editorial to baldly state that safety fears of nuclear power are not legitimate reasons for slowing nuclear R&D. Those of us who view nuclear power as an unwise and unnecessary danger often feel that one of our main opponents is, in fact, nuclear R&D. The momentum developed by nuclear research billions has become

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