Electric Fish Study

Investigations have been in progress on the species of electric fish, Sternarchus albifrons, and S. leptorhynchus, for 7 months. Now, having sufficient equipment, and with techniques developed over some months, we see good prospects for success in several lines of investigation.

Our initial work was directed at the responses of these fish to magnetic fields. Investigators using other species of electric fish have observed strong, overt responses to extremely weak magnetic fields. It seems likely that such fish, with proven ability to perceive extremely weak electric fields, must be responsive to current induced in them by changing magnetic fields. However, our investigations indicate that for Sternarchus at least, there is no response to strong (100 gauss), steady fields. Investigations with progressively weaker fields continues in effort to eliminate the possibility of the blanking effect of too powerful stimulus. The case with the magnet may well be analagous to that reported for applied current on these fish: the smaller the applied stimulus; the greater the relative response.

A concurrent study will proceed using a pulsed magnetic field. Sternarchus is reported to respond to applied A.C. currents and fields far more readily than to stimulation by currents and fields of D.C.

Also in progress is a study of threshold perception for A.C. and D.C. current. There are several reports in the literature already on this topic. However, the data is reported in such a way as to render the work of questionable usefulness to us. The threshold values are reported in Volts/distance. Data on resistance of the syster must be obtained before such figures are useful.

The above experiments have a possible practical application in that electric fish may find use as or as a model for energy detection in the water. The electric field navigation system may also be practical and further baseline studies of its natural originators, the electric fish, will be invaluable.

The electric field of the electric fish is easily monitored by means of an amplifier and oscilloscope. As such, the fish provides what amounts to a living nerve preparation. We feel that monitoring the free swimming animal provides a "window" on nervous activity. As such, this animal could provide a useful model for drug study. With the current emphasis on the breakthrough in the treatment of Parkinson's disease with dopamine, we saw an opportunity to test this theory. Investigations are preliminary, but electrical activity and physical behavior have been observed to be altered after several hours in L-DOPA solution.