x) could be the model for the replacement data (x = length of the flagellum rather than the number of organisms). By integrating the equation the solution of x was obtained and the new variable defined as: $x = KC^{aK}e^{aKt}/1 + C^{aK}e^{aKt}$. The best fit for the theoretical curve was determined by the least squares method such that $(x - x_1)^2$ was minimum for the time intervals (t_1). It required setting the partial derivatives with respect to a and K to zero. The estimation of a and K was therefore dependent upon the solution of the quadratic equations. C, the arbitrary constant, was the averaged initial conditions. The critical values of a, K, C and t used in the determination of x did statistically demonstrate the workability of this mathematical model.

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Electrophysiological studies of earthworm longitudinal muscle.

Intracellular recordings of earthworm body wall muscle made by Hidaka *et al.* (J. Exp. Biol. 50: 387, 417, 1969) and Chang (Am. J. Physiol. 216: 1258, 1969) indicate these cells have low resting potentials (35 to 37mV) and very unstable membranes giving spontaneous trains of spikes. The mEJPs are reportedly rare and EJPs often have very irregular and erratic characteristics. In their studies a saline was used which does not correspond to the ionic composition of earthworm coelomic fluid or blood.

We have therefore examined intracellular muscle activity in the earthworm, *Lumbricus terrestris*, using a saline which more closely resembles earthworm coelomic fluid and blood. In our saline the mean resting potential of muscle fibers was 49.2 mV and spontaneous trains of spikes were not recorded. Stimulation of individual segmental nerves produced discrete, smoothly developing EJPs varying in amplitude from 0.5 to 20mV. Individual muscle cells appear to be innervated by one or two nerve fibers from a single segmental nerve. We therefore conclude that, contrary to previous reports, instability and hyperexcitibility are not characteristic of earthworm longitudinal muscle membranes when bathed in an appropriate saline and that the electrophysiology of earthworm muscle may be more comparable to other invertebrates than has been previously reported (Supported by N.S.F. Fellowship.)

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Physiology of the earthworm crop-gizzard.

The crop-gizzard preparation of the earthworm, *Lumbricus terrestris*, is often cited as a classical example of a spontaneous myogenically rhythmic system. However up to this time all studies on this preparation have been performed in a saline which is markedly different in its ionic composition from the coelomic fluid. We therefore have re-examined this preparation using a saline which has a closer resemblance to the earthworm's own coelomic fluid. Bathed in this saline the rhythmic contractions no longer appear. This suggests that the spontaneous rhythmic contractions reported by previous workers may not in fact reflect the normal functioning of the crop-gizzard. We therefore examined the functioning of the crop-gizzard in the intact animal. A short slit was made in the body wall over the crop-gizzard and the frequency of contractions was determined. In these experiments no saline was used and a drop of mineral oil was applied to the exposed area to prevent drying. Under these conditions the contractions occurred at irregular intervals ranging from about 30 sec up to 5 min or more, the average interval being about 2 min. This is in contrast to the regular 10 to 60 sec intervals reported for isolated crop-gizzard preparations by previous workers. In other experiments crop-gizzards in intact animals were bathed in our saline. Under these conditions we obtained results identical to those seen in preparations in which no saline was used. When, however, these crop-gizzards were bathed in the saline used by previous workers, the intervals between contractions, though still irregular, occurred at much shorter intervals, ranging from 1 min to as little as 5 sec, the average interval being less than 20 sec.

From these observations we conclude that the spontaneous myogenic activity of the isolated crop-gizzard preparation reported by previous investigators is probably induced by the use of an inappropriate saline. (Supported by National Science Foundation Science Faculty Fellowship.)

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Volumetric variations and alanine permeability characteristics of nerve axons in Crustacea.

Volumetric properties of isolated axon fibers of *Callinectes sapidus R.* are analysed in various osmotic conditions. The movement of alanine across the axonal membrane is parallely studied according to a method previously described (Gerard and Gilles, Experientia, 1972, in the press). The dilution of the incubation saline induces an increase of the tissular volume, the latter being regulated within 4 hours. A variation of the extracellular space in opposite direction to the cell change is parallely observed. It is also regulated after 2 hours of incubation. In the same conditions an increase in alanine influx and efflux is recorded. Differences between influx and efflux of alanine determined by radioactive chromatrography, suggest the existence of an uphill active transport which is also influenced by osmotic conditions. These results are discussed in relation with the intracellular isosmotic regulation of euryhaline crustaceans. (Supported by a Grant NIMH No. HE12157-05.)

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