Sex selection: Technique not confirmed

A year ago, R. J. Ericsson and co-workers at the A. G. Schering Co. in Berlin reported an unprecedented feat. They had managed to successfully separate those sperm that decide whether offspring will be male from those sperm that decide whether offspring will be female. The feat appeared to open the prospect of selecting the sex of one's children (SN: 1/12/74, p. 20). More practically, it appeared to hold value for selective breeding of livestock.

Now two groups of investigators in Scotland report in NATURE (253:352) that they have not been able to confirm the results of Ericsson and his team. This lack of confirmation seriously challenges the value of their technique for selecting the sex of offspring. However, the results of one group suggest that the technique may still prove useful in treating infertile men.

The technique of Ericsson and his co-workers is relatively simple. They collected sperm from volunteers, diluted the sperm in Tyrode's solution, then placed the sperm in solution on top of a column containing bovine serum albumin. The sperm were allowed an hour to penetrate the albumin. Then the sperm that had managed to penetrate the albumin and those still on top of the albumin were drawn off separately and identified as motile or nonmotile or as X or Y sperm. (X sperm result in female offspring, Y sperm in male.) The investigators found that the sperm in the albumin were more motile than those on top of the albumin, and the preponderance of sperm in the albumin were Y sperm. If they placed the more motile Y sperm on albumin once again, they would end up with even more motile Y sperm than before, and so on.

So they concluded that sperm that managed to penetrate the albumin were more motile (faster swimmers) than those still on top of the albumin, and that these faster-swimming sperm were mostly Y sperm. They suggested that their technique offered a practical means of separating out Y sperm that might then be artificially inseminated in females and result in male offspring. They admitted, however, that "final proof of an increase in frequency of Y sperm must await sexing of offspring conceived of spermatozoa exposed to the isolation process, whether this be in human or other species."

J. M. Evans and his co-workers at the University of Glasgow Veterinary School are one of the two groups that have tried to confirm the results of Ericsson and his co-workers. They used essentially the same technique the Ericsson group did and repeated the experiment 19 times. But in none of these efforts were they able to obtain a preponderance of Y sperm from the albumin. They conclude that "we have been unable to confirm the results obtained by Ericsson et al."

A. Ross and colleagues at the Western General Hospital in Edinburgh have also attempted to confirm the results of Ericsson and his co-workers. Like Evans and his team, they were not able to obtain a greater percentage of Y sperm from the albumin. But, like the Ericsson group, they did find that more motile sperm migrated into the albumin.

Ross and his colleagues thus conclude that while the technique of Ericsson and his co-workers may not provide a means of separating out Y sperm, it might prove useful in the treatment of male subfertility. □

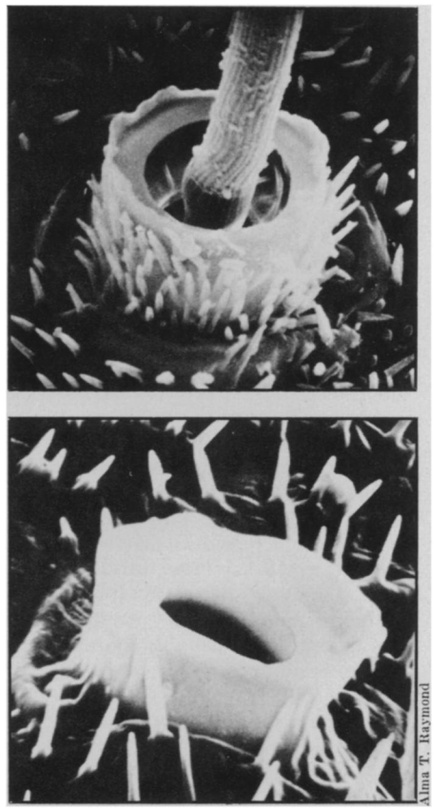
Studying crickets for neurogenetics

Just studying a vertebrate's nervous system is hard enough—many basic interactions of the complex system are still unknown—but directly tracing the genetically controlled development of neurological systems has proved virtually impossible. In primitive species, like the one-celled *Paramecium*, where single-gene mutations are easily detected and studied, neurological data could hardly be extrapolated. In vertebrates, genetic control of particular neurons would be too difficult to isolate. However, zoologist David Bentley of the University of California at Berkeley may have found a species that is genetically simple to study and yet can provide meaningful data on neural development—the Polynesian field cricket. He reports his results in the Feb. 28 SCIENCE.

In order to finally select two neurological mutants from a test group of some 40,000 crickets, Bentley used an air gun to tickle their posteriors, causing normal cricket nymphs to hop and be sucked away by a vacuum system attached to the gun. By further observing, testing and breeding those that didn't hop, he identified a single-gene, sex-linked, recessive mutation involving failure to grow a particular type of hair. The hair is used to detect external motion and trigger the evasive hopping reaction.

Each hair, it turned out, was served by only one neuron, so consequent effects on nervous system development could be traced with relative ease. What Bentley found was that although all nerves were present and properly connected, various parts of the neural sensing apparatus were markedly atrophied, apparently solely as a result of lack of stimulation. Specifically, the neuron connecting the site of the missing hair to a terminal ganglion had only about a quarter of the cross-sectional area of a corresponding neuron in a normal cricket, and within the ganglion itself, the "medial giant interneuron" (MGI)—which is thought to provide the first step in organizing the evasion response—was also withered.

This discovery may have important implications for the study of more complex, vertebrate nervous systems, for it offers a clear, simple case in which not only the structure but also the active functioning of the system is necessary for development. In kittens, if one eye is sewn shut during a critical period of infancy, normal sight can never be restored, apparently because proper nerve development could not take place without a minimum level of stimulation. If such neural failures in kittens and crickets are comparable, a powerful new tool for the study of nervous system development, physiology and structure may now be available. Concludes Bentley: "It may be that in the control of their development, vertebrate and arthropod neurons have more in common than has previously been thought." □



Normal, mutant sensory hair sockets.