not without disadvantages, one being the electrolytic reaction with the lining of the copper wash boilers used for storage. Wooden tree-labels proved to be cumbrous, and the copper wire discolored the specimens.

Metal markers have been substituted. Several trials of different methods of making these were utilized. Thin sheets of soft metal were imprinted in a typewriter with the ribbon removed. This is rapid and has been done with both copper and aluminum. However, the thin strips bend out of shape with handling, and the clarity of the letters has been criticized. Stylus writing on thin metal was more legible. Letter dies of various sizes give sharp cleanly cut words and heavy gauges of metal may be used for the tag, but the process of stamping one letter at a time by hand is very slow. Specifications of die stamping machines were examined but the purchase of such a machine appeared to be an unjustified expenditure considering the infrequent use it might receive. Other methods were considered and rejected for one reason or another.

A Chicago firm (Denoyer-Geppert Co.) has experimented with our suggestion and has produced metal labels which are excellent. The words are clearly stamped on resistant metal and the letters are filled in with white lacquer. They are very legible and have withstood tests in preservatives. A set of standardized labels could be made for any laboratory animal and used over and over, or a generalized list might serve for any of several animals. A metal tag with square ends with one hole and stamped lacquered letters costs ten cents each (minimum order $2.00) or $4.50 for fifty, while another label with rounded ends and smoothed edges with a hole at either end sells for 20 cents each or $9.50 for a set of fifty.

These metal tags may be used for identifying museum specimens, laboratory displays, preserved material in collections where species are mixed, for marking animals collected in the field, for student guidance in demonstration dissections, for practical examinations, for class reviews. Tried as well as probable uses point to this as a method which is flexible and thus adaptable under many circumstances.

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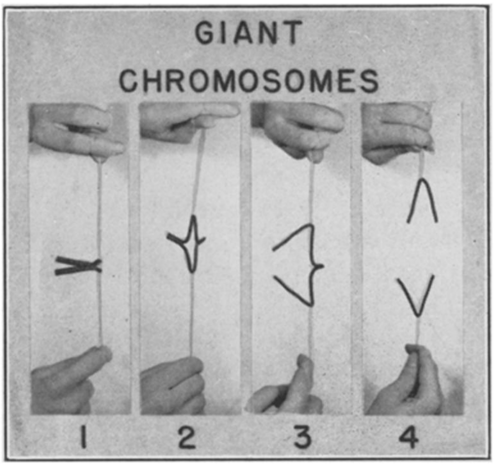
GIANT CHROMOSOMES

It is often difficult to demonstrate convincingly to the average Biology class just how chromosomes split longitudinally during mitosis. The teacher of Biology must frequently wish that he had some giant chromosomes with which he could demonstrate this phase of cell division. Good charts or models, if available, will be very helpful, but experience has shown that the following simple method is much more effective. The main reason for its success lies in the fact that charts and models are stationary things which do not move, whereas this method actually performs the act of tearing apart the giant chromosome model. The



necessary material can usually be found in any laboratory, or can be purchased for a few cents, and the time and skill required to perform the demonstration is negligible.

The giant chromosome is really nothing more than a few inches of ordinary electric lamp cord, namely, the kind in which the two strands of wire are encased in a single rubber coat. The role of the spindle fibers is played by two pieces of very thin wire or stout thread, each about a foot long. With a scalpel, or preferably a pocket knife, a small slit is cut lengthwise in the rubber casing between the two parts of the electric wire, at the midpoint of the artificial chromosome. Through this slit the two pieces of thin wire or thread are passed, and one of them is securely fastened to each of the separated rubber coated wires. The giant chromosome should then be bent to form the characteristic V shape. Then by pulling on the two thin wires or threads, which act as spindle fibers, the rubber casing of the electric wire will easily tear in a manner very similar to the traditional splitting of a chromosome. The accompanying illustrations show four stages in the splitting of this giant chromosome.

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The Aquarium as a Teaching Device

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(*Continued from January*)

9. Locomotion

The pupil can spend a good deal of time watching the locomotion of animals in an aquarium; after he has observed the leech, compared the snail with planaria, noted such various insects as the water strider, back-swimmer, water boatman, whirligig beetle, diving beetle and mosquito wiggler, seen the way in which the rainbow darter uses its fins to climb over rocks and watched the swimming movements of the water snake, frog and turtle he cannot help but see the correlation of body form and type of movement. He will realize that different animals bring about the same type of movement with different body parts and that the same animal may have two or more distinct types of locomotion making use of different body parts.

10. Protection

By careful placing of rocks, sand and vegetation the aquarium can be so arranged as to bring out the protective coloration of the tadpole and the hiding behavior of the crayfish. The closing of the shell of the clam and turtle and the trapdoor of the snail can be observed at close range. And the student may himself give the stimulus that induces the protective response. Such weapons as the spines of many of the fishes, the jaws of the hellgramite and the claws of the crayfish can be seen in action. The use of speed to escape a predator can be observed in a large aquarium.