

radioactive tracers, or by determining changes in other physical properties of the stabilized media.

There are several types of apparatus and procedures that can be used in the study of electrophoretic behaviors. In developing my apparatus I have incorporated features from several designs. However, the apparatus is primarily a horizontal closed system adapted from an apparatus by McDonald. In this apparatus the paper or cloth medium is sandwiched between glass and placed in a removable non-conducting frame. The ends of the medium dip into buffer vessels at each end of the frame and are in turn connected to the electrode vessels by means of agar salt bridges. The entire apparatus is housed in a glass covered box which serves to retard evaporation and protects the operator from the high voltage potential.

The electrical potential provides a regulated and variable output voltage which can be held constant over wide load variations. The useful range of the voltage output is 150 to 500 volts under a maximum of 200 ma.

This apparatus is particularly suited for graphic experiments which involve simple ion migrations. It is adaptable for separation and fractionation experiments as well as some mobility determinations.

At the present this apparatus is being applied to a research project involving the extraction of amino acid from fossil material.

REFERENCES

- Lodge, O. British Association Reports 38. 1886.
Tiselius, A. A New Apparatus for Electrophoretic Analysis of Colloidal Mixtures. Faraday Society; 33:524-31, 1937.
McDonald, H. J. Journal of Chemical Extraction; 29:428, 1952.

A STUDY OF HYBRIDIZATION IN HAMSTERS¹

MINER L. MOORE

Bearden High School, Knox County

The Golden hamster is a rodent, very closely related genetically to the rat. The scientific name for the Golden hamster is *Cricetus auratus auratus*. The hamster originated in the arid desert regions of Syria. Today the hamster is extinct in its natural habitat. Noted for their tremendous ability as hoarders of grain, the hamsters were eradicated by the farmers of Syria. Before this happened, an English zoologist captured a pair of hamsters which later produced a litter of young. This litter was the origin of all the hamsters which are in captivity today.

¹The project described in this paper was one of the prize-winning projects exhibited at the meetings of the Junior Academy of Science in Murfreesboro, November, 1956.

The project presented here is the result of a period of about five years' duration of my association with hamsters. Original interest was gained in a pair of males obtained as pets. Soon this interest resulted in the beginning of a sizable breeding colony. One of the male members of this colony was of a strain known as the "Panda." This strain was characterized by large brown and white spots found in the pelt. This male was crossed with a homozygous Golden female. The result was a litter which at first appeared to be normal Golden animals. After a period of time, the fur on these young began to change slowly to brown and white. In two months this color change ceased in all but one of these animals. The fur on this one, a small female, continued to become increasingly white, and during a period of two weeks her ears lost more and more of their pigmentation. At the end of this time, the exact length of which was not noted, the female had totally white fur, pink ears and black eyes.

Several deficiencies were noted in this female. The most prominent of these were weak eyes and very small size. Her smallness would have made it difficult, if not impossible, for her to have produced a normal sized litter.

In trying to find a plausible problem to enter in the Southern Appalachian Science Fair, it was decided that it would be interesting to try to repeat the experiment and attempt to produce an animal similar to the little white female, which had recently died.

In order to do this, it was necessary to obtain a hamster of the "Panda" strain, as nearly identical to the original male as possible. The Gulf Hamstery of St. Petersburg, Florida, was contacted regarding the possibility of securing another "Panda" male. In reply, they said that due to weaknesses in the strain they had been forced to discontinue their "Panda" animals. They were, however, beginning to promote a new strain of animals known as *Albus Guestus*. The characteristic markings of this strain are solid white fur, pink eyes, and black ears. If this animal were used, the original problem would be invalid due to the white color of the base stock. However, it was decided that a project dealing with the validity of Mendel's law, as pertaining to hamsters, would be interesting. Therefore, the *Albus Guestus* male was obtained.

The cross was made by mating the homozygous *Albus Guestus* male with a homozygous *Cricetus auratus auratus* female. This resulted in a heterozygous litter showing the dominant characteristics of the Golden hamster. At this point the project seemingly came to a stalemate. Repeated attempts to cross these hybrid animals always resulted in failure: there apparently was sterility in these animals. To find out if this

failure was peculiar to this litter, further crosses between Golden and *Albus gvestus* were made. These all resulted in the same thing — apparently sterile hybrids. There were two possible causes for this probable sterility: either diet deficiency or genetic characteristic. The dietary phase was checked by changing to a food with large amounts of vitamin K. The animals continued to show sterile traits.

The next problem was to check the hybrids genetically to determine if the males, females, or both were sterile. At this point the *Albus Gvestus* male died of a respiratory disease.

To replace this male, a pair of *Albus Gvestus* animals have been obtained. The female has given birth to a litter of *Albus Gvestus* young. The plan is to cross a hybrid male with a fertile *Albus Gvestus* female, and a hybrid female with an *Albus Gvestus* male. If either of these crosses produce litters, the offspring should be *Albus Gvestus* and hybrid in the ratio of 1/1. If neither of the crosses produce litters, the sterility of the hybrids will be conclusively established. The next step, if the latter is true, will be to rid the *Albus Gvestus* of the black pigmentation in the ears through inbreeding. If this is accomplished, the result should be a totally Albino hamster.

A STUDY IN SOUND

ALVIN J. SANDERS

Young High School, Knoxville, Tennessee

The purpose of my project was to study the effects of harmony and discord on humans and dogs. Since I knew nothing about sound before I began, my experimenting involved a general study of sound.

Of course this required more apparatus. A list of materials follows:

1. Three 256 vps tuning forks.
2. One 320 vps tuning fork.
3. Two 384 vps tuning forks.
4. About a half-dozen copper tubes, ranging in length from one to twenty-five centimeters.
5. An apparatus for producing two air jets, consisting of four feet of rubber tubing, a glass "Y" section, and two nozzels.
6. One test tube 10 centimeters in length.
7. One test tube 7 centimeters in length.
8. A piano.
9. One adjustable organ pipe.