It is hoped that outstanding pledges will be paid in the near future and that any persons still desirous of joining in the establishment of this memorial to Dr. Ransom will not delay longer.

ELOISE B. CRAM,
Secretary, Ransom Memorial Committee
BUREAU OF ANIMAL INDUSTRY,
WASHINGTON, D. C.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE DEVICE FOR WASHING CULTURE TUBES

ONE of the most irksome and time-consuming operations of the bacteriological laboratory is the washing of culture tubes. Recently, we have been using a very simple piece of apparatus which has proved to be so satisfactory in this laboratory that we believe others will find it useful.

The device consists of a water-motor which attaches directly to the faucet by means of a screw connection. A 4-inch motor furnishing ⅛ h. p. on 80 pounds water pressure with a free speed of 4,500 revolutions per minute is used. Because of its simplicity, cheapness and ease of control this motor appears to be more satisfactory for the purpose than an electric motor. The test-tube brush is attached to the motor shaft by means of a metal chuck. We have found it more satisfactory to employ only about two inches of the bristle-tipped portion of the brush in a chuck about six inches long. This arrangement causes the brush to revolve steadily when running free and facilitates insertion into the tube. Brushes with straight bristle-tipped ends have been found more satisfactory than the newer kinds with the so-called "spray tuft" end. After the tubes have been given the preliminary preparation for brushing they can be handled rapidly and with much less breakage than by the method of hand brushing. The rate should approximate 800 to 1,000 tubes per hour.

So far as we are aware none of the supply houses is furnishing the complete apparatus at the present time. The chuck we are using can be made in a few minutes from a piece of brass rod of suitable size for attachment to the motor shaft and turned down to a diameter of about ¼ inch. A hole drilled in the end of the rod receives the brush wire, which is held in place by means of a screw. The entire apparatus costs only a few dollars.

I. M. LEWIS
UNIVERSITY OF TEXAS

SPECIAL ARTICLES

NOTES ON A SPECIES CROSS IN MICE AND ON AN HYPOTHESIS CONCERNING THE QUANTITATIVE POTENTIALITY OF GENES

SPECIES crosses in laboratory rodents are not very numerous. That of *Cavia rufescens* Lund. and *C. porcellus* Linn. reported by Detlefsen,[1] and of *Rattus rattus* × *R. alexandrinus* studied by de L'Isle ('65),[2] and of Morgan,[3] are among the more important.

The present note deals with a cross between males of *Mus wagneri* (Eversman) from China[4] and tame *Mus musculus* females of a dilute brown race which has been inbred brother to sister in my laboratory since 1909.

Mus wagneri is small, nervously active, with relatively long ears and short tail, and is white-bellied, black agouti in color. This color variety was first described genetically by Cuénot[5] as a "gris à ventre blanc." It is allelomorphic and epistatic to ordinary grey-bellied black agouti.

The hybrids were easily obtained, grew vigorously, and were intermediate in size between the two parent species. In color they were white-bellied black agouti, but with deeper pigmentation than that of *M. wagneri*. In many of them the proportion of black hairs on the dorsal surface was very high, suggesting a weakened condition of the agouti pattern. The same tendency was seen in the ventral surface where dark-tipped hairs frequently were found in areas which in contrast to the white-tipped hairs gave a pattern which we have described as a "vest." It is extremely interesting to note this condition, which will again be referred to.

The three recessive genes of the dilute brown *M. musculus* females—a. (non agouti), b. (brown) and d. (dilution) disappeared in F_1 just as they would have done had the white-bellied black agouti pattern of *M. wagneri* been that of the same color variety of *M. musculus*.

A back cross of F_1 males and dilute brown females showed segregation of the three genes. The eight classes listed below were expected in equal numbers. The actual figures, however, depart widely from equality as follows:

[1] *Publ. Carnegie Inst. of Wash.* (1914) No. 205.

[2] *Arch. f. Rassen u. Gesellschafts Biologie* (1911) 8; 697.

[3] *Am. Nat.* (1907) 43; 182–

[4] I am greatly indebted to Dr. Sheo Nan Cheer, who personally brought with him from China the live specimens of *M. wagneri* which form my breeding stock of that species.

[5] *Arch. Zool. Exp. et Gén.* (1911) 8, 40–56.

	Black agouti white belly	Black	Dilute black agouti white belly	Brown agouti white belly	Dilute black	Dilute brown agouti white belly	Brown	Dilute brown	Total
Observed	31	30	10	19	23	21	16	13	163
Expected	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	163.2

If the pairs of genes are considered separately, we find that there are 94 animals with gene B(black) and 69 without it. There are 96 with gene D(intensity) and 67 with d(dilution), while there are 81 with A^w (agouti white belly) and 82 with a (non-agouti). Obviously the chief excess is found in black or intense animals. When these two genes are found together it appears that there are 61 animals, while those with (b) and (d) number 34. Those with (B) and (d), 33, and those with (b) and (D), 35. A somewhat similar excess of animals which had both (B) and (D) was observed in a cross reported by the writer and Phillips,[6] between color varieties within the species *M. musculus*. It is probable that it depends upon death of recessive color combinations rather than upon any linkage or other gametic disproportion.

The "vested" variety is an extremely interesting phenomenon. What perhaps is a somewhat similar condition in that it involves a "weakening" of the agouti pattern was observed by Detlefsen in the case of the guinea pig hybrids referred to above. In his material almost complete disappearance of "ticked" hairs was observed on the dorsal surface in some hybrids. The same phenomenon has been observed in the mice.

Morgan reports a weakened condition of the black factor in F_1 generation mice produced in a cross between a small Japanese-waltzing male and a larger brown non-waltzing female. It is interesting to note that Japanese-waltzing mice are, by many, believed to be descended from *M. wagneri* (see Gates[7]).

At all events we have in three crosses, two of which *do*, and one of which *may* involve specific differences, distinct evidence of "weakened" activity of three epistatic genes introduced by males of the smaller species or variety.

This suggests an interesting line of reasoning as follows:

In addition to the qualitative attributes which distinguish it, each gene may have a quantitative potentiality adapted by natural selection to the size of the body which its activity must cover.

Since activity of genes in development is undoubtedly related in some way to liberation of energy, and since liberation of energy means previous storing of energy, it seems likely that a species will by natural selection eliminate those individuals wasteful enough to build more of such potential activity than is commonly called upon. This would follow since surplus material would require additional food and storage space and would tax more than was necessary the systems by which waste products of metabolism were eliminated.

When a species cross is made resulting in an F_1 hybrid of distinctly larger size than that of the small parent species, the genes of the latter adapted in their physiological activity to covering only a certain more or less limited body area, may find themselves unable to act over the whole of the body of the larger hybrid, and as a result the recessive gene would partially express itself. Such was actually the case in the three crosses referred to. The rôle of the cytoplasm in determining the degree or extent to which the gene may act is also possibly a matter of great importance in this connection. Data on reciprocal crosses in the three cases in question are not as yet available.

The principle of the quantitative limits of gene activity will, if established, be an interesting line of research to follow in size inheritance and in many other genetic problems of birds and mammals.

C. C. LITTLE

LABORATORY OF MAMMAL GENETICS,
ANN ARBOR, MICH.

[6] *Am. Nat.* (1913) 47, 760–765.

[7] *Publ. Carnegie Inst. of Wash.* (1926) No. 337.

THE ABSORPTION SPECTRUM OF MERCURY AT HIGH PRESSURE ADMIXED WITH NITROGEN[1]

A CONSPICUOUS feature of the absorption spectrum of mercury, as shown by Mohler and Moore,[2] is the appearance of a train of eighteen flutings reaching their optimum range of 2770–2930 A at 420° C. (2100 mm.).

In the present work, when 13 mm. of pure nitrogen gas was admitted to the same 40 cm. quartz absorption tube before sealing off and spectra photographed using the same source of radiation (a high potential discharge in hydrogen), this system of flutings was extended on the red to 3087 A at temperatures of 215–305° (28–215 mm. Hg) and on the violet to

[1] Publication approved by the Director of the U. S. Bureau of Standards, Department of Commerce.

[2] Mohler and Moore, *J. Optical Soc. Am.* 15, p. 74 (1927).