Coat 'Color' Difference Between Castrated and Intact Male Mice

In a previously reported experiment concerned with genotype and sex drive[1], 12 of 24 male mice of the hybrid strain B6D2F$_1$ were castrated at 16 weeks of age. The animals were housed in groups of 6 so that each cage contained both castrated and intact males. Daily tests for sexual behavior were continued until a criterion for loss of the ejaculatory reflex was met by all castrates. A total of 11 weeks was required to meet this criterion.

About 4 weeks after castration, we discovered that it was possible to select from each cage the castrated, or the non-castrated males, on the basis of their 'coat color' alone. Animals of this strain are black, but there was a qualitative difference in coat blackness between castrates and non-castrates. Comparisons with animals of various ages in the laboratory indicated that the non-castrates had undergone a normal moult which changed their coats from a glossy black to a rather rusty black. The castrates, on the other hand, had maintained a more 'juvenile' coat condition. Crude microscopic examinations indicated a lower pigment content in hairs of the intact males.

10 naive observers were asked to look at the mice in each cage and to divide them into 2 groups on the basis of coat color. In every case, the observers placed all castrates in 1 group and all intact males in the other.

After all males had met the criterion for decline of sex drive, injections of 1 mg testosterone propionate[2] were given for 21 consecutive days. These injections failed to change the coat condition of the castrates, although sex drive returned in all animals.

A search of the relevant literature has failed to reveal previous reports of such a major effect of castration on coat color. Since we do not plan to pursue the matter further, we decided to present our observations in this short note with the hope that they might be of interest to those concerned with hormone-integument interactions[3].

Zusammenfassung. Es wird festgestellt, dass kastrierte männliche Mäuse der Kreuzung B6D2F$_1$ sich von nichtkastrierten männlichen Mäusen gleichen Alters durch einen qualitativen Unterschied der Fellfärbung unterscheiden.

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[1] T. E. McGILL and G. R. TUCKER, Science, *145*, 514 (1964).

[2] The hormone preparations were generously supplied by Dr. R. R. McCORMICK, Schering Corporation, Bloomfield (New Jersey).

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A New Method for Recording the Swimming Activity in Flatfishes

Several methods for recording the diurnal activity of fishes have been developed in recent years, some more or less adapted to a single species. For a review of the main principles described in the literature, see the Table.

For our study of the diurnal activity of flatfishes under nearly natural conditions, the use of a large tank (8.5 · 3.5 · 1.5 m) seemed essential. First, several recording methods were tested without satisfactory results. The mechanical method used previously for plaice[4] failed in a large basin with turbots. The wires easily became entangled and the leaden balls were bitten off. The main objection, however, was that the levels at which the fishes passed could not be clearly separated.

Next, a thermoconductive method was employed[13]. The difficulty with this method was that large scale eddies caused by the circulation system and by the movements of fishes of the size used were persistent in large tanks and were recorded together with the real displacements of the fishes.

In the wake of the fish there are a sufficient number of smaller eddies. These are less permanent[22]. Small eddies can be selectively measured with a rapid thermic system. The thermic resistance of the glass envelope of the thermistor, however, proved to be too large for our purpose. In seawater, an unprotected thermistor, on the other hand, deteriorated in the course of a few weeks and the initially successful method became unreliable.

Finally, the following method was worked out and yielded reliable results. This inductive method reported here uses the induction voltage which is generated in a fixed, oblong, rectangular coil, when a flatfish provided with a permanent magnet crosses the coil (Figure 1). The magnet is a plastic covered ferrite (size: 15 · 9 · 5 mm; mass: 5.5 g), attached by means of a fishtag according to PETERSEN.

For the recording of the activity on and along the bottom, one coil was buried in the sand, while for the surface activity a second coil was placed in the same position just above the surface. The length of the coil was determined by the width of the passage to be controlled.

The actograph was to operate when the magnetic flux ϕ through the coil reached a certain threshold value. This was achieved by the integration of the voltage induced over the coil ($d\phi/dt$). The range of the actograph will then become, in principle, independent of the swimming speed of the passing fish. Only with very small swimming velocities is the range impaired owing to the bad ratio between the induction tension and the tensions as a result of the magnetic perturbations in the environment. As they have no swimbladder, flatfish cannot, however, reduce their swimming speed unlimitedly without sinking.

The range of the actograph is determined by the dipole moment[23] of the magnet M ($= 2.2 \cdot 10^{-7}$ Vsm), the number of windings n ($2 \cdot 1250$; 0.22 mm Cu), the dimensions of the coil ($1 \cdot 0.1$ m) and the adjustment of the range (Figure 2a). The range applies to a fish swimming horizontally. A fish swimming obliquely upward will cause a smaller difference in flux through the coil, resulting in a slight decrease of the range. For the case drawn in Figure 1, the magnetic flux ϕ is about equal to:

$$\phi \approx \frac{n\,M\,a}{\pi\,z^2}\left\{\frac{2\,l}{(z^2+l^2)^{1/2}} - \frac{l^3}{(z^2+l^2)^{1/2}}\right\}\frac{1}{1-(a^2-y^2_M)/z^2} \tag{1}$$

provided that: $a \ll z$ and $y_M \ll z$.