## Testicular Hypoplasia and Epididymal Cysts in the Syrian Hamster

WE have observed certain definite changes in the testes of some inbred hamsters. These changes are characterized by a striking testicular hypoplasia, mostly bilateral. Such testes, represented sometimes by structures which are almost invisible to the naked eye, appeared very pale, with an apparent lack of normal vascularization. Their individual weight was only 2–306 mgm., as compared with a testicular weight of 0·900–1·400 gm. in the normal hamster. However, we have observed fertile animals the individual testes of which weighed only 0·580 gm. The hamsters with bilateral hypoplasia were, without exception, sterile. On the other hand, the animals with unilateral hypoplasia proved to be fertile. No relationship was found between the hypoplasia and the growth-rate or mature weight of the animals. Although we have also observed hypoplasia of the ovaries and sterility in some females, our data in this respect are inconclusive.

In the epididymi of some inbred and outbred hamsters we have encountered single and multiple cysts, histologically connected with the epididymis itself. Such cysts, of a yellow colour and of a sterile content, varied greatly in size: they varied from the size of a very small pearl to that of a normal hamster testis. In some animals these cysts were found in both epididymi, although most of them were unilateral. Most of the cysts were found in the tail, although a few of them occurred in the head of the epididymis. Most of them contained mainly spermatozoa.

Through the study of the reproductive capacity of hamsters with normal testes but with epididymal cysts, unilateral or bilateral, in some cases making use of surgical ligatures, we observed that the cysts impaired the fertility of the animals only when they were of considerable size, especially when such cysts were located near the beginning of the ductus deferens. This shows that these cysts can produce sterility only by mechanical blocking of the normal passage of the spermatozoa through the epididymis.

In a few cases we have also observed another kind of cyst, the contents of which are devoid of spermatozoa. They are small, yellow formations, usually flattened, round or ovoidal. These cysts are found either free, in the neighbourhood of, or loosely connected to, the tail of the epididymis.

The testicular hypoplasia was observed only in a group of inbred hamsters. They were of different age, 92–240 days, and under different dietary regimes. The epididymal cysts, found in both inbred and outbred animals, were observed mostly in very mature hamsters, 220–240 days of age. The cause of the hypoplasia seems to be of a hereditary nature, similar to that described by Lagerlöf[1,2] and Eriksson[3] in cattle. A complete report with a histological study is being prepared.

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[1] Lagerlöf, N., *Vet. Rec.*, 48, 1159 (1936).
[2] Lagerlöf, N., Proc. 13th International Veterinary Congress, Zurich, 1, 214 (1938).
[3] Eriksson, K., "Hereditary Forms of Sterility in Cattle", 1 (Håkan Ohlssons Boktryckeri, Lund, 1943).

## Isophosphorylase

BOTH pure potato phosphorylase[1] and crystalline muscle phosphorylase[2] produce from glucose-1-phosphate a non-branched polysaccharide containing only α-1,4-glucosidic links and resembling amylose. By the action of extracts of yeast[3], of heart, brain or liver[4], branched polysaccharides are obtained containing up to 10 per cent of α-1,6-glucosidic linkages and resembling glycogen. In 1942, Meyer and Bernfeld[5] reported the presence of an enzyme in yeast which brings about the phosphorolysis of the terminal α-1,6-glucosidic links of residual dextrin (the final degradation product of amylopectin by β-amylase). A purified potato phosphorylase was not able to effect this reaction. It was therefore concluded[5] that there are two different phosphorylases, one of which effects the fission or synthesis of α-1,4-glucosidic links, the other the α-1,6-glucosidic links involved in branching. Cori[6] has found an enzyme in liver extract and also in heart extract which he calls the 'branching factor', and which is able to produce glycogen by simultaneous action with the crystalline muscle phosphorylase. Haworth, Peat and Bourne[7] have described a thermolabile factor which they term the '*Q* enzyme' and to which they attribute the property of synthesizing the α-1,6-glucosidic links in amylopectin. Their '*Q* enzyme' has, in addition, an amylatic action.

We have now succeeded in finding also in potato extract an enzyme which, in the presence of inorganic phosphate, renders residual dextrin accessible to β-amylase attack (see Table 1).

Table 1. Simultaneous action of potato extract and β-amylase on residual dextrin

| Addition of potato extract | Degradation by β-amylase | |
|---|---|---|
| | Phosphate present | Phosphate absent |
| Without | 0 per cent | 0 per cent |
| With | 25 ,, | 5 ,, |

We have been able to show that, in the presence of phosphate, this same enzyme converts amylose to amylopectin and even to glycogen by simultaneous action with potato phosphorylase (see Table 2). No conversion takes place in the absence of inorganic phosphate.

Table 2. Simultaneous action of potato extract and potato phosphorylase on corn amylose

| Time in hours | Phosphate present 1·35 P/amylose* | | Phosphate absent less than 0·01 P/amylose* | |
|---|---|---|---|---|
| | Iodine coloration | Conversion limit by β-amylase[5] | Iodine coloration | Conversion limit by β-amylase[5] |
| 0 | blue | | blue | |
| 24 | violet | | blue | |
| 72 | purple | | blue | |
| 144 | purple | 65% | blue | 100% |

* Mols of phosphate per glucose equivalent of amylose.

The results given in Tables 1 and 2 show that potato extract contains an enzyme capable of catalysing the phosphorolysis of α-1,6-glucosidic links and equally of their synthesis. We propose to call this enzyme 'isophosphorylase'.

Meyer and Bernfeld[5] have shown that potato phosphorylase only brings about the fission of α-1,4-glucosidic links which are proximate to terminal non-reducing groups. This has been confirmed quite