changes in β -glucanase and β -glucosidase activity of protein extracts of commercial samples of barley (var. Golden Promise) during malting. The limit dextrinase activity in these extracts was initially low, and did not change significantly during steeping, although there were three- and ten-fold increases after germination for 1.5 and 3.5 days respectively. This trend continued up to 7.5 days, giving a maximum value of about a 20-fold increase. The overall rate of increase in activity was significantly lower than that of α -amylase. This conclusion differs from that of Kneen & Spoerl (1948), who reported virtually identical rates of increase.

In laboratory-scale germination experiments at 21°C, large increases in the limit dextrinase activity of extracts of rye, wheat and maize were observed after germination periods of 2–3 days. By contrast, the activity of extracts of oats, which initially had the highest activity of any of the cereals examined, did not increase markedly during germination for 4 days. The hydrolytic activity of the above extracts towards maltotriose was also examined; this did not alter greatly during the germination periods.

Since limit dextrinase represents a component of a multi-enzyme system involved in the mobilization of starch *in vivo* for metabolic purposes and the conversion of starch into fermentable sugars *in vitro*, the factors that control its formation are now being investigated.

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The Presence of an Endogenous Inhibitor of the Cholesterol Side-Chain-Cleavage System of Human Placenta

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The presence of an active cholesterol side-chain-cleavage enzyme system in human placental mitochondria was reported by Morrison, Meigs & Ryan (1965). Solubilization of the enzyme was achieved from an acetone-dried powder preparation. These workers noted that thorough treatment of the powder with ether was necessary to obtain active preparations.

The adrenal cholesterol side-chain-cleavage enzyme

and the steroid 11 β -hydroxylase systems possess similar characteristics (see Omura, Sanders, Estabrook, Cooper & Rosenthal, 1966; Simpson & Boyd, 1967a). Sharma, Forchielli & Dorfman (1962) reported the preparation of a soluble steroid 11 β -hydroxylase from bovine adrenocortical mitochondria. They observed that ultrasonic treatment followed by high-speed centrifugation resulted in increased enzymic activity as compared with the initial ultrasonically treated preparation. This suggested the presence of an 11 β -hydroxylase inhibitor associated with the insoluble particles.

We have investigated various methods for the solubilization of the cholesterol side-chain-cleavage enzyme system present in human term-placental mitochondria. The assay was performed as described by Simpson & Boyd (1967b). Native placental mitochondria converted [4-¹⁴C]cholesterol into progesterone with a 4–8% conversion in 1 h. Ultrasonic disruption of the mitochondria produced a decrease in enzymic activity. However, after ultracentrifugation (105 000g for 1 h) of the sonicated preparation, increased enzymic activity was shown in the supernatant. Similarly, freeze-drying of the sonicated mitochondria resulted in a preparation that did not show maximal activity until ultracentrifugation at 105 000g for at least 90 min. A mitochondrial acetone-dried-powder preparation exhibited a similar phenomenon.

The results suggested the presence of an enzyme inhibitor associated with the insoluble material. It was heat-stable and firmly bound to the insoluble particles, but could be extracted with chloroform-methanol (2:1, v/v). Prolonged acetone treatment of the mitochondria also resulted in removal of the inhibitor. The main components present in the acetone wash were phospholipid (mainly phosphatidylcholine and phosphatidylethanolamine) and cholesterol. The phospholipid fraction was found to be inhibitory.

The effect of authentic phosphatidylcholine and phosphatidylethanolamine on the enzymic activity was investigated. The former was found to be the more potent inhibitor of the enzymic activity. Mitochondrial phospholipid, together with other factor(s) present in the placental mitochondria, inhibited cholesterol side-chain-cleavage activity. The mechanism may involve sequestration of the cholesterol substrate in some micellar or lipoprotein form.

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Uptake and Interconversion of Oestrone and Oestradiol in Rabbit Uterus

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The activity of oestradiol-17 β oxidoreductase in the uterus of the rabbit is hormone-dependent, being higher in the intact than in the ovariectomized animal (Macartney & Thomas, 1969); during pregnancy the enzyme activity increases 25-fold and is at its maximum a few days either side of parturition (Jutting, 1966). It has been suggested that the ability of rabbit uterus to be maintained in organ culture by oestrone, as well as oestradiol, may be a consequence of cellular interconversion of the two oestrogens by the uterine oestradiol-17 β oxidoreductase (Russell, Macdougall & Thomas, 1969).

The present study was undertaken to examine the role of uterine oestradiol-17 β oxidoreductase in regulating the hormonal environment of the uterus in the intact non-pregnant rabbit and in the lactating rabbit (24h *post partum*). Animals were infused with [6,7-³H]oestrone over a period of 1h. Although the concentration of radioactivity in the plasma rose steadily during the infusion, the concentration of free oestrone and oestradiol remained fairly constant after the first 10min. Tissues were collected 10min after the end of the infusion and were analysed for labelled oestrone and oestradiol.

In the non-pregnant animal the uptake of oestrone and oestradiol into the cortex, hypothalamus and skeletal muscle did not differ markedly from that of plasma (oestradiol/oestrone ratios 0.3–0.6), whereas in the uterus and vagina predominantly oestradiol was found (ratios 7.5 and 2.5 respectively). Of all the tissues examined the anterior pituitary showed the highest uptake of radioactivity and contained equal amounts of oestrone and oestradiol.

In the lactating rabbit the increased activity of uterine oestradiol-17 β oxidoreductase was not reflected in a marked difference in the peripheral metabolism of oestrone. The oestradiol/oestrone ratio in the uterus (3.9–5.3) was marginally depressed compared with the non-pregnant animal, whereas the ratios for the other tissues examined were essentially unchanged.

Although the tissues showed marked differences in their cellular concentrations of oestrone and oestradiol, the ratios obtained in the uterus in this study were similar to those obtained when rabbit

uterus was cultured in the presence of oestrone, showing that the oestradiol-17 β oxidoreductase is also of importance in the utilization of oestrone in the intact rabbit. However, the present study does not indicate the extent to which metabolism within the tissue may contribute to the regulation of the relative proportions of the two oestrogens in that tissue.

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Cytochromes of Ovary Mitochondria: Effect of Human Chorionic Gonadotrophin

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The primary action of human chorionic gonadotrophin, which stimulates both growth and steroidogenesis in ovary, could be control of production and distribution of energy in mitochondria. The presence in the ovary of a dual cytochrome system (a normal respiratory chain and a cytochrome *P*-450-containing chain), such as that described by Cammer & Estabrook (1967a) for the adrenal gland, could enable controlled distribution of energy between ATP production and steroidogenesis.

This work aims to establish whether such a system exists in rat ovary and to determine the effect of human chorionic gonadotrophin on the cytochrome concentrations.

Groups of about 100 immature female rats were each given 50i.u. of pregnant-mare-serum gonadotrophin. Half of these rats received 25i.u. of human chorionic gonadotrophin 3 days later, and the remainder received no further treatment. The rats were killed 8 days after the first injection. The ovaries from each group were pooled and mitochondria were prepared in 0.25M-sucrose.

Measurement of the cytochrome content from the dithionite-reduced minus oxidized difference spectra indicated that human chorionic gonadotrophin doubled the cytochrome content. Similar increases in both cytochrome oxidase and succinoxidase activities measured manometrically were observed. Administration of half the dose of human chorionic gonadotrophin produced identical effects, but a second dose of pregnant-mare-serum gonadotrophin instead of human chorionic gonadotrophin had no effect. Antimycin A inhibited succinoxidase activity completely in all cases. Liver cytochromes were insensitive to human chorionic gonadotrophin.