An Increased Secretion of Oestradiol Following Unilateral Ovariectomy of Cyclic Hamsters

The endocrine basis of compensatory ovulation which follows semispaying remains obscure. At least two theories have been advanced. According to one theory the absence of one ovary by reducing circulating levels of steroids causes a diminution in the negative feedback which results in an increased gonadotrophin secretion leading to ovulatory compensation[1,2]. The other theory holds that following semispaying twice as much gonadotrophin becomes available to the remaining gonad as was previously available to two, and thus causes ovulatory compensation[1,2]. The second hypothesis received some support from our earlier failure to show any changes in circulatory levels of LH following semispaying[3]. HOWEVER, HOWLAND and SKINNER[4] have recently found a slight but significant rise in LH and FSH on the day of metoestrus following semispaying of rats on the day of oestrus. Using sensitive radioimmunoassays for steroids[5] and the technique of ovarian cannulation[6], we measured changes in the secretion of oestradiol and progesterone following semispaying to evaluate the first hypothesis.

Adult hamsters with established cycles of 4 days were semispayed under ether anaesthesia at 09.00 h on day 1 (day of external vaginal discharge) of the cycle. Usually the left ovary was removed. Groups of animals were anaesthetized with chloral hydrate (5 ml/kg, 7.0% aqueous solution given i.p.) and ovarian vein blood was collected from the remaining ovary usually for $^1/_2$ h from a total of 48 hamsters as described earlier[7]. Blood collection was done between 10.00 and 20.00 h on days 1 to 4 of the operated cycle and between 05.15 and 18.45 h on day 1 of the subsequent cycle. For comparison, intact animals were similarly anaesthetized and ovarian vein blood was collected at comparable stages of the oestrous cycle from the right ovary of 40 hamsters. The blood volumes averaged 0.9 ml. The samples of whole blood were kept frozen at −20 °C. At the time of analysis the samples were thawed and radioactive oestradiol and progesterone were added to them to permit correction for losses incurred during the assay. They were then analyzed by radioimmunoassay using the method of ABRAHAM et al.[5] incorporating a few modifications[7]. All steroid values were adjusted to 100% recovery and expressed as concentration (ng or μg/ml of blood).

The number of tubal ova recovered from semispayed animals on the day of ensuing oestrus was 13.4 ± 0.7 (N = 16) which was similar to the total number of ova obtained from both oviducts of intact animals (14.9 ± 0.8, N = 11, $P > 0.05$), demonstrating full ovulatory compension under the experimental conditions used. The ovarian blood flow rate (BFR) showed no significant changes as a result of semispaying at any stage of the oestrous cycle but oestradiol concentration showed a significant rise within 12 h after semispaying (Table). It remained significantly elevated for the subsequent 3 days as compared to the values found on corresponding periods of the oestrous cycle in intacts animals. However, by day 5 of the cycle, i.e. day 1 of the following cycle, the oestrogen concentration was similar in intact and semispayed animals. When data were expressed as output (ng/h/ovary), the conclusions remained the same (not shown in the Table). Thus there was a rapid rise in oestradiol secretion following semispaying which was sustained during the remainder of the cycle, although the general pattern of secretion remained comparable to that found in intact animals. The rise apparently occurs before an increased follicular growth, as a result of semispaying, can be detected in the remaining ovary[8]. In contrast to the increase in oestradiol secretion, progesterone secretion showed no significant changes due to semispaying.

The results (Table) would imply that the peripheral plasma level of oestradiol would remain essentially unaltered and that of progesterone would fall to half the level in intacts animals following semispaying, provided semispaying does not result in alterations in the metabolism or clearance rate of steroids. If this is true, the oestrogen level to which the pituitaryhypothalamic tissue is exposed may remain similar to that in intact animals, and consequently the secretory pattern of LH would remain unaltered. Indeed, in our earlier study[3] and

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Blood flow rate (BFR) and concentration of oestradiol and progesterone in ovarian vein blood of intact and semispayed cyclic hamsters (Mean ± SEM)

Parameter	Day of the cycle 1	2	3	4	5 (1) [f]
BFR (ml/h/ovary)					
Intact	1.43 ± 0.13 (9)	1.88 ± 0.26 (8)	1.81 ± 0.38 (10)	1.92 ± 0.44 (7)	1.87 ± 0.34 (6)
Semispayed	1.62 ± 0.23 (8)	1.84 ± 0.30 (9)	1.92 ± 0.16 (12)	2.01 ± 0.16 (11)	2.25 ± 0.41 (8)
Oestradiol conc. (ng/ml)					
Intact	1.20 ± 0.44 (8)	2.47 ± 0.61 (8)	4.51 ± 0.67[b] (10)	5.68 ± 1.47[b] (7)	1.67 ± 0.67 (6)
Semispayed	3.71 ± 1.06[d] (8)	7.42 ± 1.15[a e] (9)	10.42 ± 1.36[b e] (12)	19.45 ± 4.56[b d] (10)	3.05 ± 1.05 (8)
Progesterone conc. (μg/ml)					
Intact	2.30 ± 0.28 (9)	1.31 ± 0.25[a] (8)	0.58 ± 0.23[c] (10)	0.08 ± 0.05[c] (7)	1.52 ± 0.40 (6)
Semispayed	2.04 ± 0.31 (8)	1.20 ± 0.15[a] (9)	0.10 ± 0.01[c d] (12)	0.17 ± 0.16[c] (10)	2.12 ± 0.29 (8)

The number in the parenthesis indicates the number of observations on which the mean is based. [a] $P < 0.05$; [b] $P < 0.01$ and [c] $P < 0.001$; statistically significant difference in the row when compared with the value for day 1. [d] $P < 0.05$; [e] $P < 0.01$; statistically significant difference between intact and semispayed animals at a given time interval. [f] Day 5, i.e. day 1 of the following cycle.

in another extensive study (unpublished) we failed to find any significant changes in the peripheral LH concentration after semispaying of hamsters. Thus, our observations do not support the hypothesis that semispaying causes ovulatory compensation by a decrease in the negative feedback of oestrogen with a consequent rise in the secretion of LH.

[9] We thank Mr. D. J. WATSON for his valuable assistance in this work.

Résumé. L'ovariectomie unilatérale pratiquée chez les hamsters au premier jour du cycle fut suivie d'un accroissement significatif de la sécrétion d'oestradiol mesurée dans le sang de la veine de l'ovaire restant, sans aucune variation du taux de progestérone pendant la durée du cycle.

H. S. JOSHI and A. P. LABHSETWAR[9]

The Worcester Foundation for Experimental Biology, Shrewsbury (Massachusetts 01545, USA), 24 August 1973.

Pigment Formation in a Colourless Strain of *Trichophyton mentagrophytes* after Phosfon D treatment

It is well established that several dermatophytic fungi form, on the underside of their thallus, coloured substances, occasionally diffusing into the culture medium[1–3]. The pigments vary from species to species and sometimes even among strains of the same species[4]. Several studies have shown that the pigmentation is due to a mixture of compounds, many of which are of quinone structure[5–8] and presumably similar to xanthomegnin, the only pigment in dermatophytes so far structurally defined[9]. Qualitative analysis of these pigments by chromatographic methods is a generally accepted criterion for the identification of a given dermatophyte[10–12]. The physiological significance of these coloured molecules remains to be established.

During investigations on the action of Phosfon D[13] on dermatophytes, we observed an inhibition of growth and the appearance of red hyphal strands on the underside of the thallus of a colourless strain of *Trichophyton mentagrophytes*. This phenomenon has been studied and the data obtained are reported in the present paper. The newly formed pigments have been extracted and analyzed by thin-layer chromatography and similarities with coloured substances of other dermatophytes have been established.

Material and methods. *Trychophyton mentagrophytes* (Rob.) Blanchard, strain No. 560.66 (Centraal Bureau voor

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[13] Phosfon D (Virginia-Carolina Chemical Corporation, Richmond, Virginia, USA) is a chemical commonly employed for retarding growth in higher plants. The compound has been shown to inhibit the gibberellic acid synthetic pathway both in higher plants and in gibberellic acid producing fungi (see WEST and FALL[14] for additional details).

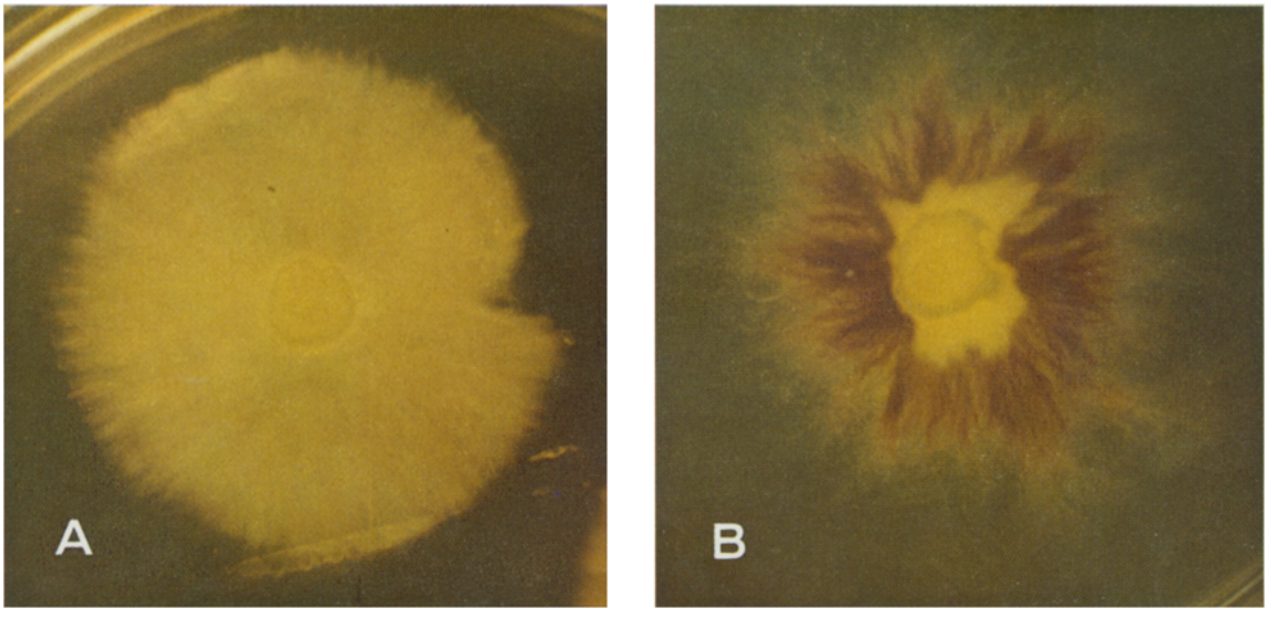

Fig. 1. Inferior surface of cultures of *Trichophyton mentagrophytes* CBS 560.66, photographed through the growing medium: A) Control culture, ×1; B) Phosfon D treated culture, ×1.8.