

Effect of Serotonin Administration on the Ultrastructure of Pinealocytes During the Period of Maximal Sexual Activity of the Male Hedgehog (*Erinaceus europaeus* L.)

There is much evidence that the pineal gland exerts a significant influence on the reproductive system^{1,2}. In view of the probability that the pineal gland controls the sexual cycle of mammals³ living under natural conditions, it seems of interest to examine the organ in these animals during the different periods of their sexual cycle.

In preceding studies⁴⁻⁷, we investigated the hedgehog pineal gland. In particular, the ultrastructural changes

occurring in the pinealocytes during the different periods of the sexual cycle have been examined. These investigations did demonstrate the presence of a special formation, composed of lamellae and vesicles, showing a characteristic evolution during the period of sexual quiescence⁴⁻⁷.

Melatonin and serotonin can be considered to be pineal compounds exerting an influence on gonadal function⁸⁻¹². The present paper offers electron microscopic data on the effect of serotonin, injected during the period of maximal sexual activity, on pinealocytes.

Material and methods. The experiment was performed during part of the period of maximal sexual activity (May-June) on 8 adult male hedgehogs collected in the western part of France. Subcutaneous injections of 0.3 ml of a solution containing 5 mg of niamide (nialamide, Pfizer-Clin) and of 0.2 ml of a solution containing 100 µg of serotonin (creatinin-serotonin, Sigma) were administered daily from May 17 to July 18. Four control animals received the same quantity of the solvent only (for details see SABOUREAU¹²). In Nembutal anesthesia the hedgehogs were decapitated, the pineal gland was dissected and fixed with common electron microscopical techniques^{4,7}.

Results and discussion. In serotonin-treated hedgehogs, the presence of peculiar reticular structures was observed in a great number of pinealocytes. (Figures 1 and 2). They are composed of rectilinear membranous lamellae of endoplasmic reticulum between which many clear and large vesicles are situated. Some ribosomes are attached to the lamellae (Figure 2). In general, the systems are located in the cell body in close vicinity to the nucleus (Figures 1 and 2). In the pinealocytes of the control animals, and in those of hedgehogs sacrificed during May to July in past years, this reticular formation was not observed^{4,7}. However, the presence of similar formations in the pinealocytes of hedgehogs, sacrificed at the beginning of the period of sexual quiescence, that is at the end of September and in the first part of October, has earlier been demonstrated⁴⁻⁷. The sexual activity of the hedgehogs used in the present study has been checked by determination of the weight of the gonads and secondary sex glands and of biochemical compounds in the latter (for details see ref.¹²). From earlier results obtained by SABOUREAU¹², it appears that serotonin acts on the male hedgehog sexual system during the normal period of maximal sexual activity, injections of this compound inducing a small but distinct decrease in activity of the testes and of the secondary sex glands. After treatment with serotonin not only a decrease of sexual activity¹² but also the appearance, in pinealocytes, of the reticular

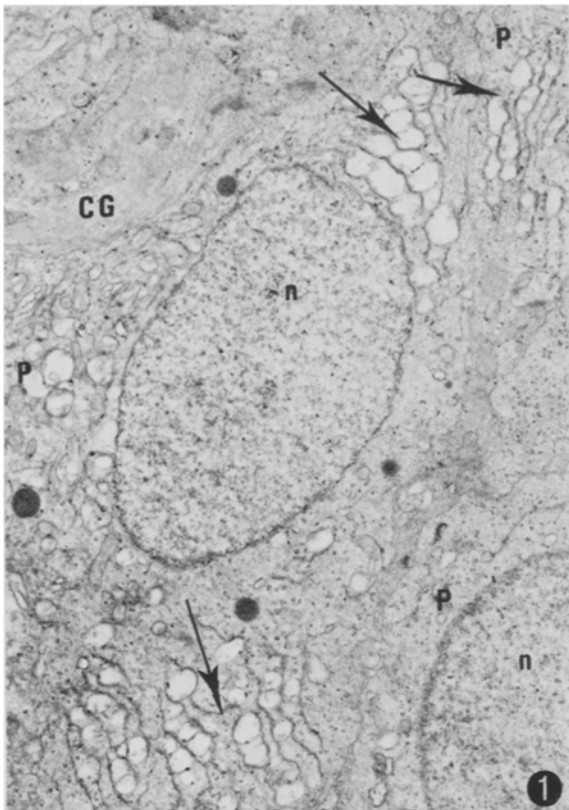


Fig. 1. Part of the pineal gland in which 3 pinealocytes (P) are seen. In 2 of these cells peculiar reticular formations (arrows) can be observed. n, nucleus; CG, glial cell. $\times 11,630$.

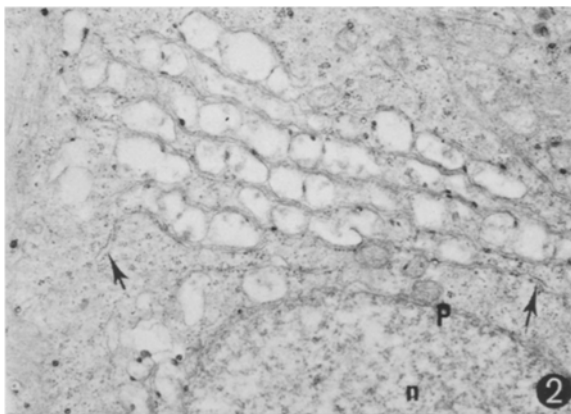


Fig. 2. Reticular formation in a pinealocyte (P). It is composed of 8 rectilinear lamellae of the endoplasmic reticulum and many large clear vesicles between these lamellae. Some ribosomes are observed at the ends of some lamellae (arrows). n, nucleus. $\times 18,250$.

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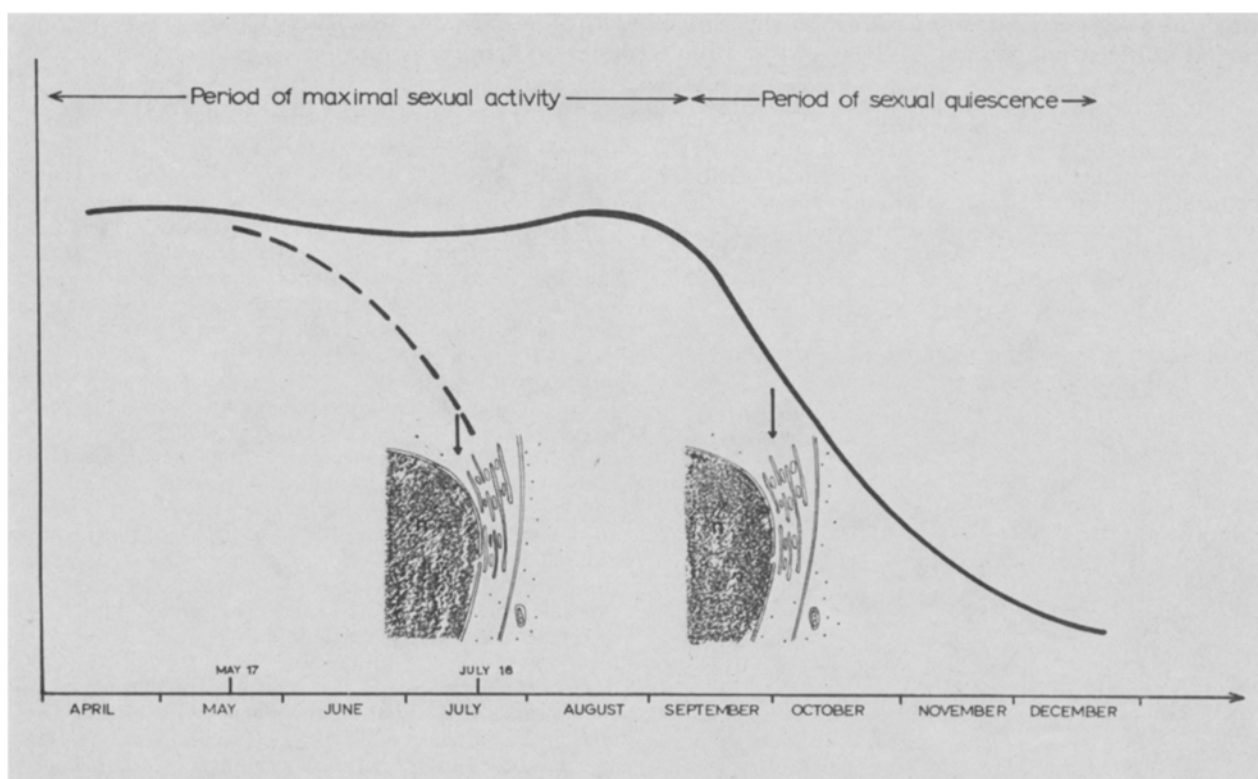


Fig. 3. Diagram of the course of normal sexual activity (drawn line) in the adult male hedgehog as determined by determination of gonad and secondary sex gland weight and the presence of chemical compounds¹³⁻¹⁵. The hatched line indicates the experimental decline of sexual activity caused by serotonin administration. This is related to the appearance of the reticular formations in the pinealocytes described and figured. This same relationship has been observed during the normal course of sexual activity at the period during which this activity starts its decline.

formation described has been observed in the present investigation. These formations are also present during one part of the period of natural decline of sexual activity (end of September – first part of October, Figure 3).

The present experiment confirms the existence of a relationship between the decrease of sexual activity and the appearance of the peculiar reticular formation described in male hedgehog pinealocytes. It is, however, not possible to decide whether the decrease of sexual activity functionally induces the appearance of this reticular system or vice-versa.

It will, moreover, be necessary to determine the exact way in which serotonin exerts this effect and the contents of the vesicles present between the lamellae. A study of the presence of serotonin in the hedgehog pineal gland

during the different parts of the sexual cycle by means of the histochemical fluorescence technique is now in progress.

Résumé. Les injections quotidiennes de sérotonine à des hérissons mâles pendant la phase de pleine activité sexuelle provoquent, au niveau des pinéaloctes, l'apparition d'un système réticulaire particulier. Ce système est composé de plusieurs cavités réticulaires rectilignes mêlées à de nombreuses vésicules. Un système réticulaire semblable avait déjà été observé chez le hérisson au début de la phase du repos sexuel.

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9 May 1974.*

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¹⁶ Acknowledgments. The authors are indebted to Dr. A. R. SMITH and Prof. Dr. J. ARIËNS KAPPERS for the revision of the text and Miss P. RÖRING for typing the manuscript.

Spontaneous Occurrence of Aneuploidy in Somatic Cells of *Rana tigrina* (Ranidae: Anura)

The diploid chromosome complement in the male and female karyotypes is fairly well established. Occasional deviations from it, however, are also on record in various animal types¹⁻⁷. The accumulation of more cytological

data and the application of improved techniques are casting doubt upon the concept of diploid karyotype constancy. The present communication, a preliminary report of the investigations being carried out on the