Naloxon auf Opiat-Rezeptoren wirkt, und doch die Naloxon-induzierten Abstinenzsymptome von chronisch morphinisierten Mäusen unterdrückt[3,4]. Dazu ist zu erwähnen, dass wahrscheinlich verschiedene Opiat-Rezeptoren bestehen[7,8]. Zudem wurde beschrieben, dass Oxylorphan, ein Morphin-Antagonist, ebenso Naloxon-Wirkung auf Abstinenzsymptone von chronisch morphinisierten Mäusen unterdrückt[9]. Schliesslich ist beizufügen, dass SSP allgemein beruhigend wirkt[4,5]. So konnten wir zeigen, dass SP und SSP auch die starke psychomotorische Unruhe durch β-β-Iminodipropionitril unterdrückt[10].

Aus diesen Versuchen kann man mit gewisser Wahrscheinlichkeit schliessen, dass SP ein physiologischer Antagonist der Opiat-Rezeptoren oder der natürlichen endogenen Liganden für diese Rezeptoren ist. Vor kurzem wurde aus dem Gehirn Enkephalin, ein Polypeptid, dessen Struktur sich aber von SP wesentlich unterscheidet, isoliert[11].

Es ist interessant zu erwähnen, dass die Opiat-Rezeptoren im limbischen System und Nucleus caudatus am stärksten konzentriert sind[12], wo auch die Konzentration von SP sehr hoch ist[13].

7 A. E. Takemori, Biochem. Pharmac. *24*, 2121 (1975).
8 A. Goldstein, Life Sci. *14*, 615 (1974).
9 A. W. Pircio and J. A. Gylys, J. Pharm. exp. Ther. *193*, 23 (1975).
10 P. Stern, S. Ćatović and M. Stern, Naunyn-Schmiedebergs Arch. Pharmac. *281*, 233 (1974).
11 J. Hughes, T. Smith, H. W. Kosterlitz, L. A. Fothergill, B. A. Morgan and H. R. Morris, Nature, Lond. *258*, 577 (1975).
12 M. J. Kuhar, C. B. Pert and S. H. Snyder, Nature, Lond. *245*, 447 (1973).
13 F. Lembeck und G. Zettler, in *Pharmacology of Naturally Occurring Polypeptides and Lipid Soluble Acid*, (Edit. J. M. Walzer; Pergamon Press, London, Oxford 1972), p. 29.

The Subcommissural Organ of the Lizard *Lacerta s. sicula* Raf. Ultrastructure During the Winter

V. d'Uva and G. Ciarcia

Institute of Histology and Embryology, Laboratory of Comparative Anatomy, Faculty of Science, Via Mezzocannone 8, I–80134 Napoli (Italy), 13 October 1975.

Summary. The secretory activity of the SCO cells of *Lacerta s.sicula* Raf. is strongly reduced during the winter. Such reduction is documented by the decrease of the number of secretory granules type A and B described in previous papers in the summer SCO cells. Also the sacks of RER filled with electron-dense material (type C secretion) are very few; in their place there are, in the basal region of the cells, large vacuoles. In the distal region of the cells, at the free cell surface, a pronounced increase in the number of microvilli is noticed.

The subcommissural organ (SCO) is a specialization of the ependyma of the diencephalon that can be found at the level of the posterior commissure at the caudal limit of the 3rd ventricle in all vertebrates[1–5].

The SCO of *Lacerta s. sicula* Raf. is composed of a single layer of elongated ependymal cells which have a winding appearance. Previously we have found that the secretory activity of the SCO varies during the course of the year. The secretory activity of the SCO begins in January when a few large masses of secretory material are observed in the basal region of the SCO cells. The activity increases in the following months and reaches its maximum in June.

1 A. Dendy, R. Soc. Proc. *69*, 485 (1902).
2 G. J. Gilbert, Anat. Rec. *126*, 253 (1956).
3 A. Oksche, Z. Zellforsch. *54*, 549 (1961).
4 R. Olsson, Acta zool. *39*, 71 (1958).
5 J. H. Diederen, Z. Zellforsch. *111*, 379 (1970).

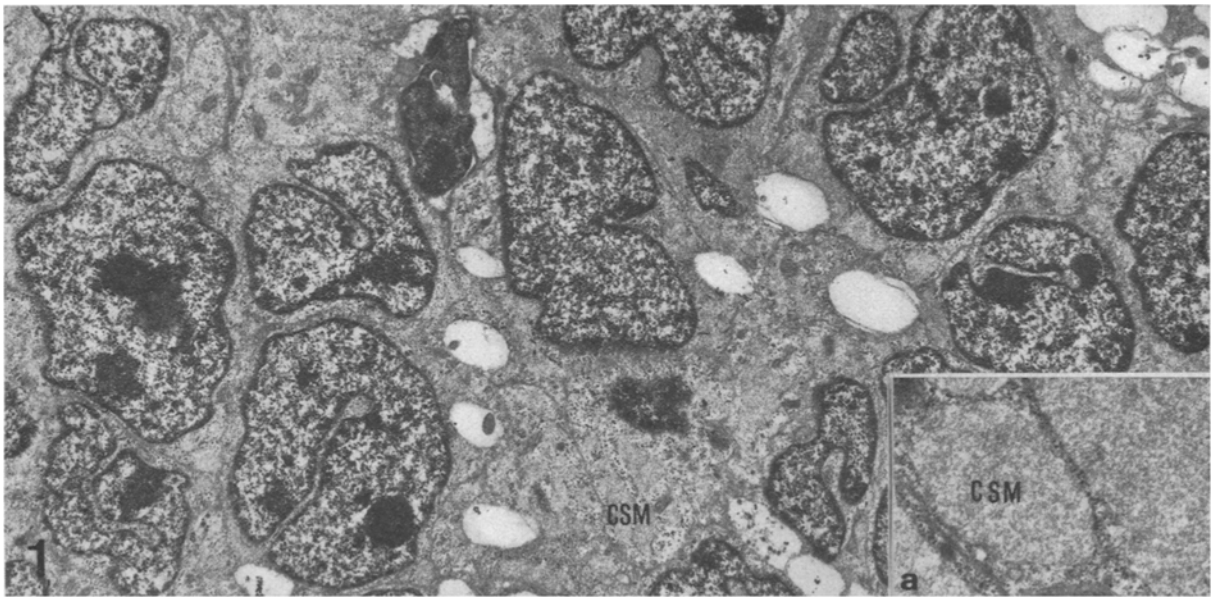

Fig. 1. SCO of *Lacerta s. sicula* Raf. Basal region. Note the ample vacuoles and cisternae of rough endoplasmic reticulum with type C secretory material (CSM) but in smaller quantity than in summer. ×4000. Details of type C secretory material. a, ×12000.

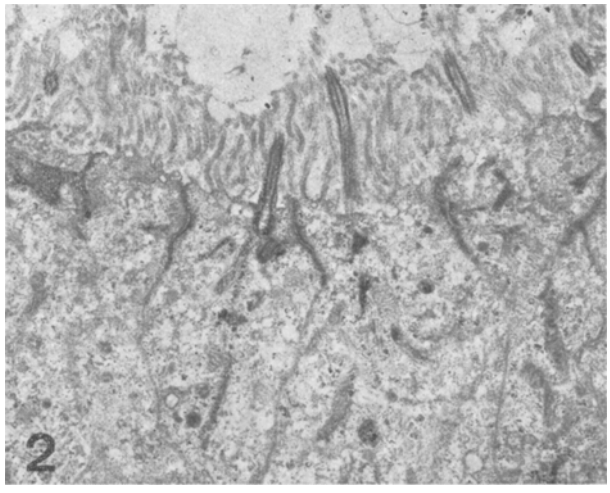

Fig. 2. SCO of *Lacerta s. sicula* Raf. Distal region. Note the numerous microvilli and cilia on the free cell surface which protudes in the 3rd ventricle. ×5600.

At this season, in the cells of the SCO large masses of secretory material completely cover the basal region. Finely granular secretory material is also found in the supranuclear and apical zone of the cells. The quantity of secretory material in the cells decreases from June to December. Reissner's fibre is present throughout the year.

We have also described the fine structure of the cells from animals with maximum SCO activity[6]; we have undertaken the present work, which reports on the ultrastructure of SCO cells from animals with minimum SCO activity, in order to complete the study of the secretory cycle of this organ.

Material and methods. Male and female specimens of *Lacerta s. sicula* Raf. were collected monthly from November to January. 25 brains were taken every month from animals with an average lenght of 6.5 cm. The SCO region was removed from the brain with the aid of a dissection microscope, reduced to small pieces with a diameter of 2–3 mm, and fixed, part in 2.5% gluteraldehyde in phosphate buffer pH 7.4 and part in formaldehyde-glutaraldehyde in phosphate buffer pH 7.4. The sections were then postfixed in 2% osmium tetroxide in phosphate buffer, dehydrated with increasing concentrations of alcohol and embedded in Epon-Araldite. Thin sections were stained with toluidine blue and observed with optical microscope. Ultrathin sections obtained with an LKB microtome (Ultratome III) were stained with uranyl-acetate and lead citrate[7]. They were observed on a Siemens Elmiskop I A of the Electron Microscopy Center of Faculty of Science of Naples.

Results and discussion. In our previous descriptions of the SCO cells, we made a distinction between a basal and a distal region of these cells, and this we do now. The basal region of the SCO cells extending to the perinuclear zone is dorsally in contact with the posterior commissure and laterally with the nervous mass. It is characterized by irregularly dilated cisternae of rough endoplasmic reticulum containing finely granular material with low electron density (type C, Figure 1a), and contains numerous free ribosomes between the dilated cytomembranes of the RER cisternae. The nucleus is lobated; the mitochondria are few with dense matrix and surround the nucleus.

[6] V. D'UVA, G. CIARCIA, A. CIARLETTA, J. submicrosc. Cytol. *8*, 175 (1976).
[7] E. S. REYNOLDS, J. cell. Biol. *17*, 208 (1963).

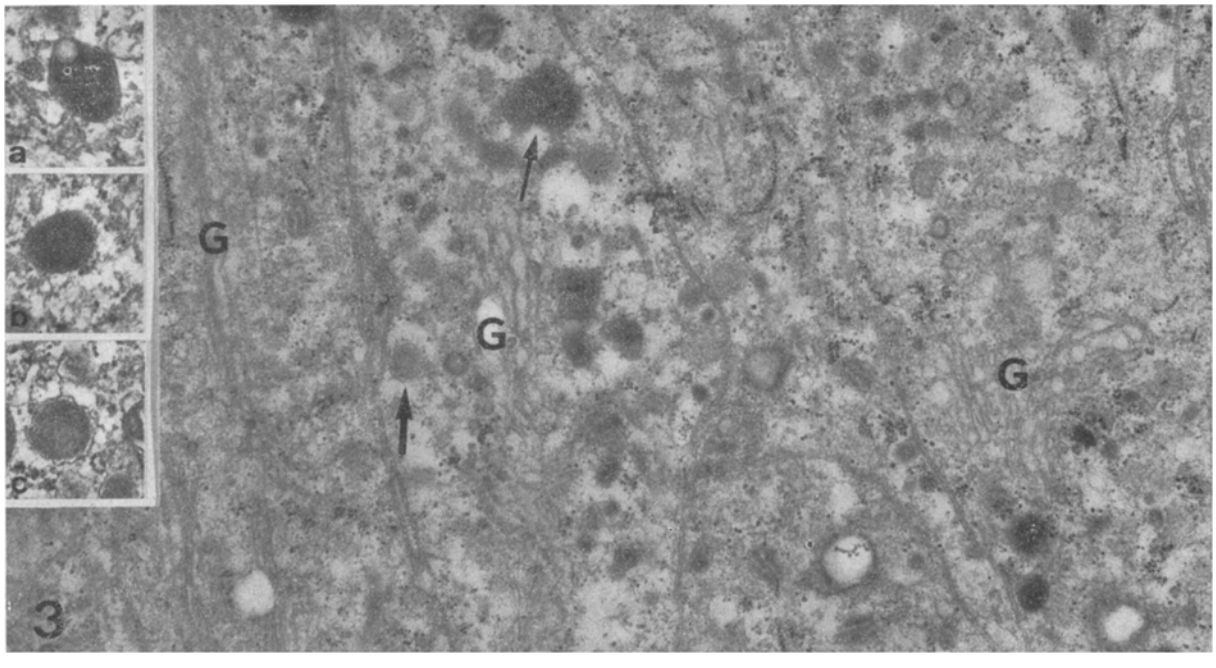

Fig. 3. SCO of *Lacerta s. sicula* Raf. The Golgi apparatus (G) is evident in 3 adjacent cells. Note also the coated vesicles close to the Golgi apparatus and the different types of granules (arrow and thick arrow). ×16200. Details of secretory granules present in SCO. a, b and c, ×24000.

Myelinated and non-myelinated nerve fibres of the posterior commissure are in close contact with the base of the SCO cells.

The distal region of the SCO cells extends from the supranuclear zone to the cell surface which protudes into the third ventricle (Figure 2). In the area immediately above the nucleus, there are cisternae of rough reticulum arranged in rows which are parallel to the long axis of the cells, and ribosomes both free and organized into polysomes. There are also granules of medium electron density with a central electron dense core surrounded by a clear halo (type B, Figure 3c), and a small Golgi apparatus made up of vacuoles, cisternae and vesicles; coated vesicles are present near the Golgi apparatus (Figure 3). In the apical zone, there are vacuolated and non-vacuolated electron dense granules (type A, Figure 3a and b), and granules of medium electron density with a central electron dense core surrounded by a clear halo (type B). Also present in this zone are numerous mitochondria with a dense matrix. At the free surface there are numerous microvilli containing 2–3 filaments and cilia of the 9+2 type (Figure 2). In the zone of contact between ependymal cells, typical terminal bars are observed and at the cellular apex there are few cytoplasmic protrusions filled with small granules.

These observations, when compared with those made on the summer SCO cells, demonstrate that in the winter there is a reduction in the development of the Golgi apparatus and the number of the type A and B granules. Moreover, also the type C secretion is strongly reduced and confined in the basal region, while in the summer this type of secretion is well represented also in the RER cisternae parallel to the long axis of the cells that are found in the supranuclear zone. The reduction of the Golgi apparatus is probably related to the lower secretory activity, and so is the disappearance of the ample sacks of secretory material from the SCO basal region, and the appearance in their place of large vacuoles. The secretory material (type C) of low electron density present in the basal region of the SCO, very abundant in the summer and scarce in the winter, is probably to be identified with the material Gomori and PAS positive described with the light microscope, which during the winter decreases and disappears. At the cellular apex, during strong apocrine-like secretory activity in the summer, several cytoplasmic protusions are present. In the winter, the reduced apocrine-like secretory activity is also shown by the decrease of cytoplasmic protusions; the increase of microvilli in this period would be related to this. No sexual difference has been found.

The Supraependymal Cells of the Rat Hypothalamus: Changes in their Morphology and Cell Number During the Ovarian Cycle

P. Mestres[1]

Ruhr-Universität Bochum, Lehrstuhl für Anatomie I, Universitätsstrasse 150, Postfach 10 2148, D-463 Bochum (German Federal Republic, BRD), 20 February 1976.

Summary. The number of SEC in the hypothalamus of the rat change during the ovarian cycle (5–8 cells in oestrus, 100 cells in dioestrus per ventricular surface). The changes in the number as well the morphology of the SEC support the hypothesis that they are of mesenchymal nature.

The existence of free cells on the surface of the ependyma (supraependymal cells) and the choroid plexus (epiplexus cells) has been known for some time[2]. Recently with the application of SEM (scanning electron microscopy) techniques, the question of the distribution, morphology and function of the supraependymal cells has become actual again[3–6]. In the hypothalamus, these cells have been found on the surface of the nonciliated areas of the ependyma, especially in the proximity of the recessus infundibularis[7–9]. In this area the hypothalamic ependyma shows cyclic changes at the apical cell poles, i.e., variations in the quantity of microvilli and size of protrusions, as well as release of cellular material. These changes can be correlated with the phases of the ovarian cycle[8, 10, 11]. The nature of the supraependymal cells in the hypothalamus is an intensively discussed topic. On the basis of their morphology and cytological characteristica and distribution, it was suggested that they may be mesenchymal cells with phagocytic activity involved in the renewal of this region of the ependyma and generally active in the transport of cell debris[12]. In connection with this hypothesis, the question which was investigated in this study is whether the cell number and the surface morphology of the supraependymal cells in the hypothalamus show variations which correlate with the cyclic changes of the ependyma during the ovarian cycle in the rat.

Methods. Subjects were 24 females and 6 males Sprague-Dawley rats. The animals were maintained on a reversed lighting schedule (12 h light, 12 h darkness). The estrous cycle was controlled daily by studying of the vaginal cytology[13]. The females were killed in groups of 6 animals in different phases of the estrous cycle. The males were sacrified in 2 groups, one after the 'dark' hours, the other after the 'light' hours.

[1] The author is indebted to Mrs. H. Ermel for expert technical assistence and to Miss K. Rascher, B. A. for critical reading of the manuscript. Supported by DFG (Me 559/1).

[2] W. Kolmer, Anat. Anz. *54*, 15 (1921).
[3] H. Leonhardt and B. Lindemann, Z. Zellforsch. *139*, 285 (1973).
[4] P. W. Coates, Brain Res. *57*, 502 (1973).
[5] D. E. Scott, G. P. Kozlowski and M. N. Sheridan, Int. Rev. Cytol. *37*, 349 (1974).
[6] D. E. Scott, G. Krobisch-Dudley, W. K. Paull, G. P. Kozlowski and J. Ribas, Cell Tiss. Res. *162*, 61 (1975).
[7] P. Mestres, W. Breipohl and G. J. Bijvank, Proc. 7th SEM Symp., Part III (IIT Research Institute, Chicago 1974), p. 783.
[8] P. Mestres, J. A. Mitchell and E. S. E. Hafez, Anat. Rec. *181*, 425 (1975).
[9] P. Mestres and W. Breipohl, in preparation.
[10] T. C. Anand Kumar, Z. Zellforsch. *90*, 28 (1968).
[11] J. R. Brawer, P. S. Lin and C. Sonnenschein, Anat. Rec. *179*, 481 (1974).
[12] R. Bleier, R. Albrecht and J. A. F. Cruce, Science *189*, 299 1975).
[13] N. B. Schwartz, Recent Prog. Hormone Res. *25*, 1 (1969).