amount of intracellular osmotic effectors as indicated by the fact that volume shrinks to values lower than control ones upon return of the axons to control saline. Modification of the intracellular fluid osmolarity may be the result of a leak of various solutes from the swollen cells. Amino acids are important osmotic effectors in tissues of marine invertebrates[1-3] and an increase in alanine efflux has been shown to occur in *Callinectes sapidus* axons submitted to hypo-osmotic stress[5]. However we consider that a modification of the amino-acid oxidative metabolism is also involved in the volume readjustment process[11]. Modifications in metabolic activity occur during both hypo- and hyper-osmotic stresses[11], while efflux changes can only be recorded during hypo-osmotic shock[5]. This may account for the fact that volume regulation cannot be observed during hyper-osmotic stress. Indeed, an increase in amino- acid amount large enough to produce volume regulation in hyper-osmotic conditions and effected solely by decrease in catabolism may take longer than the time of our observations.

Lack of volume regulation during hyper-osmotic shock does not appear to be due to non-availability of osmotic effectors in the incubating saline, since volume readjustment cannot be observed in salines supplemented with a 10 mmolar mixture of amino acids. It remains, however, possible that some factor present in the blood of the animal would be required to initiate an increase in uptake of osmotic effectors. This possibility is at present under investigation.

Résumé. Les axones isolés du crustacé euryhalin *Eriocheir sinensis* sont capables d'effectuer une régularisation de volume lorsqu'ils sont soumis à des chocs hypo-osmotiques. Les mécanismes pouvant être impliqués dans ce processus sont discutés.

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Multi-Lamellar Astroglial Wrapping of Neuronal Elements in the Hypothalamus of Rat

Cajal proposed specific glio-neuronal contact relationships in the central nervous system, a conception which was generally accepted. Though such relationships could not be confirmed by electron microscope studies of neocortical tissue[1,2], specific spatial affinity between astroglia and receptive surfaces of neurones or synapses has been recognized in many subcortical regions of the central nervous system[2-5]. The affinity of the astrocyte contacts seems to be restricted not only to special regions but also to distinct neuron types, e.g. in the cerebellar cortex the Purkinje cells are regularly covered by astroglia, the granular and basket cells are only poorly covered if at all[4].

In the nucleus suprachiasmaticus, n. ventromedialis and the area praeoptica, many neuronal elements are surrounded by more than one astroglial lamella. The 2–10 layers result from interdigitations of different lamellar extensions of astrocytic processes. Sporadically one very extended lamella forms a spiral cover around a neuronal element or a synapse. This kind of wrapping occurs on different parts of the neuron, i.e. the dendrites (Figure 2), somata and presynaptic elements. Synapses are enveloped irrespective of their type, i.e. their position on the postsynaptic neuron (soma, dendrite, intrabouton-al spinule) and the structure of their presynaptic elements (different vesicle types, etc., see Figure 1). Thus all discernible types of synapses may be covered in

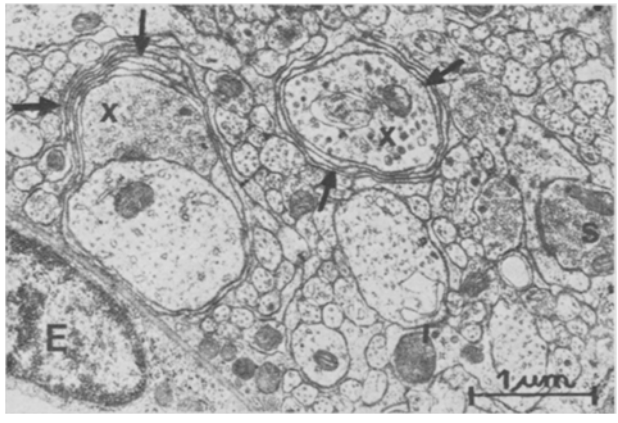

Fig. 1. Multi-lamellar wrapping of 2 synapses (×) by astroglial lamellae (arrows) near a capillary in the n. ventromedialis. Note another synapse (s) with only uni-lamellar, partial covering. E, endothelial cell; cal. bar, 1 µm.

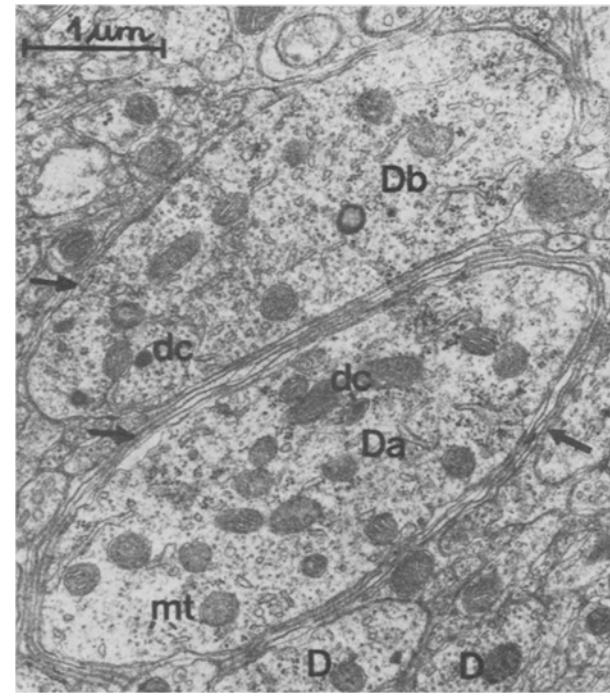

Fig. 2. Dendrites (Da, Db) covered by several astrocytic lamellae (arrows) in the n. suprachiasmaticus. Note other dendrites (D) only partially covered, if at all. dc, dense core vesicles; mt, microtubules; cal. bar, 1 µm.

this way. However the synapses and neuronal elements may also have only a uni-lamellar, or partial glial covering. These variations are most obvious in the n. suprachiasmaticus.

Similar glio-neuronal relationships are observed in the n. arcuatus and the n. supraopticus, though multilamellar formations are rare on synapses in these nuclei. Preliminary observations show that after saltloading the perineuronal accumulation of astroglial lamellae seems to increase in the n. supraopticus.

The present results demonstrate increased perineuronal wrapping produced by astroglial processes in various nuclei of the hypothalamus. The fraction of the covered surface of the neuron, and the number of astroglial lamellae varies significantly. In contrast to the cerebellar cortex, nucleus of Deiters and the spinal cord[4], the astroglial covering does not seem to be restricted to a distinct type of neuron or synapse. The large differences of glial covering found on neuronal elements in the hypothalamus might be caused by periodic, long-lasting changes of the activity level[6]. Further studies are necessary to reveal whether the degree of neuronal wrapping by astrocytic processes is dependent on the activity level of the neuron concerned.

Zusammenfassung. In verschiedenen Kerngebieten des Hypothalamus wird eine wechselnde Zahl neuronaler Elemente, wie Somata, Dendriten und verschiedene Synapsentypen, von multilamellären Formationen der Astroglia umhüllt. Diese verstärkte Umhüllung ist hier nicht spezifisch für bestimmte Neuronen- und Synapsentypen, wie in anderen Teilen des ZNS. Vorläufige Ergebnisse am n. supraopticus nach Salzbelastung lassen es als möglich erscheinen, dass die wechselnd starke Bedeckung der neuronalen Elemente durch Astrocytenlamellen vom Aktivitätsniveau der Neurone abhängt.

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Impaired Jejunal Transport of Monosaccharides in Experimental Cholestasis

Monosaccharide absorption is assumed to be unimpaired in children with extrahepatic biliary atresia[1]. However, in these patients, D-xylose values may be affected by alterations in plasma volume, shunting or inability of the cirrhotic liver to metabolize the absorbed substrate[2]. The purpose of this study was to examine, in rats, the effect of acute experimental cholestasis on the transport of 3-*o*-methyl glucose (3-*o*-MG). Absorption was measured in extracorporeally perfused jejunal segments and in everted intestinal rings.

Material and methods. Bile duct ligation was carried out in male Sprague-Dawley rats weighing 150 to 220 g. Controls were sham operated. The 2 groups of animals were placed in restraining cages and offered ad libitum a 5% sucrose solution containing 40 meq/l of NaCl and 20 meq/l of KCl for a period of 48 h following the surgical procedures.

Absorption through jejunal segments: The animals were weighed and bilirubin levels determined. Under pentobarbital anesthesia, 20 cm segments of jejunum distal to the ligament of Treitz were completely removed from the animals and perfused extracorporeally as described previously[3]. Circulation of the blood perfusate was maintained at a rate of 2.5 ml/min. The proximal end of the jejunal segment was perfused for 36 min at a rate of 1 ml/min with a 5 m*M* solution of 3-*o*-MG and 2 μCi of ^{14}C-labeled 3-*o*-MG (New England Nuclear Corporation: 5.3 mCi/mmole) in a physiological electrolyte solution. At the 24 min mark in 16 of the 24 animals, the luminal perfusate contained in addition a 35 m*M* solution of Na taurocholate (Maybridge Research Chemicals, U.K.) which was repurified[3]. The % absorption of 3-*o*-MG per min was calculated by dividing the amount of substrate in the portal effluent collected at 1 min intervals by the mean luminal substrate concentration. Results were then corrected per g dry weight of mesentery free jejunal segment.

Transport in intestinal rings: The rats were decapitated and a segment of proximal jejunum was removed, everted and cut into intestinal rings weighing 7–10 mg each[4]. The rings were kept until incubation in chilled Krebs-Ringer bicarbonate (pH 7.4) which had been gassed for 30 min with 95% O_2 and 5% CO_2. Each ring was then transferred to a 10 ml Erlenmeyer flask containing 2 ml of freshly gassed Krebs-Ringer bicarbonate buffer and either Inulin-Carboxyl-^{14}C (New England Nuclear Corporation: 1–3 mCi/g) or a 0.5 m*M* solution of 3-*o*-MG with .3 μCi of

3-*o*-MG absorption in the vascular compartment of perfused jejunal segments

	Bile duct ligated (12)	Sham operated (12)	*P*
Weight loss (%)	8.2 ± 2.3	6.8 ± 2.1	N.S.
Bilirubin at 48 h	7.2 ± 3.0	0.8 ± 0.2	< 0.001
Absorption per min (%)	23.1 ± 7.7	36.6 ± 13.2	< 0.01

Figures in parentheses correspond to the number of animals studied. Results shown represent mean ± SD. *P* was calculated using the student *t*-test.

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