The characterization of the Thy-1 molecule from rat brain

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Tissue specific molecules at the cell surface are likely to be involved in cell-cell interactions. One method of identifying these is by studying tissue-specific cell surface antigens; e.g. the Thy-1 antigen, which is only present in large quantities on the cell surface of thymocytes and in all regions of adult brain of rats and mice [3]. In brain there is a rapid rise in the expression of Thy-1 from low levels at birth to near adult levels after 3 weeks.

The Thy-1 molecule has now been purified from rat brain by following the antigenic activity, throughout the purification, by the inhibition of a radioactive antibody binding assay [1]. Crude membrane was prepared from rat brain and extracted with the detergent Lubrol PX. The material not solubilized was then extracted with sodium deoxycholate to yield solubilized Thy-1 antigen which, after affinity chromatography with lentil lectin and gel filtration, gave a glycoprotein which carried the Thy-1 antigens. This glycoprotein (apparent mol. wt. 24,000) is similiar to the Thy-1 molecule purified from rat thymocytes [2].

Purified preparations of Thy-1 from brain and thymocytes have been compared by amino acid and carbohydrate analysis. No detectable differences have been found in the amino acid compositions but the carbohydrate compositions were strikingly different. Thus it is likely that a similar protein backbone is associated with different carbohydrate residues in the two tissues. No function has yet been found for Thy-1; one possibility is that it may be involved in cellular recognition in the brain and the lymphoid system.

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The effect of lesions of the fornix on the behaviour of the rat. A deficit in place learning

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This paper describes research on the effect of punishment on fornicotomized rats in two simple learning situations — lever pressing and food reinforced approach in a straight runway.

(1) Lever pressing: control rats displayed a relationship between food deprivation level and behaviour following punishment. The greater the deprivation, the more time spent near the bar and the shorter the latency of the next lever press. Rats with fornical lesions showed no consistent relationship between deprivation level and location in the Skinner box or latency of the next lever press following punishment. Their response latencies were similar to those of higher deprivation controls. These results suggest that fornicotomized rats can inhibit lever pressing as well as controls, and that the differences in behaviour which were observed arise from the failure of fornicotomized rats to show an approach-avoidance gradient relative to the place in the box in which they had been shocked.

(2) Runway behaviour: rats were punished in different locations in a runway. Control rats hesitated in the start box of the runway no matter where they were shocked, even though they could not observe the runway cues in the presence of which they had been shocked. Rats with fornical lesions inhibited responding only when very near to cues in the presence of which they had been shocked. These results suggest that control rats responded in terms of their knowledge of spatial relations among objects and locations in the environment while rats with fornical lesions did not.

An attempt to demonstrate subliminal 'silent synapses' in the visual cortex of deprived cats

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In normal cats the majority of neurones in the visual cortex can clearly be excited by visual stimulation of either eye: but a variety of developmental misadventures early in a kitten's life can lead to the loss of functional input from one eye or the other. Monocular deprivation, even for just a few days, causes virtually total silencing of the input from the deprived eye [3]; the induction of an artificial strabismus leads to the establishment of two predominant populations of monocularly driven cells [1]. We have tried to determine whether these changes represent the complete loss of synaptic input from one eye or the other, or whether the synapses might still be present but merely reduced in strength. We employed a method logically similar to that used by Merrill and Wall [2] in their work on subliminal input to cells in the dorsal horn of the spinal cord. We inserted concentric bipolar stimulating electrodes intraocularly, in