G SEROOGY,* Kim B., László SERESS* and Charles E. RIBAK, Department of Anatomy, University of California, Irvine, California. Ultrastructure of commissural neurons of the hilar region in the dentate gyrus.

Previous studies have described the polymorph neurons in the hilus of the dentate gyrus at the light microscopic level and have indicated that many of these neurons are the cells of origin for both ipsilateral associational and commissural projections to the dentate gyrus. Since previous studies have not described the ultrastructural characteristics of the hilar neurons, the following study was undertaken to identify these features of the commissural neurons in the hilus. The horseradish peroxidase (HRP) retrograde transport method was utilized along with a silver staining technique for HRP intensification. Small quantities of a 30% HRP solution (0.1 µl - 0.2 µl) were injected into the dentate gyrus. After 48 hours the rats were perfused, refrigerated overnight at 4°C, and then the brains were removed from the cranium. Each brain was sectioned coronally on a vibratone at a thickness of 100 µm. The sections that contained the hippocampus were reacted histochemically to detect HRP reaction product. Two populations of labeled commissural neurons were observed in electron microscopic preparations of the contralateral hilus. One type consisted of cells with somata exhibiting round or oval nuclei with no intranuclear inclusions, having exclusively symmetric axosomatic synapses, and with main dendrites that were thick, tapering and spiny. In contrast, the other type of labeled somata had infolded nuclei containing intranuclear rods or sheets, displayed both symmetric and asymmetric axosomatic synapses, and had dendrites that were less thick and generally aspinous. In these same preparations, commissural axon terminals were labeled as a result of the anterograde transport of HRP. These terminals formed asymmetric synapses with dendrites and dendritic spines in the hilus and molecular layer. From the results of this study it appears that there are two distinct populations of commissural hilar neurons: one type resembles the morphology of the spiny CA3 pyramidal neuron while the other is similar to the local circuit basket cells of the dentate gyrus, which we have shown previously to be inhibitory, GABAergic neurons. These structural differences probably reflect different functions for these two cell types.

(Supported by Grant BNS 80-23606 from NSF.)