

Higher Basidiomycetes Mushroom Extract Effects on Nerve Cell Spike Activity *In Vitro*

Michael M. Moldavan,¹ Anna A. Grodzinskaya,² Solomon P. Wasser,³
Elvira F. Solomko,² and Viktor M. Storozhuk¹

¹A. A. Bogomoletz Institute of Physiology, National Academy of Sciences of Ukraine, 4 Bogomoltza Str., Kiev 01024, Ukraine; ²N. G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine, 2 Tereshchenkivska Str., Kiev 01601, Ukraine; and ³Institute of Evolution, University of Haifa, Mt. Carmel, Haifa 31905, Israel

The spike activity of 141 neurons with background activity from the rat brain during the application of extracts of 15 species of Basidiomycetes was studied. The species were *Boletus edulis* Bull.: Fr., *Xerocomus hadius* Fr., *Lentinus edodes* (Berk.) Sing., *Lactarius turpis* (Weinm.) Fr., *Amanita muscaria* (L.: Fr.) Hook., *A. pantherina* (DC.: Fr.) Secr., *A. citrina* (Schaeff.) S. F. Gray, *A. phalloides* Fr., *A. rubescens* (Pers.: Fr.) S. F. Gray, *Psilocybe cubensis* (Earle) Sing., *Stropharia aeruginosa* (Curt.: Fr.) QuéL., *Armillariella mellea* (Vahl.: Fr.) P. Karst., *Hypoholoma fasciculare* (Huds.: Fr.) Kumm., *Piptoporus betulinus* (Bull.: Fr.) P. Karst., and *Calvatia utriformis* (Pers.) Jaap. Studies were carried out *in vitro* using rat hippocampal slices placed in a working flow chamber where they were continuously perfused with an artificial cerebrospinal fluid (ACSF) that was gassed with a mixture of 95% O₂ and 5% CO₂, which provided nutrient for the slices. Neuronal spike ac-

tivity from the pyramidal layer of the hippocampal CA1 zone was recorded extracellularly using glass microelectrodes and processed on the basis of a special computer program. To obtain extracts, fruiting bodies of mushrooms were cut into small pieces and covered with ethanol (96%) at a ratio of 1:10 for dry and 1:2 for fresh samples for 10 days. Before the experiments the extract was evaporated and then its initial volume was restored by means of distilled water, assuming that its concentration was 100%, and after that it was diluted in ACSF up to the required concentration. During the application of various mushroom species extracts hippocampal neurons showed specific spike responses and selective activation of definite types of receptors belonging to various types of transmitter systems. It was established that extracts of *P. cubensis* and some *Amanita* species could inhibit glutamate transmission in the hippocampus.