During the last thirteen years we studied the diversity of the acoustic communication system of the katydid genus *Neoconocephalus*. The ancestral call pattern is an extremely fast pulse rate (>200 Hz) produced as a continuous trill. Three derived call patterns occur in this group. Each one of these derived call traits has evolved several times independently.

We tested female call recognition for pulse and chirp patterns. We found at least 5 different recognition mechanisms for the pulse pattern and three mechanisms for the chirp patterns of male calls. In addition, we found some species where male calls have derived characters but female call recognition remained in the ancestral state.

Comparative analyses of the processing of the temporal call patterns and their timing relationships in the ascending sensory pathway provide additional evidence on the evolutionary mechanisms shaping the communication system.

Molecular clock approaches reveal that the diversity of communication in this genus evolved extremely rapidly, with divergence times orders of magnitude less than found in comparable systems.

In this talk, I attempt to integrate the various data sets into a comprehensive view of the evolutionary history and the mechanisms generating the diversity of this communication system.