1003-92-1627    **Mike Phillips\*** (mdphillips@gmail.com), **Istvan Karsai** and **Jeff Knisley**. *An Agent-Based Model of Nest Construction in Social Wasps.* Preliminary report.

Social insect colonies develop into parallel processing systems in which the colony conducts most of its operations concurrently instead of sequentially. Recently, theories of self-organization have explained this behavior by using local information to provide a better understanding of the complexity and dynamics present in these systems. Social wasp colonies provide some of the clearest views of self-organization in biological systems. In particular, wasp nest construction provides a great opportunity to study division of labor.

An ODE mathematical model of the division of labor in wasp colonies was developed by Karsai and Balazsi (2002). We build on this earlier work with a bottom-up modeling approach. To study decentralized decision making in these colonies we propose an agent-based model that prohibits individual access to global information and ensures that all interactions take place on a local level.

Using only a few simple mechanisms, we have created a model that accurately predicts the division of labor in social wasp colonies. With only a few simple behavioral rules and no central control present, the model is able to predict a great amount of complexity and capture the dynamics of the natural system. (Received October 05, 2004)