1048-92-22 **Wyatt A. Mangum*** (wmangum@umw.edu), 1301 College Ave, Fredericksburg, VA 22401. *A Nonlinear Difference Equation Model of the Population Biology and Resistance Evolution of the Mite Varroa destructor, a Parasite of Honey Bees.*

Miticide-resistant varroa mites constitute a grave threat to honey bee populations in North America, Europe, and other temperate climates. Extensive observational studies on the population biology and population genetics of resistant varroa mites revealed unexpected dynamics and motivated the following model. The complete model is composed of a system of nonlinear difference equations that originate from population biology and population genetics. The population biology model, a logistic model greatly modified for the mite's life cycle, is coupled with a population genetics model, a haploid-diploid selection model with density-dependent inbreeding based on additional life history parameters of the mite. Together these equations calculate the number of mites in a colony and the frequency of the miticide-resistant ones, a frequency that depends on the selection regime (the chemical treatments). When the population biology model exhibits cyclic behavior, a cycle of the same period temporarily emerges in the frequency of the susceptible varroa mites in the genetics model. Under several regimes the model exhibits chaotic dynamics and apparently period-doubling reversals. Several modeling scenarios will be discussed. (Received December 04, 2008)