1145-37-1200 **Azmy S. Ackleh** (ackleh@louisiana.edu), Department of Mathematics, University of Louisiana at Lafayette, Lafayette, LA 70504, **Md Istiaq Hossain*** (hossain.istiaq@louisiana.edu), Department of Mathematics, University of Louisiana at Lafayette, Lafayette, LA 70504, and **Amy Veprauskas** (aveprauskas@louisiana.edu), Department of Mathematics, University of Louisiana at Lafayette, Lafayette, LA 70504. *The effect of prey evolution on predator-prey dynamics.* Preliminary report.

Continuous exposure to a toxicant may result in the evolution of toxicant resistance in relatively short-lived species. In this study, we investigate the effect of such evolution of toxicant resistance in the prey population on the overall dynamics of a predator-prey system. We first derive and analyze a discrete time predator-prey model. We establish conditions for the existence and stability of various equilibria, as well as conditions for the persistence of both predator and prey populations. We then extend this model to an evolutionary model by applying the Darwinian evolutionary game theory methodology. This methodology couples the population dynamics with the dynamics of an evolving phenotypic trait, which we assume provides a measure for the level of toxicant resistance developed by the prey. The predator is impacted by prey evolution indirectly, through changes in prey density, and directly, through an assumed trade-off between toxicant resistance and the ability of the prey to escape predation. We study the dynamics of this model and establish conditions for when the prey is able to evolve toxicant resistance. In particular, we show that the evolution of toxicant resistance may allow both the predator and prey to persist when, without the evolution, both may go extinct. (Received September 21, 2018)