On inter-species regression analysis

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Abstract

When conducting inter-species regression analyses, the phylogenetic relationships between the individual species need to be taken into account. In this paper, a procedure for conducting such analyses is discussed, which only requires the use of a measure of relationship between pairs of species, rather than a complete phylogeny, and which at the same time assesses the importance to be attached to the relationships with regard to the conclusions reached. The procedure is applied to data from Minder et al. (2005), relating testis size to mean hind tibia length, duct length and spermathecal area in 15 species of Scathophagidae (Diptera). We show that considering the phylogenetic structure significantly improves the fit of the model to the data. We find a robust relationship between testis size and spermathecal area but could not support one between testis size and spermathecal duct length.

Keywords: likelihood based inference, Ornstein-Uhlenbeck process, phylogenetic relationship.