The chiropteran hypophysis: a phylogenetic and ecological approach

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The hypophysis plays an important role at the life history of vertebrates, since this endocrine gland influences biological functions at physiological, developmental, reproductive and social levels. We explored the phylogenetic trends of the volumetric changes of the hypophysis components (adenohypophysis and neurohypophysis) by mapping confidence intervals (TNT program) among 96 species belonging to Yinpterochiroptera and Yangochiroptera suborders in a well-resolved tree. Our raw data was obtained from a log transformation of a database recently published. Further, we explored the relation of the hypophysis volume as a whole (Hyp) and its separate components (AdH and NeH) with social (roosting association, mating system, female promiscuity), reproductive (male testes mass), physiologycal (body mass) and foraging (diet) variables of the studied species, using ANCOVA for discrete variables and linear regressions for continuous variables. The hypophysis as a whole and its separate components showed significant linear relation with body mass ($p<0.005$; Hyp $r^2=0.86$; AdH $r^2=0.79$; NeH $r^2=0.93$). When body mass effect was excluded (using body mass as covariate at ANCOVA analyses, and using at linear regressions analyses the residuals from previous linear regressions of each variable -Hyp, AdH, Neh and testes mass- vs. body mass), the Hyp, AdH and NeH showed no significant linear relation with testes mass ($p>0.005$) nor significant differences with roosting association, mating system and female promiscuity ($p>0.005$) variables. On the other hand, the hypophysis volume as a whole and the adenohypophysis component showed significant differences with diet ($p<0.005$). The volumetric changes of the hypophysis components supported various monophyletic groups, reflecting the high phylogenetic fit displayed by this structure regarding to the well-resolved topology of the order Chiroptera. Our results suggest that the volumetric differences of the hypophysis in bats are better explained by a phylogenetic effect, probably linked to the evolution of the body mass in the group, than ecological aspects linked to the natural history of the extant species.
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