Open PhD Position

Area of research: Functional morphology

PhD Title: Form and function relationships in the process of secondary adaptation to an aquatic life - the contribution of semi-aquatic mammals

Supervisors: Dr. Anthony Herrel, Dr. Alexandra Houssaye & Dr. Raphael Cornette
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Research unit: UMR 7179 - Mécanismes Adaptatifs : des Organismes aux Communautés

Host laboratory : Equipe FUNEVOL - *Approche fonctionnelle de l'évolution des systèmes complexes*. UMR7179 CNRS/MNHN

Subject :

Several amniote lineages have secondarily adapted to an aquatic life. This has resulted in a striking convergence in form and function due to the biomechanical constraints imposed by movement in water. The aim of this PhD is to better understand the adaptation of organisms to this change in environment by analyzing the relationships between anatomical specializations and functional requirements in environments differing strongly in their mechanical properties: water and land.

This project will involve the *in vivo* analysis of locomotion in various extant mammals in water and on land. The project will combine movement analyses in 3D, the quantification of forces, and respirometry analyses. Paired taxa, phylogenetically and morphologically close but displaying different ecologies (terrestrial versus semi-aquatic forms) will be selected for study.

In addition, the shape of bones of interest (notably long bones) will be characterized in semi-aquatic and terrestrial mammals using geometric morphometrics, using both traditional landmark-based analyses as well as surface-based sliding landmark analyses. This will allow us to highlight the anatomical differences observed between species.

The final aim is to link the ecology of the organisms analyzed with their locomotor performance and bone shape and structure in order to better characterize the link between form and function in these taxa. This will improve our understanding of the various anatomical features associated with the adaptation to a semi-aquatic lifestyle in these taxa.

This PhD is part of an ANR project whose larger objective is to understand the adaptation of bone to intrinsic (e.g. phylogenetic, behavioural) and extrinsic (e.g. environmental) constraints in the process of secondary adaptation to an aquatic life, a major theme in evolutionary biology.

Financial information: The PhD will be financed as part of an ANR project.
The material necessary for this project will be made available to the student or is present in the collections of the MNHN. Moreover, all the required technical support is available at the MNHN.

Start: 01/04/2014

Duration: 3 years

Candidate profile: Student with a Master in Biological Sciences; dynamic, able to work autonomously as well as in a team; good level in spoken and written English.

Please send a CV and a motivation letter by e-mail to houssaye@mnhn.fr and herrel@mnhn.fr. The copy of your Master Thesis would also be welcome.

Deadline: 05/01/2014