

Comparative Anatomy and Morphology

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Research

The Department of comparative anatomy and morphology is continuing its long tradition of studying both vertebrates and invertebrates. Modern scientific methods are being employed to investigate the functional anatomy and ecomorphology of vertebrates, mites and echinoderms.



Vertebrate excretory systems

Ontogenetic studies on the development and differentiation of the pro- and opisthonephros of birds, reptiles, amphibians and osteichthyes complement studies on the kidneys of adult vertebrates. Data on nephron structure and the renal vascular system not only provide an important basis for evaluating the phylogenetic position in the natural system, but also allow an interpretation of ecological niche formation in the individual species. Most recently, emphasis has been placed on the structure of kidney tubules and renal corpuscles of various amphibians and reptiles.

Amphibians are particularly suitable for ecomorphological studies of the excretory system. In

addition to inhabiting a wide range of biotopes, they undergo a complex larval development which involves a change from an aquatic to a terrestrial life style. Our work relies heavily on ultrastructural techniques (scanning and transmission electron microscopy) and light microscopy. Vascular systems are rendered visible by corrosion casting.

Reptile cranio-cervical systems

Our studies on vertebrates currently focus on the form and function of the head/neck systems of reptiles, especially of turtles. The movement of the cervical vertebrae during feeding is being documented by high-speed cinematography and simultaneous X-ray photographs. X-ray analyses and microdissection reveal the mechanics of the muscle-ligament-skeletal system. The form and distribution of taste buds and glands in the oral cavity will be described. These data should enable us to model the various feeding apparatuses and allow us to classify the various turtle species into specific feeding categories.

Mite reproductive organs

A further focal point of research in the department is the comparative and functional anatomy of mites; our current research effort concentrates on the structure of the reproductive organs of astigmatic mites. This species-rich, economically and medically important mite group displays a great adaptability to diverse environmental conditions.

Electron microscopical techniques are being applied to the poorly known embryonic development of these mites in order to shed light on their segmentation and extremity anlagen. Additional studies on the reproductive biology focus on the influence of environmental factors on the duration of embryonic development and on the generational cycles of several pests of stored foods (that tend toward mass reproduction) and of house dust mites.

Echinoderms

Our current studies on the functional anatomy of echinoderms focus on the microarchitecture and biomechanical aspects of the corona and the external appendages (spine, pedicellaria, podia) of regular and irregular sea urchins. Future investigations will deal with the cellular elements involved in biomineralisation. Studies of the coelomocytes and the axocoel complex especially of Ophiuroidea and Echinoida will contribute to our understanding of the reproductive biology of burrowing sea urchins.

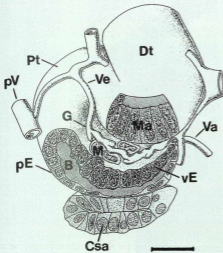


Fig. Developing nephron of an anuran tadpole. Scale: 20 μ m

Teaching

Lectures: General Biology IV (comparative anatomy, morphology and biology of animals) (L,3h); - Somatology (L,4h); - Vertebrates (L,2h); - Comparative Embryology (L,3h) - Anatomy and Biology of Echinodermata (L,2h); - Anatomy and Biology of Fishes (L,2h); - Anatomy and Biology of Reptiles and Birds (L,2h); - Scanning Electron Microscope Techniques (L,2h); - **Practicals:** Morphology: Vertebrata from the lamprey to mammals (P,8h); - Microanatomy of Vertebrates (P,4h); - Comparative Embryology (P,8h); - Introduction to the Fauna of Marine Ecosystems (2-week course at the Marine Biological Station in Rovinj, Croatia) (P,10h); - Histological and Histochemical Methods (P,8h); - Comparative Anatomy (Tentaculata, Echinodermata, Hemichordata, Chaetognatha and Tunicata; microanatomy of various mammalian organ systems) (P,5h); - Basic Zoology lab course I; collaboration.



Fig. House dust mite (*Dermatophagoides farinae*) in frontal view, scale: 20 μ m

International Cooperations

Institute of Zoology, Jagellonian University Krakow, Poland; - Department of Environmental, Population and Organismic Biology, University of Colorado at Boulder, Colorado, USA; - Institute of Evolutionary and Ecological Sciences, University of Leiden, The Netherlands; - Department of Biology, University of Alabama at Birmingham, Alabama, USA

Selected References

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- Hilgers H, Schinner GO (1995) Pedicellariae of the endemic mediterranean heart urchin *Schizaster canaliferus*. *Proc of the 8th IEC Dijon 1993*, Balkema, Rotterdam
- Richter S (1995) Circulation, viscera and endocrines. The urogenital system. In Altig, R, Mc Diarmid R (eds): *The biology of anuran larvae*. University of Chicago Press, Chicago, London
- Walzl MG (1992) Ultrastructure of the reproductive system of the house dust mites *Dermatophagoides farinae* and *D. pteronyssinus* with remarks on spermatogenesis and oogenesis. *Exp appl Acarol* 16: 85-116
- Weisgram J, Splechtna H (1992) Cervical movements during feeding in *Chelodina novaequinae* (Chelonia, Pleurodira). *Zool Jb Anat* 122: 331-337