

this system, we examined the development of the nervous system of *B. simodensis* from early embryogenesis to the metamorphosis with pan-neural marker 1E11 antibody, which recognizes synaptotagmin. 1E11 positive neuroblasts were first detected in the apical plate of the late gastrula embryos. As the ciliary bands developed, the nervous system developed along the ciliary bands, except for the perianal ciliary ring and midventral ciliary band. Neurons in the longitudinal ciliary band projected their axons into the oral field where a complex neural network formed. In the Spengel-stage larva, just before metamorphosis, de novo neurons that would become the dorsal and ventral nerve cords in an adult were formed in the dorsal and ventral midlines. Thus, both the larval and adult nervous systems were present in this stage. During the metamorphosis, as the ciliary bands atrophied, the larval nervous system also degenerated. These results suggest that the nervous system is probably reconstructed through metamorphosis. This study using *B. simodensis* must be the basis of the study on the neurogenesis and metamorphosis of enteropneusts.

#### ***Dipteropeltis* Revisited: Important Clues to Resolving Branchiuran Phylogeny Hidden in a “Semi-Cryptic” Species**

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*Dipteropeltis* is the only monotypic genus within the Branchiura. Although it was described already in 1912 (by W. T. Calman, from a *Salminus* sp. (Characidae) from Brazil), the literature only records less than 20 individuals ever collected (including the type material) basically making this a “semi-cryptic” species. Recently, we presented the first phylogenetic reconstruction ever to include Branchiuran genera based on molecular markers (Møller *et al.* 2008—Arthropod Struct Dev 37, p333-346). Obviously, *Dipteropeltis* could not be included because of lack of material, but the investigation clearly demonstrated the need for a thorough analysis of the available morphological characters if even the simplest resolution of relationship is to be found. Based on a recent re-examination of the type material from the NHM, London, we here present preliminary but new significant details of *Dipteropeltis* morphology, with emphasis on cephalic characters. This is supplemented by and compared with results from previously unpublished investigations of *Dolops* and *Chonopeltis*. This is a part of our ongoing investigation of Branchiuran morphology with the purpose of compiling a usable character matrix for phylogenetic reconstruction thus finally shedding light on the hitherto unresolved “four genera problem” in the taxon.

#### **Innervation of Luminescence in Scale Worms (Polychaeta, Polynoidae)**

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In some scale worms of the subfamily Polynoinae, a ventral epithelial area of the elytra has been reported to emit light flashes upon stimulation. The behavioral or ecological function of this bioluminescence remains unknown. The origin of the bioluminescence in polynoids is a photoprotein that reacts specifically to the presence of reactive oxygen species (ROS) such as superoxide anions, but not to other ROS such as hydrogen peroxide. This membrane photoprotein is called polynoidin. Four “luminescent” scale worms *Harmothoe imbricata*, *H. areolata*, *H. fragilis*, and *Acholoe astericola* and two “nonluminescent” species, *Lepidonotus squamatus* and *L. clava* were collected in the White Sea, Mediterranean Sea, and North Sea and reared in artificial sea water. The luminescence in scale-worms is controlled by the nervous system. In the “luminescent” species, elytral autotomy is a habitual response to any stress situation. The normal reaction of the nervous control system seems to imply the destruction of the electrochemical coupling between the elytra and the elyrophore. The polynoidin emits light as a response to the presence of superoxide radicals. These radicals play the role of mediator in converting the stress reaction into a nervous signal. In the case of a “nonluminescent” species whose elytra also contained polynoidin, the artificial stimulation of the whole worm did not induce any light emission. The explanations for the absence of natural luminescence in nonluminescent scale-worm species is a morpho-physiological difference between these species and the luminescent ones in the electrochemical coupling between nerve excitation and muscle construction.

#### **Symposium D—Integrating Morphology and Molecules in the Study of Evolution: Poster Abstracts**

##### **Hox Gene Survey in the Myzostomid *Myzostoma cirriferum***

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Myzostomid affinities are still disputed, but a recent analysis of mitochondrial gene order and sequence data points toward annelid affinities. This hypothesis is in agreement with morphological observations. As annelids, myzostomids appear to be segmented, having in most cases five distinguishable body segments including serial protonephridia and parapodia with chaetae. For a further exploration of a possible relationship with annelids, we conducted a hox gene survey in the myzostomid *Myzostoma cirriferum*. We report the first hox gene sequences for Myzostomida and investigated the phylogenetic significance of this data. Analyses of hox genes will be a prerequisite for future developmental studies (e.g. comparing the expression of hox genes in the course of segmentation) of this taxon.

##### **The Bryozoa of Sweden—Morphological and Molecular Data in Modern Taxonomic Research**

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With the Swedish Taxonomy Initiative (www.artdata.slu.se), Sweden is the first country in the world aiming at a complete inventory of its multicellular life within 20 years. The project combines large scale inventories and taxonomic research with an intense outreach component in form of a popular scientific book series the Encyclopedia of the Swedish Flora and Fauna. The scientific focus of this venture aims to a large part on the discovery and description of new species as well as the intense study of little known groups, as for example bryozoans. In our inventory of the Swedish bryozoans, we aim to set the basis for advanced research on this group in the future by generating a comprehensive species and distribution record for these animals and use the material for a range of interdisciplinary studies. During the first two cruises in the Skagerrak and the Kattegat in 2006, we found as many as 80 bryozoan species of which 15% are new recordings for Swedish waters. The collected material is used for taxonomic, phylogenetic, and biogeographic studies; and currently, we are generating an image library on all Swedish bryozoans. Our morpho-base will contain data from stereo microscopy, scanning electron microscopy, and confocal laser scanning microscopy and will ultimately be used to extract raw morphological data for (i) taxonomic descriptions (ii) phylogenetic analyses, and (iii) the popular scientific literature. We further collect genetic material of several species to address evolutionary questions. Here, we present the most recent findings of our morphological, as well as molecular investigations.

##### **Combining Morphological and Molecular Characters to Distinguish Spinicaudatan Species (Crustacea: Branchiopoda) With Special Focus on the Male Claspers**

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The Spinicaudata (Crustacea: Branchiopoda) fauna of Australia was only poorly studied in the past. Recently, several new species were discovered, all found in temporal pools. They survive dry periods with resting eggs in the sediment, which are also their mean of dispersal. All male spinicaudatans have two pairs of claspers (modified first two pairs of thoracopods), which are used for holding the female's carapax during mating. The claspers comprise a movable finger opposing an unmovable hand and two palps. Morphological characters of the claspers are commonly used for discriminating higher taxa but rarely for discriminating species. The aim of this study was to gain molecular and further morphological support for these newly discovered species focusing on two spinicaudatan genera: *Limnadopsis* (endemic to Australia) and *Eocyclus* (newly reported for Australia). This was necessary because all species show great morphological variability with overlap in many characters between species and are therefore hard to distinguish. The sequences of COI, 16S, ITS1, and ITS2 were analyzed and compared with SEM results focusing on structures on the tip of the movable finger. Molecular