evolution of different morphologies for the forelimb and hindlimb, and how morphological changes in the limb bones and muscles of early tetrapods influenced their abilities to generate forces against the substrate and thereby achieve the water-land transition. The combined results of these two complementary projects are illuminating new aspects of limb evolution across the fin-limb and water-land transitions.

POS2-74 4:30 pm
Ontogeny of the West African caecilian *Idiocranium russeli* (Lissamphibia: Gymnophiona: Indotyphlidae).
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Abstract: Very few detailed descriptions of the skeletal and muscular development of caecilian amphibians are currently available. The recent studies show that there are disagreements concerning the homology of different skull bones and the number of different ossification centres. We investigated the embryonic and juvenile development of the skeleton and musculature of *Idiocranium russeli*, a miniaturised caecilian endemic to southwestern Cameroon. *Idiocranium* was suggested to be a direct developing genus like other members of the Indotyphlidae (e.g. *Hypogeophis rostratus* or *Gegeneophis ramaswamii*). Our results strongly support this hypothesis. The external morphology of different embryonic stages, the ossification sequence and the muscle configuration of *I. russeli* indicate heterochronic shifts of adult characteristics into embryonic development, as well as the loss or absence of various larval and metamorphic traits. For example, the maxilla and the palatine fuse to form the maxillopalatine well before hatching. This compound bone is typical for adult caecilians and forms during metamorphosis in most biphasic species. The tentacle, which normally also develops during metamorphosis, is already fully developed in late embryos. Furthermore, exclusive larval muscles like the M. interhyoideus or M. hyomandibularis are completely absent during ontogeny. The M. genioglossus and M. cephalodorsosubpharyngeus are present in embryonic development – a typical feature of direct developing caecilians. A larval ceratobranchial IV is also present, but fuses to the ceratobranchial III very early in ontogeny. The ossification sequence of *Idiocranium* is highly similar to those of *G. ramaswamii* and *H. rostratus*, but there are small differences like the coronoid starting to ossify earlier than in other indotyphlid species and the dermal pterygoid appearing comparatively late in ontogeny.

POS2-76 4:30 pm
Modeling the skeletomuscular system in Sea Lampreys (*Petromyzon marinus*): An integrative approach from microdissection, 3D imaging, and field observations.
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Abstract: Lampreys play a key role in the reconstruction of the evolutionary history of vertebrates, but little is known about their functional morphology or their interactions with their environment. Our study integrates field observations and functional morphological studies of adult Sea Lampreys. We observed and video-recorded the body movements of spawning lampreys transporting stones to build nests and defending their territories in the high-velocity tributaries of the Connecticut River. Lampreys are capable of a much wider range of motion than gnathostomes: Dorsal and ventral flexions in excess of 90 degrees, lateral flexions up to 180 degrees, and twisting motions over 300 degrees. We hypothesize that the lamprey's greater mobility may be at least partly due to the absence of a pectoral girdle, stiff vertebral column, and horizontal septum, which are characteristic of gnathostome fishes. To test this, we analyzed the fiber arrangement and orientation of the connective tissue and musculature of the trunk by microdissection and 3D modeling based on x-ray CT and MRI. The connective tissue skeleton comprises the dermis, a sub-dermal dorsal longitudinal ligament, and myosepta. The ligament sends and receives fibers from the dermis and medio-dorsal fascia, thereby acting as a node linking the dermis to the connective tissue skeleton anchored to the notochord and surrounding the coelom. The myosepta are actually formed by tendons extending from myomeric muscle fibers. Superficial tendons between muscles fibers of adjacent myomeres are aligned and, therefore, look like a "myoseptum." Tendon fibers that dive medially join the deeper connective tissue skeleton. Hence, forces of contracting myomeres are transmitted across the myosepta as well as to the connective tissue anchored to the notochord and coelom enabling great flexibility of the body.

POS2-78 4:30 pm
Ultrastructural study of the skin of three caecilians (*Ichthyophis tricolor*, *Uraetyphlus oxyurus*, and *Gegeneophis ramaswamii*) from Western Ghats, India.
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Abstract: The aim of the present study is to investigate the skin structure of three adult caecilians belonging to Ichthyophiidae such as *Ichthyophis tricolor*,*Uraetyphlus oxyurus*, and Indotyphlidae as *Gegeneophis ramaswamii*. The SEM and TEM observations of their skin shows that skin is segmented with numerous glandular outlets in the dorsal, ventral and lateral regions. Round, oval, and polymorphic shaped glandular outlets were distributed in the skin. *Ichthyophis tricolor* skin has both collar type and funnel type glandular outlets but *Uraetyphlus oxyurus* and *Gegeneophis ramaswamii* has only collar type glandular outlet. Pore size and pore distribution in the