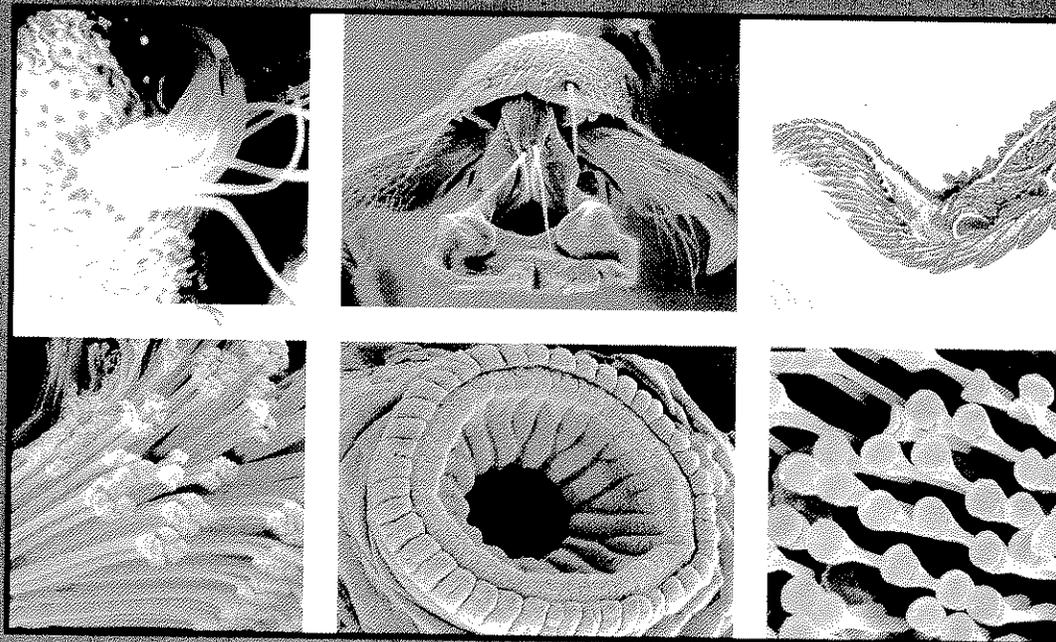


Integrative and Comparative Biology



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prompted the hypothesis that this axis plays a mediating role in the glomerulopathic processes, but the underlying mechanisms are not defined. The murine mesangial MES-13 cell line expresses IGFBP-2 exclusively of the other IGFBPs, providing an opportunity to study its putative role without interference from other IGFBPs. When cultured in diabetic glucose concentrations (>20 mM), the cells exhibit significantly activated production of several ECM components concomitant with a significant increase in IGFBP-2 levels. In addition, affinity crosslinking using ¹²⁵I-IGF-I indicates cell surface binding of endogenously-expressed IGFBP-2 is enhanced by the high ambient glucose. When IGF-I antibody is added, these glucose-induced changes are attenuated, suggesting that IGF-mediated events are involved. Furthermore, as AngII has recently been established as a factor mediating glucose-stimulated ECM expression, we have recently shown that it stimulates IGFBP-2 release in a dose-dependent manner. This effect is reduced by addition of the AT1 receptor antagonist, saralasin, while saralasin addition alone also reduces IGFBP-2 levels. In conclusion, data thus far indicate that AngII increases production of IGFBP-2 and ECM in MES-13 cells and suggest that IGF-I and/or IGFBP-2 may play a mediating role in glucose- and/or AngII-activated MES-13 cells. [Support by NIH grant #GM-50089 & NSF grant #IBN-9600783]

11.2 BERGMANN, P.J., RUSSELL, A.P.; University of Calgary, Canada. *Growth of the original tail in iguanian lizards: are segmental patterns of growth conserved?*

The original tail of lizards is composed of discrete, serially repeating vertebrae. Segmental (vertebral) patterns of tail growth were modeled using principal component analysis and compared to geometric mean regression slopes for the whole tail. Despite different allometric patterns of entire tail growth between species, segmental growth followed a conserved pattern in four species of iguanian lizard with highly divergent caudal functions. Specifically, segmental growth patterns were very similar for the arboreal, quadrupedal *Anolis grahami* and the terrestrial, semi-bipedal *Callisaurus draconoides*, which both have autotomic tails; as well as for the prehensile tailed *Chamaeleo dilepis* and extremely long tailed *Calotes versicolor*, which have non-autotomic tails. Patterns of tail growth are characterized by proximal vertebrae exhibiting positive allometry, and distal vertebrae growing in a negatively allometric fashion. A middle transitional region approximating isometry is also evident, but differs in extent between species. This pattern was mirrored by the scleroglossan gecko *Pachydactylus turneri*, which represents the sister group of the iguanians and further attests to the generality of the pattern observed. However, the pattern breaks down in *Phrynosoma coronatum*, an iguanian with a highly reduced tail. In this species the proximal portion of the tail shows negative allometry, while the distal portion grows positively allometrically. From the six species examined, it appears as though the pattern of segmental caudal growth is generally conserved in lizards, but may be modified in association with tail reduction.

P1.23 BERKE, S.K., WOODIN, S.A.; University of South Carolina. *Self-decoration: an Onuphid polychaete example.*

Behaviors with analogues across phyla suggest the existence of fundamental processes which drive behavioral evolution. Knowledge of such processes allows us to develop a theoretical framework in which to consider behavioral evolution in diverse systems. Behaviors spanning taxa thus warrant close investigation. One such behavior is self-decoration. Self-decoration is observed in a variety of terrestrial, freshwater and marine invertebrates including several insect species as well as some crustaceans, gastropods, anthozoans, echinoderms and polychaetes. A polychaete system which lends itself to study is the tube-building marine worm *Diopatra cuprea*. *Diopatra* tubes terminate in large tube caps decorated with pieces of debris from the water column. Several hypotheses have been offered to explain why *Diopatra* decorate their tubes, but few rigorous tests

have been attempted. A series of experiments were conducted to investigate two such hypotheses: 1) that decoration makes the cap cryptic and 2) that decoration enhances the worm's ability to discriminate among physical disturbances applied to the cap. If decoration makes the cap more cryptic, one expects undecorated caps to experience fewer predation attacks than decorated caps. This prediction was tested using field and laboratory predation experiments. If decoration enhances the worm's ability to discriminate among disturbances, then one expects worms in undecorated caps to respond differently to disturbances than worms in decorated caps. *Diopatra* with and without decoration were disturbed in the field and their behavioral responses were measured. These data, combined with data from other systems, suggest commonality among the suite of factors that can give rise to self-decorating behaviors.

S8-2.5 BERMINGHAM, E.; Smithsonian Tropical Research Institute, Republic of Panama. *Evolutionary assembly of the Mesoamerican freshwater fish fauna.*

Over the past 2-7 million years there has been extensive intercontinental exchange of flora and fauna between North and South America across the isthmian bridge of Panama, a phenomenon known as the Great American Interchange because of its importance for New World biogeography. Although freshwater fishes participated in the Great American Interchange, biogeographic studies of this group are few in comparison to the detailed and instructive studies of mammals. Yet, because the dispersal of primary freshwater fishes depends on direct connections between drainage basins, historical biogeographic analysis of freshwater fishes permits strong inference regarding the biotic and geologic evolution of Mesoamerica. Using molecular systematic approaches, we have taken advantage of the unique isthmian experiment to investigate the modern assembly and diversification of a biota. We show that the primary freshwater fish fauna of Mesoamerica assembled in a relatively brief period of time, and posit several distinct, but relatively recent waves of invasion from putative source populations in northwestern Colombia. In subsequent colonization episodes the geographic scale of the dispersion of lineages was progressively more limited, a pattern we attribute to both biological contingency and landscape evolution. Thus, the fish eye view of Mesoamerica suggests a complex biogeographic history of overlaid cycles of colonization, diversification, sorting and extinction of lineages.

P2.137 BERNIER, N.J., CRAIG, P.M.; University of Guelph, Canada. *Central mechanisms regulating food intake in hypoxic rainbow trout: evidence for a role of CRF-related peptides.*

Hypoxia inhibits growth in a variety of fish species primarily via a reduction in food intake. While the appetite-suppressing effects of hypoxia are well recognized, the mechanisms mediating this response are not known. Among the signals that suppress food intake in fish are the two related neuropeptides corticotropin-releasing factor (CRF) and urotensin I (UI; *Neuroendocrinol.* 73:248-260, 2001). Thus, to determine whether CRF and UI maybe involved in mediating the appetite-suppressing effects of hypoxia, we examined the effects of hypoxia on food intake and on the gene expression pattern of CRF and UI in the brain of rainbow trout. Exposure to 50 and 35% O₂ saturation for 24h significantly decreased food intake by 28 and 48%, respectively, and concomitantly elevated brain CRF and UI mRNA levels in the 35% O₂ saturation treatment. Similarly, increases in plasma cortisol and lactate were only observed in the 35% O₂ saturation treatment. In addition, relative to fish infused with saline only, chronic intra-cranial infusion of the CRF receptor antagonist alpha-helical CRF [9-41] significantly reduced the appetite-suppressing effects elicited by 24h exposure to 35% O₂ saturation. Overall, our findings indicate that CRF-related peptides play a physiological role in mediating at least a portion of the appetite-suppressing effects of hypoxia in rainbow trout. Whether the CRF and UI neurons involved in the control of food intake