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The effects of differential glucose concentration on the proliferation and differentiation of [i]Oncorhynchus mykiss[/i] myogenic precursor cells [i]in vitro[/i]

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Isolation by distance and dispersal among populations of a Caribbean octocoral

Observations of larval behavior and patterns of recruitment of the Caribbean octocoral *Antilloorgia elisabethae* suggest that its negatively buoyant larvae do not disperse over great distances. Microsatellite analyses of adults from 13 sites in the northern Bahamas and from recruits from 4 sites on the Little Bahama Bank identified a pattern of isolation by distance among the adult populations and recruits that most likely come from the same or adjacent sites. Analysis of molecular variance indicates that the source(s) of recruits were not different between years nor were the recruits different from the populations of adults at the sites. Assignment tests of recruits were unable to unambiguously assign recruits to origins from individual sites, but for each recruit the most likely source was generally the local or adjacent population. The vast majority of recruits were assigned to the Little Bahama Bank sites. Assignment tests also suggest some differences in the extent of self-recruitment between sites. Recognition of these complex patterns is important in developing management and conservation plans for *A. elisabethae* and similar species.

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The Effects of Differential Glucose Concentration on the Proliferation and Differentiation of *Oncorhynchus mykiss* Myogenic Precursor Cells In Vitro

As a group teleost fish exhibit glucose intolerance, which leads to persistent hyperglycemia and coincides with transient hyperinsulinemia. Insulin-deficiency cannot explain this phenomenon as teleost fishes normally exhibit high plasma insulin levels, likely due to evolutionary diet adaptation or the peripheral utilization of glucose (Moon, 2000). However commonly utilized fish cell culture techniques use classical media based on mammalian physiology. Of interest in this study, myogenic precursor cells (MPCs) from several teleost species are currently cultured in a high glucose medium similar to that used for the culture of mammalian myosatellite cells (MSCs) and the immortalized mammalian cell line C2C12. To assess the impacts of glucose concentration on cultured cells, *Oncorhynchus mykiss* (rainbow trout) MPCs were cultured in high or low glucose media over an 8-day period. Samples were collected at specific myogenic stages: D2, myoblasts; D4, differentiating myoblasts; and D8, myotubes. Preliminary results show that cell proliferation, demonstrated by PCNA expression, did not change significantly in response to glucose levels. However, myogenin expression was increased, indicating increased cell differentiation, in the low glucose media. While both media appear to be suitable for the culture of teleost primary cells, low glucose media may be used to enhance cell differentiation stimulated by incubation with 2% FBS.

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Expression of TR_{\pm} and TR^2 throughout ontogeny in the direct-developing frog *Eleutherodactylus coqui*

Direct development is a life-history strategy that has evolved independently in at least a dozen amphibian lineages. Direct-developing frogs, including the Puerto Rican coquí, *Eleutherodactylus coqui*, typically hatch from terrestrial eggs as miniature adults. Their embryonic development is characterized by precocious formation of adult features, such as limbs, and modified features such as a highly vascularized tail used for respiration. Embryos of *E. coqui* undergo morphological changes mediated by thyroid hormone (TH) that mirror those at metamorphosis. TH also modulates metamorphosis, a fundamental amphibian life history trait, in indirect developing frogs. Because TH has widespread and diverse effects throughout metamorphosis, changes in TH signaling could underlie the evolution of direct development. Specifically, changes in temporal or spatial expression of peripheral TH regulators, such as the nuclear thyroid receptor \pm (TR_{\pm}) or thyroid receptor 2 (TR^2) could coordinate the heterochronic shift in metamorphic events observed during embryogenesis. Quantitative real-time PCR was used to quantify transcript levels of TR_{\pm} and TR^2 in the limbs and tail at key developmental stages. LC-MS was used to determine the corresponding thyroid hormone profile at these stages. These data inform our understanding of the role of hormones in direct development and the evolution of this successful life-history strategy.

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Wounding alters blood chemistry parameters and skin corticosteroid receptors in house sparrows (*Passer domesticus*)

Skin is an important physical barrier against pathogens, but it can become damaged through fighting with conspecifics, predator attacks, and assaults by biting insects. Therefore, the ability to quickly and effectively heal wounds directly impacts an animal's health. The hormone corticosterone (CORT) has many complex effects on immune function and can slow wound healing. It has been suggested that CORT's role during wound healing may be to act as a "brake" on inflammation and cell proliferation. This project aimed to clarify the role of CORT in the healing process by quantifying glucocorticoid receptors (GR) and mineralocorticoid receptors (MR) in the skin of wounded (n=9) or unwounded (n=8) house sparrows (*Passer domesticus*) using radioligand binding assays. We also quantified receptors in three other tissues, and several different blood chemistry parameters using a VetScan machine. One day after wounding, plasma glucose was higher, and aspartate aminotransferase lower, in wounded birds compared to controls, which may be related to animals' changing metabolic needs in response to tissue regrowth or the immune challenge of wounding. Birds had significantly decreased MR, but not GR, in the skin on their wounded leg compared to the skin on their unwounded leg. There was also a trend towards lower MR in wounded skin compared to unwounded birds. Receptors in three other tissues (liver, spleen and pectoralis muscle) did not differ between groups. This study suggests that decreasing the skin's sensitivity to CORT immediately after wounding may be a necessary part of the normal healing process in wild birds.