Loss of limb skeletal elements is a recurring theme in tetrapod evolution, but the developmental mechanisms underlying this phenomenon remain largely unknown. The Australian lizard genus Hemiergis offers an excellent model system to study limb reduction among closely related, naturally occurring populations with different numbers of digits. Evolutionary digit loss in Hemiergis does not result from simple truncation of a pentadactyl skeletal developmental program. Rather, the duration of embryonic expression of the patterning molecule Sonic hedgehog (SHH) is shortened in limbs with reduced numbers of digits, and is correlated with decreased cell proliferation in the posterior aspect of the limb. Moreover, this comparative analysis suggests an early role for SHH in specification of digit identity and later importance in maintaining cell proliferation and survival. Subtle changes in spatial or temporal regulation of SHH may alter proliferation and patterning of the developing limb, thereby effecting divergence in adult limb morphology among closely related species. In contrast, expression of MSX and Distal-less proteins were similar among embryos from different populations. J. Exp. Zool. (Mol. Dev. Evol.) 297B:48–56, 2003.

Access article: https://doi.org/10.1002/jez.b.19