

**69th Annual Meeting
American Society of
Ichthyologists & Herpetologists**

**5th Annual Meeting
American Elasmobranch Society**

17 - 23 June, 1989

**San Francisco State University and
California Academy of Sciences**

San Francisco, California

THE EFFECT OF SPECIES CONCEPTS AND TAXONOMIC TRADITIONS ON ESTIMATES OF DIVERSITY IN NEOTROPICAL FISHES

Species concepts and criteria for assigning higher taxonomic rank will affect estimates of diversity. Diversity as commonly used in the conservation literature means "number of taxa" (usually species), while in the evolution literature it may mean number of taxa and/or represent an attempt to enumerate morphologies. Species diagnosable by autapomorphies will usually represent cladal diversity accurately. Species described by "unique combinations of characters" are based on homoplasies, at least, and may not accurately estimate cladogenesis. Species defined on the basis of exception are not diagnosable, and may underestimate cladal diversity or represent ancestors. Higher taxa represent subjective estimates of morphological differences between groups, sometimes monophyletic, sometimes not, depending on the systematist. Because of the subjectivity of higher taxonomic rank, even when dealing with monophyletic groups, estimates of diversity based on higher taxa are meaningless. Examples from Neotropical fish systematics will be discussed.

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ONTOGENETIC CHANGE IN NUMBERS OF TOOTH POSITIONS AND ITS BEARING ON THE PHYLOGENETIC RELATIONSHIPS OF SNAKES WITHIN SQUAMATA

Hypotheses about the relationships of snakes range from an origin within Anguimorpha, sometimes close to *Lanthanotus* in particular, to an origin prior to the divergence of lineages leading to all other extant squamates. A character bearing on this issue, but one that has not been analyzed previously, is the presence or absence of ontogenetic addition of tooth positions in the marginal tooth rows. We surveyed this character broadly by synthesizing data in the literature and counting marginal tooth positions in postembryonic ontogenetic series of one or more species representing most of the squamate taxa traditionally assigned the rank of family. Addition of tooth positions characterizes Iguania (known to occur in Iguanidae and Agamidae) and Gekkota (Gekkonidae). Taxa having a constant number of tooth positions in postembryonic ontogeny include Serpentes (Boiidae and Colubridae), Anguimorpha (Anguidae) and Scincomorpha (Teiidae). Addition of tooth positions was determined to be ancestral for squamates, as well as for amniotes and tetrapods, based on its occurrence in Rhynchocephalia (the sister group of squamates), crocodylians, mammals, and amphibians. Therefore, having a fixed number of tooth positions at birth is a derived condition within Squamata. Given that this condition evolved once within that taxon, a constant number of postembryonic tooth positions supports the monophyly of Autarchoglossa as well as hypotheses that snakes either have their origins within this taxon or as its sister group.

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PHENOLOGY OF REPTILES AND AMPHIBIANS IN THE DRY CHACO OF ARGENTINA

We sampled the herpetofauna of a site in the dry chaco during a wet year (1987-88) and an exceptionally dry year (1988-89) with 7 pitfall arrays, 47 pitfalls along a 1.6 km transect, and by hand. Sixteen lizard, 22 frog, 3 amphisbaenid, 2 turtle, and 14

Leptodactylus, *Physalaemus*, *Bufo*, *Tropidurus*, *Teius*, and *Cnemidophorus* allow analyses of seasonal activity by species, sex, and age. *P. biligonigerus* was the dominant frog during the wet year, but was replaced by *L. bufonius* in the dry year. Iguanids were captured more frequently than teiids during cool months, and the inverse was true during summer. Hatchling iguanids were abundant late in the season, when adult iguanids and all teiids were captured much less frequently. Patterns like these possibly result in functionally distinct herpetofaunal assemblages during different times of the year.

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REPRODUCTIVE BEHAVIOR OF THE BLUEHEAD SHINER, *NOTROPIS HUBBSI*

Bluehead shiners (*Notropis hubbsi*) exhibit a high degree of sexual dimorphism, a common occurrence in the family Cyprinidae, but are unusual in having males with two phases of post-juvenile development. These phases differ in size, coloration, relative fin sizes and behavior. The largest and socially dominant males, which we have coined terminal males, are much less abundant in breeding schools than secondary males (1:9) and have ephemeral color changes during shows of aggression. Bluehead shiners were found to spawn over warmouth (*Lepomis gulosus*) nests in cavities between buttressing roots of bald cypress trees. Terminal males establish and defend territories containing the nest cavities using shows of aggression and displays. Bluehead shiners can live at least 3 years and the sex ratio of adult fish in breeding season was 3 females to 2 males.

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EXTRAEMBRYONIC MEMBRANE DEVELOPMENT IN THE OVIPAROUS SKINK, *EUMECES FASCIATUS* (SAURIA: SCINCIDAE)

Morphology of extraembryonic membranes was studied at different stages of development. The transitory choriovitelline membrane, a trilaminar omphalopleure, forms early in development (chorionic ectoderm, mesoderm of the area vasculosa, and endoderm) dorsal to the sinus terminalis. The choriovitelline membrane is replaced by the vascular allantois which expands to fill the extraembryonic coelom. Prior to the development of the chorioallantois, intravitelline cells invade the yolk sac abembryonic to the sinus terminalis. This development forms a yolk cleft and isolates a thin mass of yolk from the yolk mass proper. The isolated yolk mass has been seen in all squamates studied to date and is a structure unique to this order of vertebrates. The isolated yolk mass is bordered peripherally by a nonvascular bilaminar omphalopleure (chorionic ectoderm, isolated yolk endoderm). Later in development, the isolated yolk mass regresses and the allantois expands, yet remains at dorsal margin of the isolated yolk mass.