Comments on a Phylogeny of Iguanid Lizards

Catherine L. Malone[1] and Robert Powell[2]
[1]Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana 47907
[2]Department of Biology, Avila College, Kansas City, Missouri 64145

In a recent study of the phylogeography of *Cyclura,* Malone et al. (2000) presented a phylogram (Figure 1) that resulted from an analysis of mitochondrial DNA sequence data. In concurrence with other recent molecular studies (Sites et al., 1996; Norell and de Quieroz, 1991; Petren and Case, 1997), these data strongly support the monophyly of the Iguanidae (*sensu strictu*) and the antiquity of *Brachylophus. Dipsosaurus* resolved as the sister group to a clade composed of *Cyclura, Ctenosaura, Conolophus, Amblyrhynchus, Sauromalus,* and *Iguana*. *Cyclura* also is supported as a monophyletic lineage, equally related to *Ctenosaura, Conolophus, Amblyrhynchus, Sauromalus,* and *Iguana*. Within the latter assemblage, the data strongly support that *Iguana* and *Sauromalus* are sister taxa, contrary to the conclusions of Wiens and Hollingsworth (2000, and references therein), who suggested that *Iguana* and *Cyclura* were so related. Within *Iguana,* lineages from different geographical areas were highly differentiated (not shown here), and may result in taxonomic distinctions with further study.

As expected, endemism was extremely high within *Cyclura,* with each lineage restricted to one island or island group. Hispaniola is the only island that supports two distinct lineages, possibly reflecting separate origins on the two paleoislands that joined to form the current island. The distinct lineages cluster geographically (Figure 2). An "eastern" clade is composed of *C. pinguis,* the oldest extant lineage, which historically inhabited most of the Puerto Rico Bank. A "central" clade is composed of *C. cornuta* from Hispaniola and Isla Mona and its sister group, containing *C. ricordii* from Hispaniola and *C. carinata* from the Turks and Caicos Islands. A "western" clade is composed of *C. collei* from Jamaica, *C. rileyi* from the western Bahamas, *C. cychlura* from the eastern Bahamas, and *C. nubila,* as traditionally defined, from Cuba and the Cayman Islands. This contradicts the topology of Schwartz and Carey (1977), who considered the *C. ricordii* + *C. carinata* group basal and clustered *C. cornuta with C. rileyi, C. collei, C. nubila,* and *C. cychlura*. This data set also brought to light the need for further inquiry into the relationship between *Cyclura nubila lewisi* from Grand Cayman and populations presently considered to be conspecific, *C. n. nubila* from Cuba and *C. n. caymanensis* from Little Cayman and Cayman Brac. Also noteworthy are the very close associations between populations currently recognized as

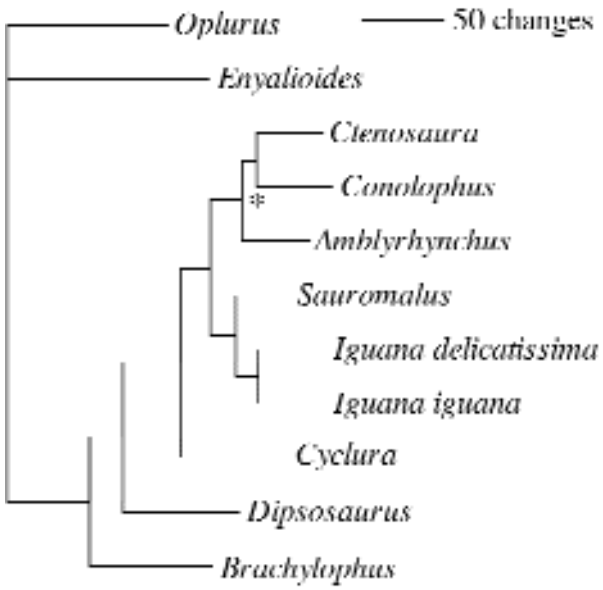


Figure 1. The maximum-likelihood estimate of relationships among iguanid lizards represented as a phylogram. The asterisk (*) indicates that support for this node is weak and that, pending further data, the relationship between *Ctenosaura, Conolophus,* and *Amblyrhynchus* might be considered a trichotomy.

Phylogeography of *Cyclura*

Cyclura nubila lewisi

Cyclura nubila caymanensis

Cyclura cychlura

Cyclura rileyi

Cyclura collei

Cyclura carinata

Cyclura ricordii

Cyclura cornuta

Cyclura cornuta stejnegeri

Cyclura pinguis

Figure 2. A phylogeographic distribution of the genus *Cyclura*, with the maximum likelihood estimate of historical relationships within *Cyclura* superimposed onto a map of the Greater Antilles, Bahamas, and Turks and Caicos Islands. The dotted arrow represents the probable historic range of *C. pinguis* on Puerto Rico proper. Photographs by John Binns (*Cyclura nubila, C. collei, C. carinata, C. ricordii*), Carl Fuhri (*C. cychlura, C. rileyi*), Robert Powell (*C. nubila lewisi, C. cornuta, C. c. stejnegeri*), and Glenn Gerber (*C. pinguis*).

subspecies of *C. cychlura*, *C. rileyi*, and *C. cornuta;* with these data arguing strongly against species-level recognition of populations of the latter from Hispaniola and Isla Mona (e.g., Powell and Glor, 2000).

Forthcoming work involves a closer look at the relationships within the *Iguana iguana* complex, within *Ctenosaura* (C.R. Hasbun, pers. comm.), and between *C. cornuta* from Hispaniola and Isla Mona. Until these data are adequately analyzed, we suggest that the phylogram presented herein constitutes the best currently available representation of relationships among iguanid lizards.

Literature Cited

Malone, C.L., T. Wheeler, J.F. Taylor, and S.K. Davis. 2000. Phylogeography of the Caribbean Rock Iguana (*Cyclura*): Implications for conservation and insights on the biogeographic history of the West Indies. *Molecular Phylogenetics and Evolution* 17:269–279.

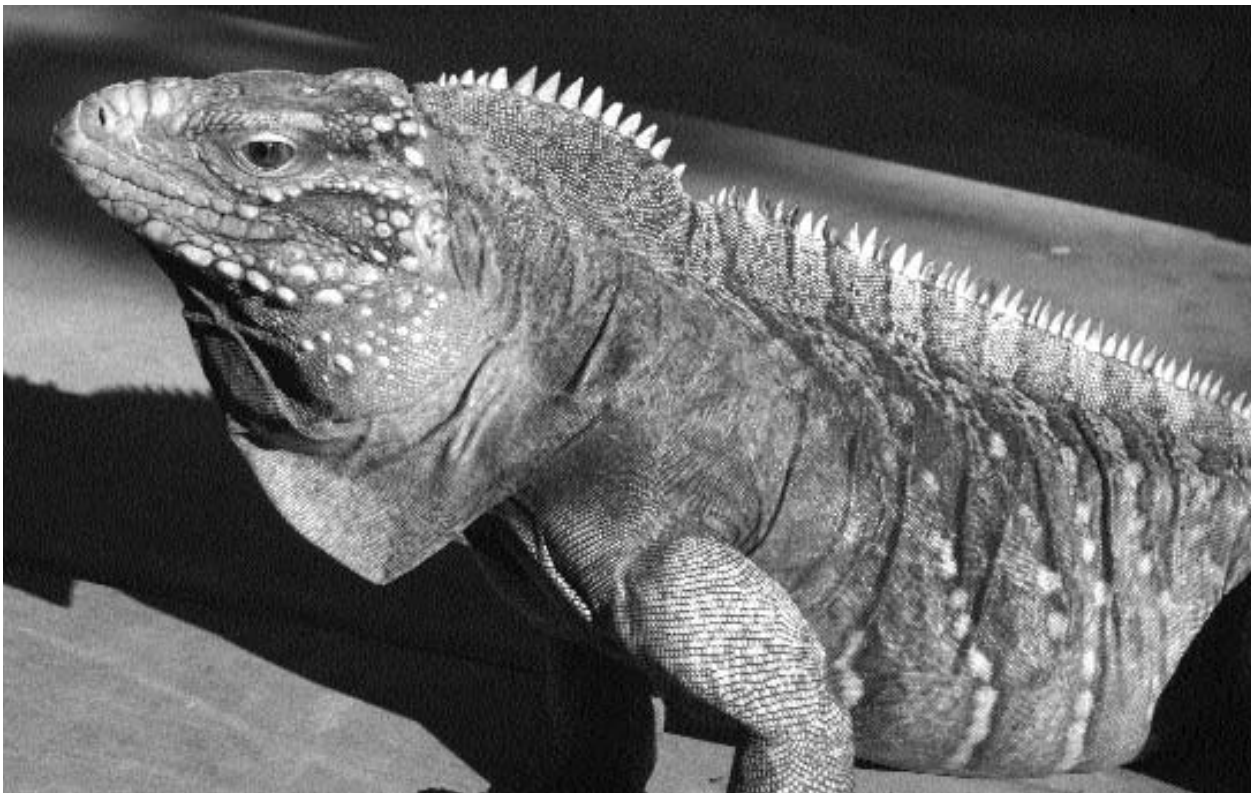
Norell, M.A., and K. de Quieroz. 1991. The earliest iguanine lizard and its bearing on iguanine phylogeny. *American Museum Novitates* (2997):1–16.

Powell, R. and R.E. Glor. 2000. *Cyclura stejnegeri. Catalogue of American Amphibians and Reptiles* (711):1–4.

Schwartz, A. and M. Carey. 1977. Systematics and evolution in the West Indian iguanid lizard genus *Cyclura*. *Studies on the Fauna of Curaçao and Other Caribbean Islands* 53:15–97.

Sites, J.W., S.K. Davis, T. Guerra, J.B. Iverson, and H.L. Snell. 1996. Character congruence and phylogenetic signals in molecular and morphological data sets: a case study in the living iguanas (Squamata, Iguanidae). *Molecular Biology and Evolution* 13:1087–1105.

Wiens, J.J. and B.D. Hollingsworth. 2000. War of the iguanas: conflicting molecular and morphological phylogenies and long branch attraction in iguanid lizards. *Systematic Zoology* 49:143–159.



Cyclura nubila nubila (above), *C. nubila caymanensis,* and populations in the *C. cychlura* complex appear to be more closely related to one another than to *C. nubila lewisi,* which probably is a distinct species. *Photograph by John Binns.*