A CHECKLIST OF THE IGUANAS OF THE WORLD (IGUANIDAE; IGUANINAE)

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IGUANA TAXONOMY WORKING GROUP (ITWG)
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Preface.—In an attempt to keep the community up to date on literature concerning iguana taxonomy, we are providing this short review of papers published since our 2016 Checklist (ITWG 2016) that have taxonomic and/or conservation implications. We encourage users to inform us of similar works that we may have missed or those that appear in the future. It is our intent to publish an updated Checklist, fully incorporating the information provided here, in the next version. Full bibliographic information for references cited within the comments below can be found in our 2016 Checklist:

Iguana Taxonomy Working Group (ITWG). 2016. A checklist of the iguanas of the world (Iguanidae; Iguaninae). Pp. 4–46 *In* Iguanas: Biology, Systematics, and Conservation. Iverson, J.B., T.D. Grant, C.R. Knapp, and S.A. Pasachnik (Eds.). Herpetological Conservation and Biology 11(Monograph 6).

AMBLYRHYNCHUS BELL [MARINE IGUANAS]

Miralles, A., A. Macleod, A. Rodríguez, A. Ibáñez, G. Jiménez-Uzcategui, G. Quezada, M. Vences, and S. Steinfartz. 2017. Shedding light on the Imps of Darkness: an integrative taxonomic revision of the Galápagos Marine Iguanas (genus *Amblyrhynchus*). Zoological Journal of the Linnean Society 181(3):678–710.

Comment: Based on range-wide analyses of microsatellite data, mitochondrial DNA sequence data, restriction site-associated sequence (RADseq) data, and morphometric and meristic data, the authors recognized eleven subspecies of Marine Iguanas. They united the subspecies *albemarlensis* (Isabela Island) with *cristatus* (Fernandina Island) and described five new subspecies: *godzilla* (northern San Cristobal Island), *jeffreysi* (Wolf Island), *hayampi* (Marchena Island), *trillmichi* (Santa Fé Island) and *wikelskii* (Santiago Island) but they provided no common names. The ITWG accepts their conclusions, and in consultation with the authors we recommend they be called, respectively, the Punta Pitt Marine Iguanas, Wolf Marine Iguanas, Marchena Marine Iguanas, Santa Fé Marine Iguanas, and Santiago Marine Iguanas.

BRACHYLOPHUS CUVIER [MELANESIAN IGUANAS]

Fisher, R.N., J. Niukula, D. Watling, and P.S. Harlow. 2017. A new species of iguana *Brachylophus* Cuvier 1829 (Sauria: Iguania: Iguanidae) from Gau Island, Fiji Islands. Zootaxa 4273(3):407–422.

Comment: The Gau (pronounced ngau) Iguana, *Brachylophus gau*, was described as a new species based on its unique coloration and morphology and is endemic to Gau Island. Habitat destruction and invasive mammals potentially threaten its long-term survival. The ITWG supports the recognition of this new species.

Ineich, I. and R.N. Fisher. 2016. Rediscovery of the 220-year-old holotype of the Banded Iguana, *Brachylophus fasciatus* (Brongniart, 1800) in the Paris Natural History Museum. Zootaxa 4138(2):381–391.

Comment: Ineich and Fisher (2016) demonstrated that the holotype of *B. fasciatus* was not lost (as previously thought), but rather exists in the Paris Museum (MNHN–RA 6812). Furthermore, the collection locality was "Tongatapu" (the main island of Tonga and the site of the capital), which should be considered the type locality.

CACHRYX COPE [THORNTAIL IGUANAS]

Malone, C.L., V.H. Reynoso, and L.J. Buckley. 2017. Never judge an iguana by its spines: Systematics of the Yucatán Spiny-tailed Iguana, *Ctenosaura defensor* (Cope, 1866). Molecular Phylogenetics and Evolution 115:27–39.

Comment: An analysis of two mitochondrial regions and four nuclear loci indicated that *Ctenosaura* is not monophyletic, with *defensor* and *alfredschmidti* more closely related to *Amblyrhynchus* and *Conolophus* than to other *Ctenosaura* species. They also provided preliminary morphological evidence that supported the distinction of *defensor* and *alfredschmidti* from the other *Ctenosaura*. To reconcile the taxonomy with these results, they resurrected the genus *Cachryx* Cope (1866. Proc. Nat. Acad. Sci. Philadelphia p. 124) from the synonymy of *Ctenosaura* for *defensor* and *alfredschmidti*. However, the authors provided no common name for members of the resurrected genus. In consultation with the authors, we recommend that they be called Thorntail Iguanas, and that *defensor* be called Yucatán Thorntail Iguanas and *alfredschmidti* be called Campeche Thorntail Iguanas.

CONOLOPHUS FITZINGER [GALÁPAGOS LAND IGUANAS]

Di Giambattista, L., A. Fulvo, A. Fabiani, J. Bonanni, J.E. Carrión, and G. Gentile. 2018. Molecular data exclude current hybridization between iguanas *Conolophus marthae* and *C. subcristatus* on Wolf Volcano (Galápagos Islands). Conservation Genetics 19(6):1461–1469.

Comment: Based on 22 microsatellite loci from more than 100 individuals of each species, Di Giambattista *et al*. (2018) found no evidence of ongoing hybridization between the sympatric species *Conolophus marthae* and *C. subcristatus*.

Zhang, Z.-Q. 2017. Species names based on photographs: debate closed. Zootaxa 4269(4):451–452.

Comment: The naming of *Conolophus marthae* without a preserved holotype evoked a controversy among taxonomists (Zhang 2017, and references cited in that paper). As outlined in Zhang (2017), this issue was closed by the publication of Declaration 45 by the ICZN (2017. Bulletin of Zoological Nomenclature 73(2–4):96–97), which allows the description of species without name-bearing type material when "the capture and preservation of specimens is not feasible for technical reasons or for conservation concerns, or when specimens must be destroyed to reliably diagnose a new species".

CTENOSAURA WIEGMANN [SPINY-TAILED IGUANAS]

McCranie, J.R. 2015. A checklist of the amphibians and reptiles of Honduras, with additions, comments on taxonomy, some recent taxonomic decisions, and areas of further studies needed. Zootaxa 3931(3):352–386.

Comment: See comment for McCranie (2018).

McCranie, J.R. 2018. The lizards, crocodiles, and turtles of Honduras; systematics, distribution, and conservation. Bulletin of the Museum of Comparative Zoology 15(1):1–129.

Comment: Hasbún and Köhler (2009) described *Ctenosaura praeocularis* from southern Honduras based on molecular and morphological data. Previous mtDNA analyses (Hasbún 2001, Hasbún *et al*. 2005) had suggested that *praeocularis* was 1.2% divergent from *flavidorsalis* and 2.6% divergent from *quinquecarinata*. In addition, a multivariate morphometric analysis of 69 characters by Hasbún and Köhler (2009) demonstrated that *praeocularis* was distinct from both *flavidorsalis* and *quinquecarinata*. They acknowledged that *praeocularis* was most similar morphologically to *quinquecarinata*, but that the two differed most significantly in the number of preocular scales, the number of caudal whorls with spinous paramedian scales, the length of the lateral processes on the frontal bone, and the posterior angle of the parietal bone. The close phylogenetic relationship among *praeocularis*, *flavidorsalis*, *quinquecarinata*, and *oaxacana* was corroborated by Malone *et al*. (2017) using both mt and nDNA sequence data. A time-calibrated BEAST analysis of four nuclear genes suggested that *flavidorsalis* diverged 1.3 mybp, followed by *oaxacana* at 700K ybp, and the divergence of *praeocularis* and *quinquecarinata* at 300K ypb. They also noted that the other distinctive species pairs of *Ctenosaura* also diverged at only 800K ypb (*oedirhina* and *bakeri*), 500K ybp (*macrolopha* and *hemilopha*), and 200K ybp (*defensor* and *alfredschmidti*).

McCranie (2018, see also McCranie 2015) reported new collection localities between the ranges of *praeocularis* and *quinquecarinata*, and closed the gap between the two species to only 20 km. He stated that "there is substantial variation in the number of preocular scales" in this new material but provided no quantitative data. He also noted that *praeocularis* and *quinquecarinata* were distinguished by "two trivial osteological characters [the frontal and parietal bones] that would not likely stand examination of specimens for those characters", but again provided no data to substantiate his claim. Based on these points, and unpublished data on genetic similarity among the four species in the clade, he recommended uniting *praeocularis* with *quinquecarinata*.

The ITWG recognizes that McCranie's statements may eventually be confirmed and his taxonomic proposal supported, but without a full quantitative reassessment of genetic and morphological variation within the clade, including the recently discovered populations, we have not adopted the unification of *praeocularis* with *quinquecarinata*.

CYCLURA HARLAN [ROCK IGUANAS]

Moss, J.B., M.E. Welch, F.J. Burton, M.V. Vallee, E.W. Houlcraft, T. Laaser, and G.P. Gerber. 2018. First evidence for crossbreeding between invasive *Iguana iguana* and the native Rock Iguana (genus *Cyclura*) on Little Cayman Island. Biological Invasions 20(4):817–823.

Comment: The authors provide troubling evidence based on mtDNA sequence data, microsatellite loci, and morphology that introduced *Iguana iguana* is hybridizing with *Cyclura nubila caymanensis* on Little Cayman.

Steadman, D.W., N.A. Albury, J.I. Mead, J.A. Soto-Centeno, and J. Franklin. 2017. Holocene vertebrates from a dry cave on Eleuthera Island, Commonwealth of The Bahamas. The Holocene 28(5):806–813.

Comment: Fossils of *Cyclura* were reported for the first time from Eleuthera Island and were previously known from New Providence (Pregill 1982), which was connected to Eleuthera as recently as 2500 ybp (Steadman *et al*. 2017). Given that Eleuthera and New Providence were also connected to at least the northern Exuma Islands as recently as 6250 ybp, it is likely that these fossils belong to the *Cyclura cychlura* complex.

Welch, M.E., G. Colosimo, S.A. Pasachnik, C.L. Malone, J. Hilton, J. Long, A.H. Getz, A.C. Alberts, and G.P. Gerber. 2017. Molecular variation and population structure in Critically Endangered Turks and Caicos Rock Iguanas: identifying intraspecific conservation units and revising subspecific taxonomy. Conservation Genetics 18(2):479–493.

Comment: This study analyzed variation across 29 microsatellite loci, a single mitochondrial gene, and protein profiles from femoral pore secretions in *Cyclura carinata*, and all three data sets demonstrated divergence between eastern and western Caicos Island lineages, but also significant geographic structuring within the eastern lineage. Furthermore, the data suggest that populations on the Turks Bank represent a relatively recent colonization of iguanas from the eastern lineage in the eastern Caicos Islands, and that the population on Booby Cay off Mayaguana, The Bahamas (formerly *C. c. bartschi*), is the result of a human-mediated translocation from the eastern Caicos lineage. The authors made no explicit taxonomic recommendations, and future work should examine morphological data to test for concordance with the molecular data.

DIPSOSAURUS HALLOWELL [DESERT IGUANAS]

Valdivia-Carrillo, T., F.J. García-De León, M.C. Blázquez, C. Gutiérrez-Flores, and P.G. Zamorano. 2017. Phylogeography and ecological niche modeling of the Desert Iguana (*Dipsosaurus dorsalis*, Baird and Girard 1852) in the Baja California Peninsula. Journal of Heredity 108(6):640–649.

Comment: Based on 15 microsatellite data, these authors found the existence of three genetically differentiated populations within *Dipsosaurus dorsalis dorsalis* along the Baja California peninsula, although some gene flow occurs among them. The authors made no taxonomic recommendations, but a range-wide phylogeographic study of the species is clearly warranted.

IGUANA LAURENTI [GREEN IGUANAS]

De Oliviera, J.C.F. and T. Marcial de Castro. 2017. Range extension of *Iguana iguana* Linnaeus, 1758 (Squamata: Iguanidae): the first record of an established population in southeastern Brazil. Check List 13(2):1–4.

Comment: The authors report an established population of *Iguana iguana* in the state of Espírito Santo in southeastern Brazil, over 800 km south of the previously known range limit. They conclude the population was introduced.

Van den Burg, M.P., P.G. Meirmans, T.P. van Wagensveld, B. Kluskens, H. Madden, M.E. Welch, and J.A.J. Breeuwer. 2016. The Lesser Antillean Iguana (*Iguana delicatissima*) on St. Eustatius: genetically depauperate and threatened by on-going hybridization. Journal of Heredity 109(4):426–437.

Comment: This paper confirmed hybridization of *Iguana iguana* and *I. delicatissima* on St. Eustatius and also found that the latter exhibits extremely low genetic diversity, significant inbreeding, and weak genetic structure on the island. Without significant intervention the long-term survival of *I. delicatissima* on the island is doubtful.