

# Crossbills were unlikely resident in the Bahamas; thus, there was no population to be extirpated

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In PNAS, Steadman and Franklin (1) make the argument that the large reduction in land area and shift in vegetation in the Bahamian Archipelago from ~15–9 ka caused declines and extirpation of two bird species, the Eastern bluebird (*Sialia sialis*) and Hispaniolan crossbill (*Loxia megaplaga*). Their evidence for *L. megaplaga* resides in fossil bones from the Bahamian island of Abaco, representing eight individuals from >9 ka. Two of three qualitative traits from the only mandible recovered provided a better match for *L. megaplaga* than for red crossbills (*Loxia curvirostra*) from North America. However, their measurements of the postcranial bones for their other specimens do not allow one to eliminate the possibility that they represent *L. curvirostra* (Fig. 1).

Fig. 1A shows the lengths of humeri and tibiotarsi from their data, including the North American subspecies *L. curvirostra grinnelli* (table S4 of ref. 1), which approximate the size of *L. curvirostra* commonly found in the southern Appalachian Mountains in the southeastern United States (2, 3). Fig. 1A also includes data for the two *L. curvirostra* ecotypes (“call types” 1 and 2) most common in the southern Appalachian Mountains (3). The lengths of humeri and tibiotarsi from the Bahamian fossils overlap those for *L. c. grinnelli* and for the two ecotypes (Fig. 1A). The ratios of the lengths of the tibiotarsus to the humerus and their similarity to fossils of *L. megaplaga* from Haiti were used (1) to further infer that the fossil specimens from the Bahamas represent *L. megaplaga*. However, the range of ratios for the *Loxia* fossils from the Bahamas overlaps

substantially with the range of ratios for *L. c. grinnelli* (Fig. 1B), and overlaps completely with those for ecotypes 1 and 2 (range of ratios for ecotype 1: 1.35–1.63, range of ratios for ecotype 2: 1.29–1.77).

Finally, Steadman and Franklin (1) imply that crossbills could have been resident in the Bahamas when stating that “resident populations of *L. curvirostra* exist today in southern Mexico and northern Central America, including in lowland savannas and woodlands featuring Caribbean pine (*Pinus caribaea*).” However, crossbills are “very scarce” in such habitats (4–6). Instead, the Central American subspecies *L. curvirostra mesamericana* is “fairly common” in the highland pine forests of *Pinus oocarpa* (4). Without *P. oocarpa*, a Central American population of crossbills would be doubtful.

Because *L. curvirostra* is perhaps the most dispersive of all songbirds and is well known for long-distance movements (hundreds to thousands of kilometers; contra 1) and for invasions into areas unable to support resident populations (7, 8), an alternative hypothesis is that the individuals recovered as fossils represent individuals from one or more such invasions. This is when the coast of Florida was only ~75 km from the shore of Abaco (1) and when the conifer forests most commonly utilized by *L. curvirostra* in eastern North America (2, 9) were shifted farther south into the southeastern United States (10). Although the scenario that Steadman and Franklin (1) envision likely applies to some bird populations in the Bahamas, crossbills were unlikely one of them.

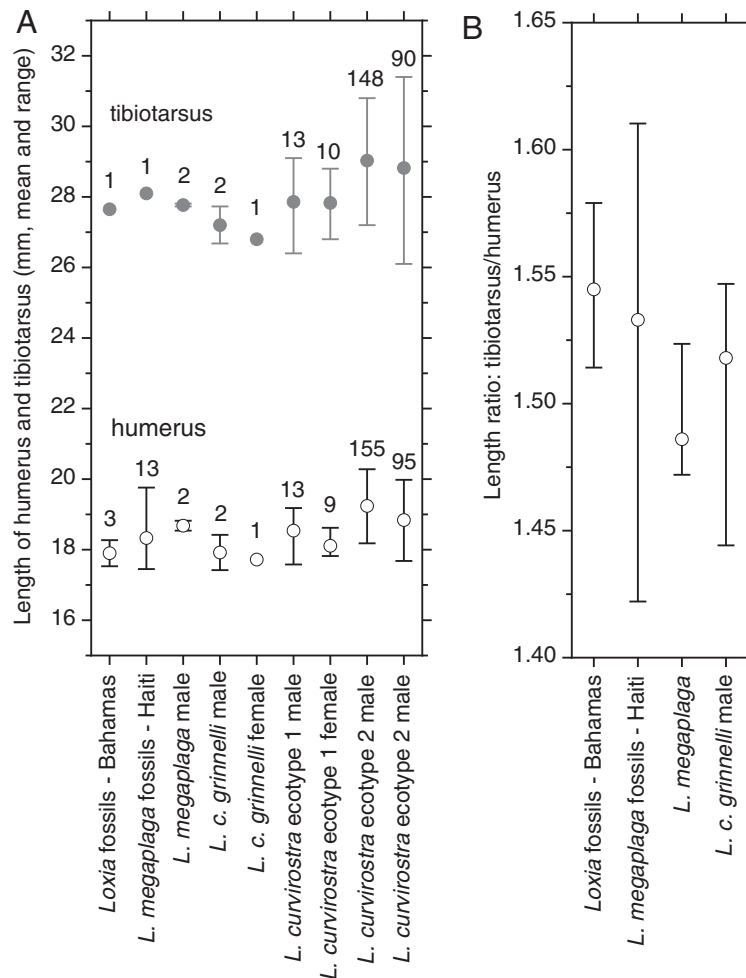
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**Fig. 1.** Plots showing means and ranges of measurements of crossbill (*Loxia*) tibiotarsi and humeri (A), and the ratios of these measurements (B), from fossils from Sawmill Sink on the Bahamian island of Abaco and from Haiti (Hispaniola), and from recent specimens of *L. megaplagla* and *L. curvirostra*. The mean values in B are the ratios of the means in A. The ranges in B represent the range of ratios possible from values in A. Data for *L. curvirostra* ecotypes (call types) in A are from Groth (2), while the rest in A and B are from Steadman and Franklin (1). The numbers above each datum in A represent the number of individuals.

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