Earliest Mexican turkey (*Meleagris gallopavo*) in the Maya region found at Preclassic El Mirador

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Introduction

The two species of pre-Hispanic Mesoamerican turkeys (*M. ocellata* and *M. gallopavo*) have non-overlapping ranges **(Fig. 1)**. Only *M. gallopavo* is known to have been domesticated.

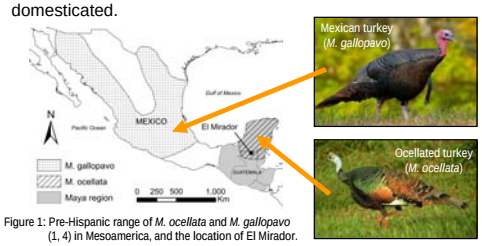

Figure 1: Pre-Hispanic range of *M. ocellata* and *M. gallopavo* (1, 4) in Mesoamerica, and the location of El Mirador.

It was previously assumed that the domesticated Mexican turkey (*M. gallopavo*) was first introduced to the Maya region during the Postclassic (AD 1000–1500) (2, 3) (**Fig. 2**).

The recent identification of Mexican turkey in Late Preclassic (*ca.* BC 300–AD 100) deposits from the Maya archaeological site of El Mirador overturns this assumption.

The turkey bones were identified through zooarchaeology, osteometrics, and ancient DNA (aDNA) analysis.

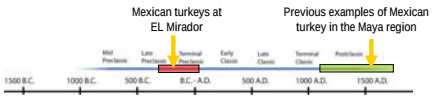

Figure 2: Timeline showing major Maya cultural periods and the chronological difference between the Mexican turkey specimens at El Mirador and when the species was previously thought to have first been introduced to the Maya cultural region.

Materials and Methods

Turkey bones (n=7) from El Mirador were recovered from the Tigre complex, a large public architectural group (**Fig. 3**).

Zooarchaeology/Osteometrics

- Bones were identified at the Florida Museum of Natural History
- Osteometric measurements (5) of archaeological bones were compared to published metric data for turkeys (4)

Ancient DNA Analysis

- Simon Fraser University Ancient DNA Laboratory
- 4 of 7 turkey bones (two DNA extractions per bone)
- BLAST-compared through GenBank to determine if they matched *Meleagris* sequences
- ClustalW used to identify the species (6)

Figure 3: Map of El Tigre Complex. Circles show structures containing turkey bones. The majority of turkey bones were associated with the Jaguar Paw Temple (Op. 26), a nine m high platform topped by triadic architecture, and decorated with sculptured stucco masks. Redrawn from original by B. Dahlin (7).

Context and Dating

Turkey bones were associated with Late Preclassic ceramics in well-sealed, undisturbed contexts (**Fig. 4**). Three AMS radiocarbon ages from animal bones found in close association with the turkey remains confirm that the deposits are Preclassic (cal 327 BC–AD 54).

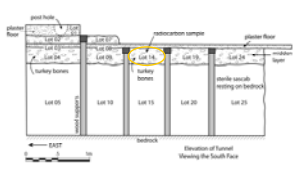

Figure 4a: Operation 26J baulk profile showing locations of turkey bones and radiocarbon sample (redrawn after Hansen 1990: Fig. 29)

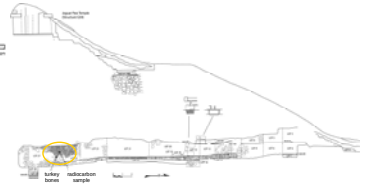

Figure 4b: Operation 26O baulk and tunnel profile showing locations of turkey bones and radiocarbon sample (redrawn after Hansen 1990: Fig. 44)

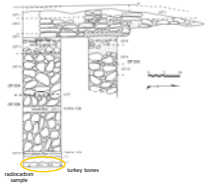

Figure 4c: Operation 35 wall and baulk profile showing locations of turkey bones and radiocarbon sample (redrawn after Hansen 1990: Fig. 56)

Results: Zooarchaeology, Osteometrics and aDNA

1. Zooarchaeology

Based on skeletal element morphology (e.g., size, shape, robustness, quill tubercle spacing) six of the seven turkey bones were identified as *M. gallopavo* (**Fig. 5**). One bone could not be identified to species due to poor preservation.

Age and sex characteristics indicate that a minimum of three Mexican turkeys are represented in the assemblage—two males and a female. One of the males is a subadult (<2 years old).

Evidence for captive rearing comes from the presence of under-developed quill tubercules, which form where tendons connect the secondary flight feathers to the ulna.

Figure 5: Comparative images of El Mirador archaeological turkey specimens with modern *M. gallopavo* and *M. ocellata* elements: A) left tarsometatarsi, and B) right ulnae.

2. Osteometry

Osteometric analysis (n=5) supported the morphological identifications. Three elements (2 ulnae and 1 tarsometatarsus) fell with within the range of male domestic Mexican turkeys, while the two carpometacarpi did not clearly match either species (**Fig. 6**).

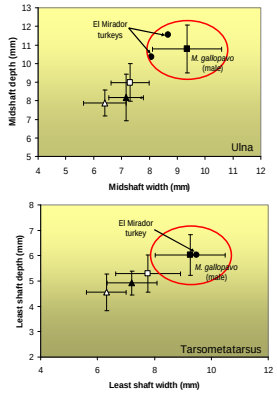

Figure 6: Osteometrics of archaeological turkey specimens (●) compared with mean (±2 standard deviatios) male (■) and female (▲) *M. gallopavo*, and male (□) and female (△) *M. ocellata* measurements (7).

3. Ancient DNA

Three of four bones produced at least one short *Meleagris* mtDNA sequence, but only one bone yielded replicable DNA sequences. All obtained mtDNA sequences matched *M. gallopavo* sequences, and were considerably different from those of *M. ocellata*.

Conclusions

- The combined zooarchaeological, osteometric, and aDNA evidence confirms the presence of *M. gallopavo* at El Mirador during the Late Preclassic.
- Until this discovery, the earliest reported evidence of *M. gallopavo* in the Maya area dated to approximately one thousand years later (2-4).
- The El Mirador turkeys may represent rare, or isolated imports from central/northern Mexico, but it is also possible that captive/domestic Mexican turkey husbandry was practiced by the ancient Maya much earlier than previously thought.
- The Maya may therefore have had access to a another domestic vertebrate (besides the dog) during the Late Preclassic to Classic period of population expansion and increasing social complexity.
- The El Mirador turkeys also provide the earliest indirect evidence of *M. gallopavo* husbandry or domestication in Mesoamerica. Previously, all other indirect evidence of domestication (e.g., pen structures, egg shells and neonates, or the appearance of the species outside its natural geographic range) dated to the Classic period or later (2, 8, 9).

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