

DOMESTICATED TURKEYS IN THE ARIZONA STRIP REGION

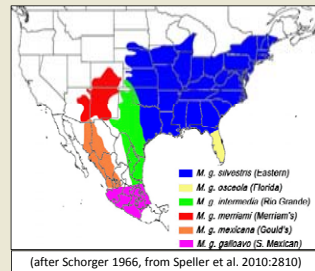


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TURKEY DOMESTICATION AND THE AMERICAN SOUTHWEST

Initial interpretations of turkey domestication in the New World suggested that they were initially domesticated in Mesoamerica and the diffused to the Southwest (Reed 1951; McKusick 1980, 2001; Schorger 1966). Brietburg (1988, 1993) later suggested that the location of domestication and direction of diffusion was the opposite – from the American Southwest to Mesoamerica. Recent genetic studies of wild turkey populations (Mock et al. 2002; Szalanski et al. 2000) and of archaeological specimens (Speller et al. 2010) have revealed a more complex picture. The genetic evidence indicates that there were two independent centers of turkey domestication – Mesoamerica and the Greater Southwest. This picture is further complicated by the finding that domesticated turkeys at Southwestern archaeological sites have a greater genetic affinity with the Eastern and Rio Grande subspecies (Haplogroup H1) than with the indigenous Merriam's subspecies (Haplogroup H2).

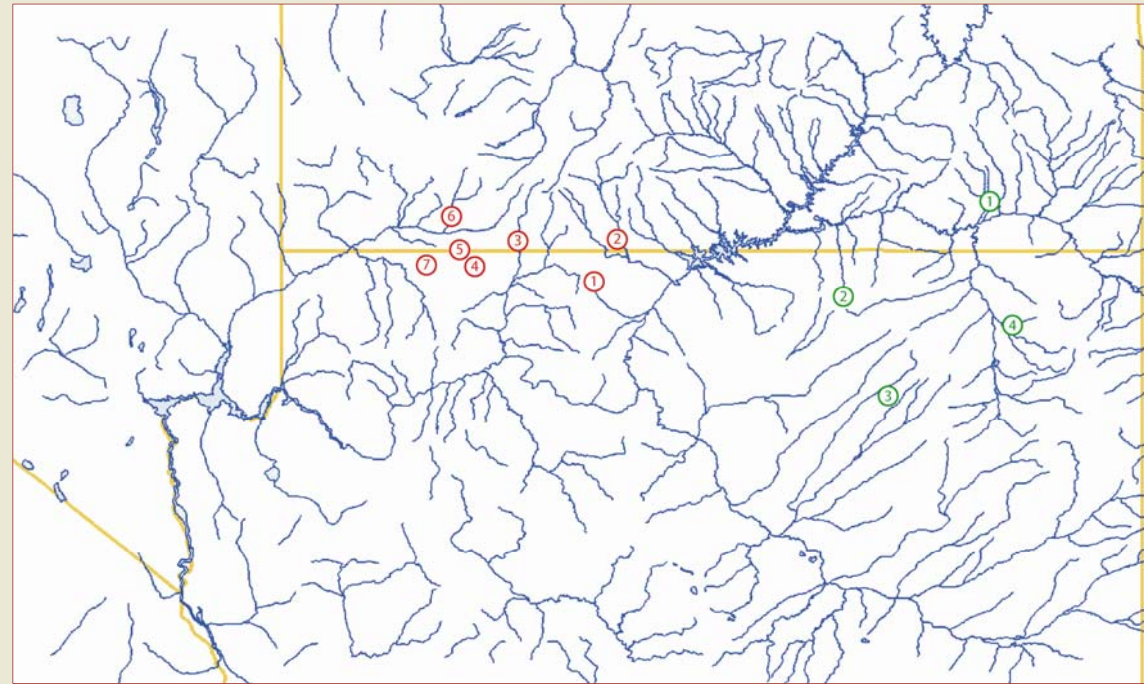


Given the modern ranges of these subspecies, the genetic findings suggest Southwestern domesticated turkeys may have originated to the east or southeast, but not in Mesoamerica, where domesticated and wild turkeys belong to Haplogroup H3. In the analyzed sample, 85% of Southwestern turkeys belonged to the domesticated H1 group, but the other 15% were the H2 group of the indigenous Merriam's turkey, indicating that after the introduction of domesticated H1 turkeys to the region, additional H2 wild turkeys were incorporated into domestic stocks.

The inclusion of wild birds may have supplemented poor reproductive success of domestic stocks, or rapidly expanded them (perhaps a strategy used by migrants). Modern populations of Merriam's turkeys in areas where prehistoric Puebloan peoples once kept domesticated turkeys carry the H1 marker in low frequencies, while those populations outside the former range of domesticated turkeys do not, indicating that feral birds were incorporated into wild populations living near humans with domestic stocks. Gene flow appears to have gone both ways, with turkey farmers adding wild birds, and wild flocks adopting escapees. The natural flocking instincts of turkey that initially made them amenable to domestication facilitated the incorporation of both wild birds into domestic stocks and of feral birds into wild flocks.

UNDERSTANDING TURKEYS IN THE ARIZONA STRIP REGION

Turkey remains, including bones, feathers, and eggshell, have been found at 14 sites in the Arizona Strip region. Since this area is outside of the historic range of Merriam's wild turkeys, any turkey remains found in prehistoric archaeological sites must be from domesticated turkeys. The crucial question is when did domesticated turkeys arrive in the Arizona Strip region? Were turkeys brought as part of the original agricultural "package" along with maize and other domesticates, or were they introduced later? Of what genetic stock were domesticated turkeys found in the region? Did people in the Arizona Strip region successfully practice turkey husbandry, or were turkeys largely the result of trade with the neighboring Kayenta area? Understanding the arrival and use of domesticated turkeys may provide significant information on the introduction of agriculture to the region, and on exchange relations with neighboring regions.



SITES IN THE AZSTRIP REGION WITH EVIDENCE OF TURKEYS

#	Site	Bones	Feathers	Eggshell	Burials	Date	Reference
1	West Bench Pueblo			X		Pueblo II-III	O'Hara 2010
2	Steward's Site 2		X			Early Pueblo II	Steward 1941
2	Steward's Site 4	X				Late Pueblo II	Steward 1941
3	Kanab Site	X			X	Pueblo I	Emslie 1981
	NA 8960	X				Pueblo I	Wade 2009
4	NA 9069	X				Early Pueblo II	Wade 2009
	NA 9072	X				Late Pueblo II	Wade 2009
	Cornrower Site	X			X	Pueblo II-III	Walling and Thompson 1991
	Reservoir Site	X				Basketmaker II	Gourley and Hall 1998
5	42W54214	X		X		Early Pueblo II	Edwards 2003
	42W54268	X				Basketmaker II-III	Edwards 2003
	AZ A-4-34 (ASM)	X				Basketmaker II	Edwards 2003
6	ZNP-21		X			Basketmaker II	Schroeder 1955
7	Antelope Cave	X	X			Pueblo I-II	Janetski and Hall 1983

ADJACENT AREAS WITH EVIDENCE OF TURKEYS

#	Area	Sites sampled by Speller et al. 2010
1	Southeastern Utah	Bluff Great House, Comb Wash Sites, and Turkey Pen Cave
2	Tsegi Canyon	Kiet Siel
3	Black Mesa	none
4	Canyon de Chelly	Antelope House and Tse Ta'a

TURKEY DOMESTICATION AND AGRICULTURE

The foraging behaviors of wild turkeys likely brought them into contact with early agriculturalists, as cleared agricultural fields created ideal microenvironments within which turkeys could forage for insects and shoots of weedy plants. The natural flocking behaviors of turkeys makes them amenable to human management and domestication. Flocking behavior also allowed humans to use turkeys a natural means of weed and pest control in agricultural fields. It is likely that the adoption of agriculture initiated the process of human-turkey interactions that culminated in domestication. This was a co-evolutionary process wherein a change in human behavior, the adoption of agriculture, altered and enhanced the natural habitat of turkeys. Subsequent human-turkey interactions led to humans becoming a selective agent that altered turkey genetics and morphology.

RITUAL USE OF TURKEYS IN THE ARIZONA STRIP REGION

Turkeys were used primarily for ritual purposes rather than as a food source (see below). Ritual use includes turkey burials that were often part of closing rituals for pit structures (Edwards 2007). The use of turkeys as a food source, however, did increase over time in the Mesa Verde region (Munro 1994). Evidence of ritual use of turkeys in the Arizona Strip region includes burials at three sites, although only one (42W54214) was in a pit structure.

EVIDENCE OF TURKEYS AT WEST BENCH PUEBLO

Excavations at West Bench Pueblo in 2010 recovered a total of 14.8 grams of eggshell presumed to be from domesticated turkey. This eggshell was found concentrated on the clay-plastered floor of a Late Pueblo II period room. The context may indicate that the room was used a pen housing domesticated turkeys and that these birds were being reared. Unfortunately, most of the faunal remains recovered during the 2008 and 2010 excavations are highly fragmented, and no turkey bones have been identified.



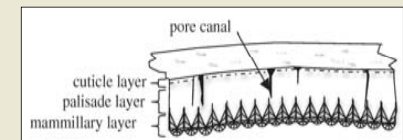
Eggshell in situ within floor fill encountered in XU-H (left), 13.3 grams of eggshell found in direct floor contact in XU-H (center), and three large eggshell fragments from this same provenience (right).

FUTURE RESEARCH DIRECTIONS

Two recent research developments could be applied to the eggshell from West Bench Pueblo to further our knowledge of turkey domestication in the Arizona Strip region: the extraction of DNA from eggshell, and the ability to determine the incubation state of the egg and whether or not it had hatched.

ANCIENT DNA FROM EGGSHELL

Recent research by Oskam et al. (2010) has demonstrated that DNA may be extracted from eggshell and sequenced to determine the species. The eggshell is powdered, as DNA is preserved within the eggshell matrix. This research has succeeded in extracting DNA from sub-fossil eggshell from paleontological sites that ranged in age from 400 to 19,000 years old.



Cross-sectional view of eggshell structure showing how pore canals allow cellular material from the mother to be incorporated within the eggshell (Oskam et al. 2010:1996).

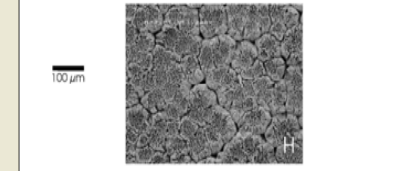
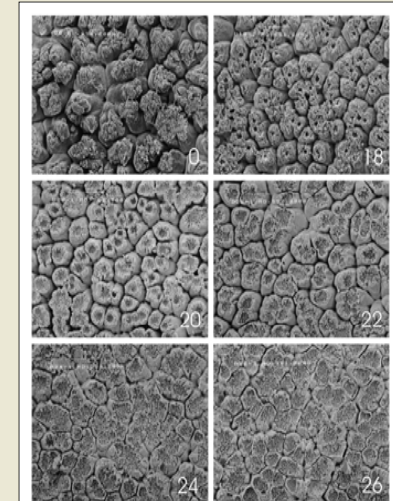
APPLYING THESE METHODS

The methods of Oskam et al. could be used for two significant purposes. First, to confirm that the eggshell is from turkey and not another bird species. Second, the resulting DNA sequences could be used to determine which of the haplotypes identified by Speller et al. in Southwestern domestic turkey populations are present.

Beacham and Durand's methods could be applied to determine whether the eggshell recovered from West Bench Pueblo was from an egg that had hatched or not. If the egg had hatched, it would indicate that turkey husbandry was successfully practiced at West Bench Pueblo.

DID THE EGGS HATCH?

Determining whether the eggs had hatched or not would provide evidence of husbandry of domesticated turkeys. Beacham and Durand (2007) have shown that the progression of cone resorption through the incubation period can be used to demonstrate whether an egg had hatched or not.



Scanning electron microscope imagery of the interior mammillary surface of turkey eggshells showing the progression of cone resorption from beginning of incubation through hatching (Beacham and Durand 2007:1615)

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