

INTRODUCTION TO EUROPE AND DIFFUSION OF DOMESTICATED TURKEYS FROM THE AMERICA

INTRODUCCION DESDE AMERICA Y DIFUSION EN EUROPA DE PAVOS DOMESTICADOS (*MELEAGRIS GALLOPAVO*)

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SUMMARY

Turkeys (*Meleagris gallopavo*) were domesticated in Mexico between 200 B.C. and 700 A.D.; neither date nor location are precisely established. The wild ancestor was the Mexican subspecies (*M. g. gallopavo*).

Two *breeds* of turkeys, different from those of Mexico, were being raised in pre-Columbian southwestern USA. Where did they originate? How do they relate to the Mexican domestication?

Mexican turkeys were taken to Europe immediately after the discovery, perhaps as early as 1500. Diffusion through Europe was very rapid and by mid-16th century they were no longer a curiosity. Rate of diffusion is estimated at 40-50 km/yr. By comparison chickens moving from Asia to Europe in ancient times had a rate of 1.5-3 km/yr. Natural increase from a few founders cannot account for the rapid spread of turkeys. Were large numbers sent to Europe following discovery?

Colonists brought turkeys from Europe to eastern North America early in the 17th century. The birds hybridized with the eastern wild turkey (*M. g. silvestris*) resulting in the American Bronze breed, the foundation of modern commercial

turkeys. Does any of the original Mexican stock still exist in Europe or in the Americas.

Similar questions are posed regarding pre-Columbian muscovy ducks (*Cairina moschata*) and chickens (*Gallus domesticus*).

RESUMEN

Los pavos (*Meleagris gallopavo*) fueron domesticados en México entre los años 200 A.C. y 700 D.C., aunque no existe ningún dato preciso de la localización de este hecho. El ancestro salvaje fue la subespecie mejicana (*M.g. gallopavo*).

Dos *razas* de pavos diferentes de las mejicanas se criaban en el Suroeste de USA también en épocas precolombinas. ¿Dónde se habían originado?, ¿Cómo se relacionan con la domesticación mejicana?

Los pavos mejicanos fueron llevados a Europa inmediatamente después del descubrimiento, tal vez tan pronto como en el año 1500. Su difusión a través de Europa fue muy rápida, y a mediados del siglo XVI ya no eran una mera curiosidad. Su tasa de difusión se estima en 40-

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50 km/año en comparación con los pollos traídos desde Asia a Europa en tiempos antiguos, que se desplazaron a 1,5-3 km/año. No puede admitirse tan rápido incremento de los pavos solo a partir de unos pocos fundadores, entonces ¿fueron enviados un gran número de individuos tras el descubrimiento?

Los colonos llevaron pavos desde Europa hacia el Este de Norteamérica al comienzo del siglo XVII. Las aves se hibridaron con el pavo salvaje del Este (*M.g. silvestris*) resultando la raza Bronceada Americana, la base del actual pavo comercial. ¿Existe aún algún efectivo de los primitivos pavos mejicanos en Europa o América?

Se presentan cuestiones similares sobre el pato almizclado (*Cairina moschata*) y gallina (*Gallus domesticus*).

INTRODUCTION

Study topics of the World Meeting on Domestic Animal Breeds Related to the Discovery of America are: domestic animal races before the Discovery, movement of animal populations during and after, and the effects of these on present domestic animal breeds. The purpose in this paper is to review existing knowledge and to identify unanswered questions related to the study topics concerning three species of poultry. Particular attention will be paid to the turkey (*Meleagris gallopavo*). Brief mention will be made of the muscovy duck (*Cairina moschata*) and the chicken (*Gallus domesticus*). Many domestic animal species were introduced to the Americas during the time of the Discovery. The major kinds included: cattle (*Bos taurus*), horses (*Equus*

caballus), donkeys (*Equus asinus*), sheep (*Ovis aries*), goats (*Capra hircus*), pigs (*Sus scrofa*), dogs (*Canis familiaris*), and chickens (*Gallus domesticus*). All of them persisted. Some of the introductions had a much greater impact than others on present-day breeds of domestic animals in the Americas. Other papers in these Proceedings will describe some of these introductions and their subsequent influence in detail.

It should be recognized that there already were a few domestic animal species in the Americas. They had been domesticated long before the Discovery. What was their status in the 16th century? Were they transported to other places including Europe? What effect did they have on animal breeds in the global context? The llama (*Lama glama*) and the alpaca (*Lama pacos*) have been both important and successful for many centuries in their natural high altitude environment, but they never achieved commercial prominence elsewhere. In contrast, the guinea pig (*Cavia porcellus*) has spread throughout the world as a food animal, as a pet, and as a laboratory animal. The situation regarding american dogs (*Canis familiaris*) at the time of the Discovery is intriguing. Dogs from Europe soon diluted and replaced the native stock throughout the Americas, except for the Arctic, although occasional traces of american dog ancestry may be found to the present. Were dogs of the Americas taken to Europe at the time of the Discovery, and if so did they have any genetic influence on european dog populations? Scholars

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seem not to have addressed this question.

Poultry domesticated in the Americas prior to the Discovery also have had a variable impact on global animal genetic resources. Turkeys (*Meleagris gallopavo*) as a domestic animal probably are the greatest gift of the Americas to the world. They have had tremendous importance as an animal protein food source, especially in developed countries. Their status at the time of the Discovery, and their subsequent development and exploitation, will be considered in detail in the following pages. Muscovy ducks (*Cairina moschata*) are a lesser success story, but nonetheless important. They spread throughout the world soon after the Discovery, especially into tropical environments. They continue to be a feature of subsistence farming in Third World countries. But elsewhere they are only poorly known and seldom utilized. Chickens (*Gallus domesticus*) are perhaps the greatest puzzle of all. Were there chickens in the Americas before the Discovery? Some scholars firmly believe that there were. If so, were American chickens taken back to Europe? With what effect?

TURKEYS **(*Meleagris gallopavo*)**

The story of turkey domestication and diffusion is relatively well known, since most of the events have occurred within the span of written history. The classic reference source is the

book by Schorger (1966). No one seems to have reviewed and interpreted new primary literature, if any, in the ensuing thirty years, and many questions remain unanswered.

The ancestor of the domestic turkey is the true wild turkey (*Meleagris gallopavo*). There are seven subspecies of the wild form (Howard and Moore, 1984) distinguished by geographic range and plumage differences. They are: Mexican (*M. g. gallopavo*), Rio Grande (*M. g. intermedia*), Merriam's (*M. g. merriami*), Gould's (*M. g. mexicana*), Eastern (*M. g. silvestris*), Moore's (*M. g. oneusta*), and Florida (*M. g. osceola*). Three of the seven are important in the domestication story. It is generally accepted that the first ancestor of the domestic turkey was the Mexican subspecies. The eastern wild turkey later hybridized with Mexican domestics to form the modern commercial turkey. Merriam's wild turkey was involved in a separate domestication in southwestern USA which has not persisted.

DOMESTICATION IN MEXICO AND EARLY DIFFUSION. Very little attention seems to have been paid to identifying precise date and location of domestication. Schorger (1966) described the finding of domestic turkey bones at a site in the Tehuacan valley in present day Puebla State which dated at 200 B.C. 700 A.D. Bones were also found at a guatemalan site dated about 700 A.D., far south of the normal range of mexican wild turkeys. However Schorger (1966) did not speculate on exact time and place of domestication. Leopold

(1959) speculated that it had occurred in western highlands of Mexico, perhaps in Michoacan. A thorough search of recent primary publications on archaeology of Mexico might reveal more precise information.

Domestic turkeys were widespread in Mexico and Central America at the time of Discovery (Schorger, 1966). They were kept throughout Mexico southward from about latitude 24° N. They were present in the Yucatan Peninsula and they extended south to the Nicoya Peninsula in Costa Rica.

There were no pre-Columbian turkeys on Caribbean Islands, but they were introduced very early in the 16th century (Schorger, 1966). Little is known about diffusion into South America.

There were turkeys in Peru in pre-Columbian times, perhaps arriving from Nicaragua. They were in Ecuador by 1587 but did not reach Chile until about 1650.

The birds were only half the size of wild relatives (a usual size reduction observed in most animals early in the process of domestication) and there were color variants (Schorger, 1966).

EUROPEAN DISCOVERY AND TRANSPORT OF TURKEYS. The date and circumstances of the first discovery of domestic turkeys by Europeans may never be known. One of the difficulties is that several bird species with superficial resemblance to turkeys - chachalacas, guans, curassows - were being kept as tamed or incipient domestic birds at the time; translation and transliteration of names led to confusion and

misinterpretation of species identities. Another difficulty is that traditional glory for the Discovery has been vested in Christopher Columbus, when in fact there may have been other unsung discoverers before him.

Important dates and events in the discovery of domestic turkeys (Schorger, 1966) are the following. In 1499 Pedro Alonso Niño is said to have discovered turkeys on the coast of Cumana, Tierra Firme (present day Nicaragua, Costa Rica, and Panama) and to have taken them to Europe in 1500. However Schorger's (1966) map of domestic turkey distribution in the 16th century shows some on the Pacific coast of Cumana but none on the Atlantic side. In 1500 Vincente Yáñez Pinzón was given birds that may have been turkeys at the Gulf of Paria in Venezuela, but that area is far beyond the known range of pre-Columbian domestic turkeys. In 1502 Christopher Columbus landed on the coast of Honduras where he was given *gallinas de la tierra* which very likely were turkeys. Written documents from Spain dated 1511 and 1512 refer to the receipt of live birds in Spain. Hernán Cortés began the conquest of Mexico in 1519 and thereafter references to domestic turkeys were frequent.

FIRST INTRODUCTIONS TO EUROPE. The first certain arrival of domestic turkeys in Spain was in 1511-12 (Schorger, 1966). A document dated 24 October 1511 was an order from the Bishop of Valencia for each ship from the Islands and Tierra Firme to

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bring to Seville ten turkeys, half males and half females, for breeding. Another from the King of Spain dated 30 september 1512 refers to two turkeys which had arrived in Spain from Hispaniola. Diffusion to other european countries subsequently was very rapid. Dates of first arrival listed by Schorger (1966) are: Italy 1520, Germany 1530, France 1538, England 1541, Denmark and Norway 1550, Sweden 1556. By mid-16th century turkeys were no longer a curiosity and they were seldom mentioned. The speed with which turkeys diffused throughout Europe has never been adequately explained. Carter (1971) estimated that chickens had moved from Asia to Europe through several centuries B.C. at the rate of 1.5 to 3 kilometres per year. A crude estimate for spread of turkeys in early 16th century is 40 to 50 kilometres per year. Natural reproduction could not have sustained that rate. Crawford (1984, 1990) speculated that there were massive shipments of live birds from the Americas to Spain and Europe which have gone unnoticed. A search of historical documents might help to resolve this question.

HYBRIDIZING WITH EASTERN WILD TURKEYS. The Mexican domestic turkeys taken to Europe early in the 16th century were small only half the size of their wild ancestors. They had the familiar plumage pattern of dark feathers with whitish tips particularly in the tail area, but their coloration was mostly black. These birds were brought to eastern North America

early in the 17th century by french, english, and dutch colonists (Crawford, 1984, 1990), where they hybridized freely with the wild eastern subspecies (*M. g. silvestris*) which was never domesticated. The progeny were much larger than the mexican parent. Their plumage had the bronze tone of the wild parent. The hybrid stock soon became known as American Bronze. Because of its greater size and vigor it rapidly replaced the original mexican domesticate in both North America and Europe. It became the modern commercial turkey.

Does the original mexican domestic turkey, small and blackish, without genetic influence of the wild eastern subspecies, still exist anywhere in the world, perhaps in Central and South America and in Europe? The question has academic interest, and it also has biological importance in the context of conserving rare and relic germplasm.

TURKEY DOMESTICATION IN SOUTHWESTERN USA. It is known that native peoples in southwestern USA also had domestic turkeys before the time of european exploration and discovery (Schorger, 1966; Crawford, 1990). It has been believed that this domestication was independent and separate from that of Mexico, that it was derived from the wild Merriam's subspecies (*M. g. merriami*), and that it neither persisted nor contributed to present day commercial turkeys. Two publications by McKusick (1980, 1986) have greatly extended knowledge in this area, but they have also raised some questions.

According to McKusick (1980,

1986) two distinct breeds were kept in southwestern USA, both originating as domestics elsewhere and from unknown ancestors. The Small Indian Domestic (*M. g. tularosa*) was small, short shanked, hump backed, dark feathered, and had plumage extending to the base of the skull. She speculated that it may have originated in coastal eastern Mexico. It first appeared about 300 B.C. in the Mogollon Culture area of New Mexico. It became extinct with fall of the Pueblos in 1672. The breed seems to have been poorly adapted and was raised with difficulty.

The second breed was called Large Indian Domestic (*M. g. merriami*). McKusick speculated that it may have had an eastern origin. It appeared in the Anasazi Culture area of Arizona about 400 A.D., and persisted until about 1723. It was well adapted to the environment. McKusick believes that the wild Merriam's subspecies is actually a feral form of the Large Indian Domestic. Color variants silver, red, white, pied were present in the Large breed but not in the Small.

The two breeds were raised together, and crossbreeds could be distinguished. The above information is both intriguing and startling. Missing from it is any connection with the Mexican domestication which was nearly concurrent. Unanswered are questions about origin of the two breeds, in the absence of a wild form resembling the Small breed, and considering McKusick's claim that wild Merriam's is actually the Large breed gone feral.

MUSCOVY DUCK (*Cairina moschata*)

The muscovy duck (*Cairina moschata*) was also domesticated in pre-Columbian times in the Americas. It is still little known and utilized as a poultry species. It is best adapted to topical environments, where it is found around the world in subsistence farming. It is also found in small numbers in temperate climates where it is not nearly as cold resistant as its distant relative the domestic duck (*Anas platyrhynchos*). Hybridizing between the two yielding the sterile mulard is conducted in some areas, particularly in southeast Asia, and sometimes in Europe for production of *pate de foie gras*. Industrial meat production from muscovy ducks has recently begun in France.

Literature on history of the species was briefly reviewed by Crawford (1990) and in great detail in the monograph by Donkin (1989). It seems peculiar that, for a species discovered by the Spanish, very little of the literature is written in the Spanish language, and hispanics have shown little interest in the bird.

The usual interpretation is that muscovy ducks were domesticated along southern shores of the Caribbean (Crawford, 1990). Donkin (1989) has postulated a second centre of domestication in Paraguay and the Chaco. The Spanish found domestic birds in Colombia and Peru in 1514 (Crawford, 1990) and probably introduced them to Mexico. They were soon found throughout Central and South America. As with turkeys, diffusion

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throughout the world was exceedingly rapid. Donkin's (1989) map shows three routings: from the Americas to the west coast of Africa, from the Americas to Spain and France, and from the Americas to southeast Asia. Most of the European writings refer to introduction from Africa (Crawford, 1990).

Biological and performance data concerning muscovy ducks are very limited. There is no world inventory, nor any complete description of stocks within a country. Do the indigenous muscovy ducks of the Americas differ significantly from those of Africa and Asia? Have distinctive breeds been developed anywhere? How do the industrial meat stocks of Europe differ from those elsewhere? Many questions remain unanswered.

CHICKENS (*Gallus domesticus*)

Chickens were the first bird domesticated by man, and they have been the most successful and beneficial (Crawford, 1990). They are everywhere in the world and vastly important as a protein source in the human diet. The Spanish certainly took them to the Americas at the time of the Discovery, where they were accepted and propagated very widely.

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Termer (1951) drew attention to the livestock breeding farms that were established in Cuba and Santo Domingo by 1495; Spanish chickens were part of those farms. He believed that chickens were adopted very quickly by native peoples, not as food, but as trade items to replace the more expensive turkeys. But were there already chickens in the Americas at the time of the Discovery? There is a strong minority view, championed by Carter (1971), claiming that chickens had been there for many centuries having come from across the Pacific. Carter and colleagues have assembled a large mass of data linguistic, cultural, biological all of which is cumulative and strongly supports pre-Columbian introduction. Missing is documentation of chicken bones from known pre-Columbian sites. Carter (personal communication) has stated that a manuscript is in press which provides the missing information and which will establish with certainty the pre-Columbian presence of chickens in the Americas. If such is demonstrated, it will raise the question of whether these early American chickens were taken back to Spain and Europe by the Discoverers. If they were, what effect did they have on the European chicken breeds and populations?

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