

## Since how long ago did *Toxoplasma* exist?

Editorial

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As is well known the first mention in history on *Toxoplasma* was its isolation from the rodent *Ctenodactylus gundii* by Charles JH Nicolle and Louis H Manceaux, both in 1908, in the Pasteur Institute Laboratory in Tunisia. In the same year (1908) Alfonso Splendore isolated it from a rabbit in Brazil. This was followed by its isolation from different animals and man all over the world, and the recognition of its medical importance. Another landmark in the history of *Toxoplasma* is the full demonstration of its asexual and sexual life cycle in the intestinal epithelium of the cat, and its recognition as an Apicomplexan, simultaneously by William M Hutchison and Jack K Frenkel, both in 1970.

Recognizing the close association between cats and rodents the two latter researchers fed infected rodents to cats that happened to be already infected with *Toxocara catii* and passing ova in their stools. Thinking that these ova were carriers of *Toxoplasma* they fed cat stool sediments to rodents which became infected with *Toxoplasma*. They noticed the concomitant presence in the inoculum of disporocystic tetrasporozoic forms which they recognised as *Isospora bigemina* oocysts. One thought led to another and when the oocysts were separated from the ova in the inoculum, the rodents acquired toxoplasmosis. Both Hutchison and Frenkel then worked on identifying the parasitic stages in the intestinal epithelium of specific pathogen free cats infected with the coccidian oocysts and demonstrated the full life cycle-coccidian stages. The cat was thus established as the definitive host of *Toxoplasma*.

But the question is how long ago did *Toxoplasma* exist in Egyptian history? (since ancient Egyptian history is one of the oldest records of mankind and associated animals), and how long ago did it exist in the world for that matter? To answer this question, we must ask how long-ago cats existed?

Cats were particularly recorded in the arts of the New Kingdom (1570-1070 BC) and again in the Late Period (1070-332 BC). Before that from ancient Egyptian reports and reviews the well-known MAU breed (cat, or 'SUN' in ancient Egyptian language) existed ever since 3000 years ago and may have been transferred to other regions of the world. At that time all cats were referred to simply as she/he who mews. In demotic language (ancient Egyptian hieratic writing) the cat was referred to as 'MIU' or 'MII'; and in the later Coptic language as 'EMU' or 'AMU'. The word 'MAU' was derived from one of these ancient languages simply meaning cat.

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In excavations, hundreds of thousands of cats' mummies with intact fur were found. Dead cats were taken to the capital city of BUBASTIS (still existing today and known as 'TEL BASTA' in Sharkia Governorate in Egypt) where they were embalmed, mummified (Figure 1) and deposited in sacred burials, anticipating escort with their owners into the eternal life.

The fur of the ancient MAU was yellow-bronze in colour with evident spots (Figure 2). Mummified cats noticeably resemble the contemporary MAU (Figure 3), substantiating the fact that the ancient Egyptian MAU is the oldest domestic cat. Primarily the MAU was employed for hunting in the marches and the retrieving of prey. Later domesticity was depicted in some papyri as a cat curled under a woman's chair, and in reliefs on walls of the Pharaohs' tombs showing the cat sitting in the laps and on the shoulders of their owners.

Even the relation of MAU and rodents (that act as intermediate hosts) is as ancient, especially since at that time the Egyptians used the cats in their constructed towers for storage of grains, to keep them protected from pillage by rodents.

The religious significance of ancient Egyptian MAU assumed great importance from about 2800 BC onwards and was regarded with deference and devotion by its ancient owners. From about 1500 BC it was believed that the SUN God Ra could manifest himself in the form of a spotted cat. Each night Ra would journey to the underworld, confront his enemy the snake demon APOPHIS, kill the snake with a knife and thus ensure the return of the sun the following morning. Many ancient Egyptian paintings showed Ra in the form of a spotted cat slaying APOPHIS. MAU was so important to the ancient Egyptians that at one time they started to worship it as the Goddess BAST (around 2000 B.C) (Figure 4). The Goddess BAST was portrayed as a cat, representative of both the sun and the moon. The Egyptians associated the female cat's fertility and motherly care with the godliness of BAST. By 945 BC the cat had become associated with another Goddess, BASTET, and sacred cats kept and bred in temple catteries in the capital city of BUBASTIS, were worshipped as living manifestations of the goddess. The town 'TEL BASTA' of today derives its name from that of the BUBASTIS and houses the remains of the temple where the Goddess was worshiped. This worship of BASTET continued for over 1500 years

into the Roman Era (to 330 AD). Many beautiful bronze sculptures of cats survived from this period; and with their long elegant limbs, high shoulder blades and level brows they are strikingly like the modern MAU.

Interestingly the Egyptian MAU of today which is the only naturally spotted breed of domestic cat that still exists (Figure 3), is an exact copy of its ancestor with ringed tail, black tail tip, and broken striped markings on body. Both ancient and modern cats resemble the modern species



**Fig. 1:** Embalmed and mummified ancient Egyptian MAU painted with their features dated around 1000 BC. Some cats were buried in limestone sarcophagi or wooden cat-shaped coffins. A few had sculptured bronze face masks. Unwrapped mummies revealed striped coats of dark fur on a light background characteristic of modern Egyptian MAU cat.



**Fig. 3:** The typical Egyptian MAU of today, definitive host of *Toxoplasma* feeding on its rodent intermediate host.

known as the North African wild cat *Felis sylvestris libyca* which was apparently domesticated by the ancient Egyptians sometime between 4000 and 2000 BC.

In conclusion the Egyptian MAU is indeed one of the oldest, if not the oldest, breed of domestic cat today. Although there are no ancient records of toxoplasmosis as a disease it can be safely concluded that as with some other parasitic diseases *Toxoplasma gondii* existed since ancient times.



**Fig. 2:** An ancient Egyptian MAU shown in the bird-filled marshes.



**Fig. 4:** Bronze statue of the goddess BASTET. Cats occur particularly frequently in the art of the New Kingdom (1570-1070 BC) and again in the Late Period (1070-332 BC).