

Wildcat and domestic cat: domestication or taming ?

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Abstract. This study point out the relationship between wild cat and domestic cat correlating the craniometric data of wild cats from literature to those from bone remains of the Museum of Veterinary Anatomy (University of Pisa). The morphological and morphometrical features closely associated with behavioral attitudes confirm the hypothesis that the cat would be considered as a taming animal.

Keywords: Wild cat, domestic cat, craniometry, domestication.

INTRODUCTION

The “domestication” of the animals begin about 11.000 B.C. years ago in the Near East, where the human communities change their way of life with a gradual shift to an economy of agriculture and livestock (Tab. 1). Progressively the current farm animals (horses, cattle, pigs, sheep and goats) and dog live and reproduce themselves in the same human environment.

An animal species is defined as “domestic” if is able to born and grow in captivity, fed and cared for by man. This species shows behavioral changes such as reduced aggressiveness, gregariousness and ability to live in herd with a definite leader, ability to provide a production (wool, milk, meat, work) (Clutton Brock J., 2001; De Grossi Mazzorin J., 2015) (Tab. 2).

Domestication has also induced morphological changes in coat (texture, color and length), reducing in body, skull and teeth size (Tab. 3).

The wild cat appears as taxon in western palaeo-arctic in early Pleistocene (2.5 million years ago). Current wild cats follow three phenotypes: European (*Felis silvestris silvestris*), African (*African wildcat*), and Asian cat (*Asiatic wildcat*). Before the 2nd millennium b.C. in Egypt tamed wild cats began to live near the human environment: from the phenotype *Felis silvestris silvestris* is thus derived *Felis catus* L. (domestic cat) (Kratochvil J.& Kratochvil Z., 1976). The “taming” of the cat is not characterized by the same behavioral attitudes determined by domestication: the cat doesn’t provide a production or work unless to protect the crops from rodents. For this reason it has been accepted and then protected in the agricultural civilization of ancient Egypt. The first tamed cats arrived in Greece with commercial traffic and then they colonized the whole Europe, where in the Middle Age, the cats were seen close to the witches, or even witches transmuted, and suffered sacrifices. It is believed that the introduction of this animal species in the peninsula followed the greek colonization of southern Italy. The first evidence of domestic cat in Italy is represented by *the cat of Fidene* (Rome): in this archaeological site, in a facility destroyed by fire, dating from the second half of the VIII

Tab. 1 – Timeline of domesticated animals.

| Animal species | Time and site of domestication |
|---|--------------------------------|
| DOG (<i>Canis lupus L./Canis familiaris L.</i>) | 14.000 B.C. (Eurasia) |
| SMALL RUMINANT (<i>Ovis vel capra L.</i>) | 7.000 B.C (Near East) |
| LARGE RUMINANT (<i>Bos taurus L.</i>) | 7.000 B.C. (Near East) |
| SWINE (<i>Sus scrofa L.</i>) | 7.000 A.C. (Near East) |
| EQUINE (<i>Equus caballus L.</i>) | 4.000 B.C. (Ukraine) |

Tab. 2 – Behavioral attitudes between wild and domestic cat.

| Domestic animal species | Wild and domestic cat |
|--|--|
| Reduced aggressiveness | Less aggressiveness, the human presence is tolerated. Wild forms usually avoid anthropic environments, except for the search of food |
| Gregariousness and replacing the leader with man | As solitary species, the cat does not recognize a leader. The housecat believe the man as a partner to share the environment |
| Ability to provide products (wool, milk, meat) or work | Both wild and housecats do not provide any productions or labor. Man takes advantage of this species in the fight against rodents, thanks to its instinct of predation |
| Ability to reproduce in captivity | The housecat does not require the presence of man to reproduce. Starting from the 17 th century man played a role in cat reproduction for aesthetic purposes, making the different breeds |
| Approach towards man | Some housecats retain their wild nature, others live in our homes |
| Submissiveness | Not present |

century B.C. remains relating to a domestic cat have been found. The subject showed different morphology and smaller size than the common wild cat (known in Italy starting from the Mesolithic). Another witness is reported in a wall painting in the *grave of the Triclinium* (Tarquiniia) (Fifth century B.C.).

There are three morphotypes of domestic cat: common morphotype (dating back to the Roman Empire), Persian morphotype (known in Europe since 1621, from Iran) and Siamese morphotype (known in Europe since 1884, from the Indies). The breeds known today originated from these morphotypes.

MATERIALS AND METHODS

Ten skulls and jaws of domestic cats and one skull of wild cat, as anatomical remains belonging to the historical collection of the Museum and dated around 1850, were studied to compare craniometric data (capacity of the skull, total skull length, width of occipital condyles, length from condyle to I₁ alv.) to those reported from literature (Kratochvil J.& Kra-

Tab. 3 – Morphological differences between wild and domestic cat.

| Domestic animal species | Wild and domestic cat |
|---|--|
| Fur coat variability (texture, color and length) | Changes induced only for aesthetic purposes |
| Change in body size | There is no change in body size: an housecat is not very different from the ancestor African wildcat |
| Reduction of the volume of the skull with relative shortening of splanchnocranium | Housecat shows skull reduced in volume than the wild one. The shortening of splanchnocranium is variable and depends on the selected breed |
| Decrease of the teeth size | There is not a decrease for teeth size |

Tab. 4 – Craniometric differences between wild and domestic cat.

| Craniometric data | Wild cat (literature) | Wild cat (Museum) | Domestic cat |
|--------------------------------|-----------------------|-------------------|----------------|
| Total skull length | 86.9 - 100.1 mm | 99,8 mm | 80,2 - 87 mm |
| Width of occipital condyles | 19.6 – 25.9 mm | 16,2 mm | 12,1 - 14,3 mm |
| Length from condyle to I1 alv. | 52.2 – 72.2 mm | 72,1 mm | 52 - 61,4 mm |

tochvil Z., 1976; Kratochvil Z., 1976; Yamaguchi N. et al., 2004; O'Connor T., 2007) referred to some morphotypes of wild cats and related to their evolution state.

RESULTS

The craniometrics data are summarized in Table 4: the study of the total skull length, as distance between the occipital condyles and a tangent line to the mandibular incisors, shows that in the domestic cat the maximum value of this parameter is close to the minimum value reported in the literature for wild cat and more less than that measured in wild cat specimen of the Museum. Taking in account the width of occipital condyles, as distance between the lateral median borders of the condyles, we point out that the morphometric parameter is closer that measured in wild cat specimen of the Museum than that reported from literature. From the analysis of the length from jaw angle to the base of the I₁ incisor, we can evidenced that minimum value of domestic cats analyzed is closer to the same of wild cat proposed in literature but much lower than that related to the wild cat specimen of the Museum. These three skull parameters, useful to differentiate wild and domestic morphotypes, allow us to consider that substantially the dimensions of skull and jaw are lower in domestic than wild cat. Morphologically (Fig. 1 and 2), some differences between wild and domestic morphotypes are detectable in a gradual reduction in the length and curvature of the nasal bones, a retraction of incisive process of nasal bone in respect to the maxillary bones, a shortening of the jaw jugular process and an appearance of a concavity at the level of the rostral part of the nasal bone. The bone processes related to insertion of masticatory muscles (temporal crest, nuchal crest, coro-

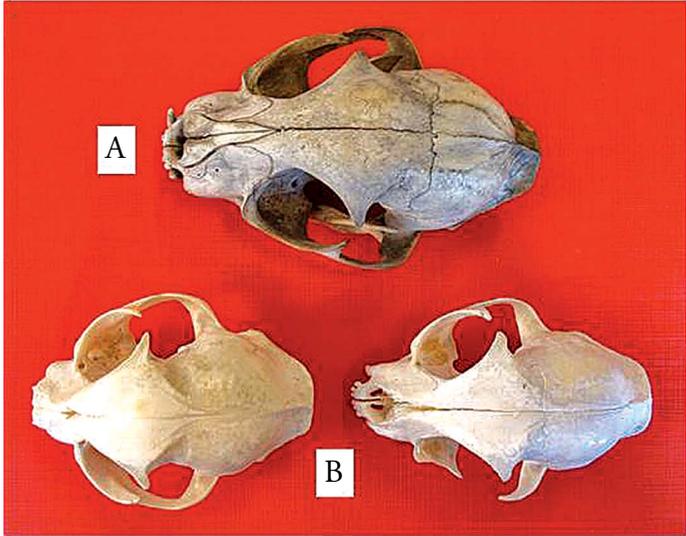


Fig. 1 – Skull of wild cat (A) and two skulls of domestic cats (B), dorsal view.

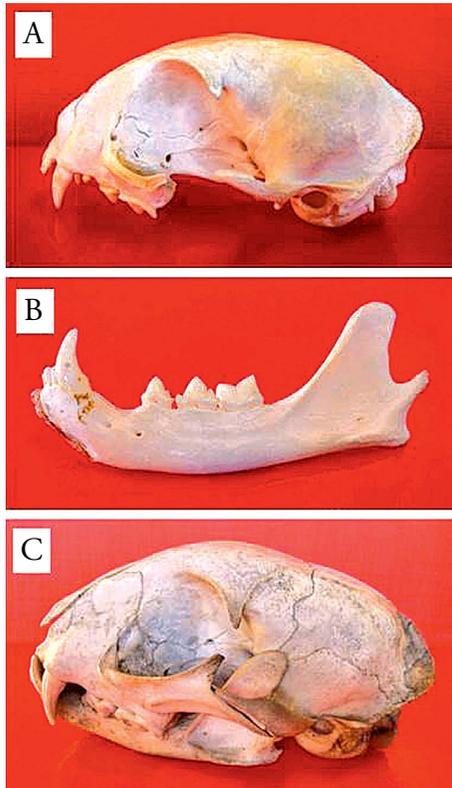


Fig. 2 – Skull (A) and jaw (B) of domestic cat and skull of wild cat (C), lateral view.

noid process of the jaw) are slightly more developed in wild subjects than in domestic ones. The shape of sagittal intraparietal and fronto parietal sutures are different: in wild cat they are indented while in domestic one are linear, as reported in literature (Yamaguchi N. et al., 2004)

DISCUSSION

Taking into account the behavioral attitudes (Table 2) and morphological features of a domestic animal species (Table 3) reported in literature with the results obtained by morphologic and morphometric study, the data we present confirm that domestic cat was not really a “domesticated” species but better a “taming” species (Bar-Oz G. et al., 2014). The Authors agree with O’Connor (2007): he believes that it is not realistic to think that a clear differentiation in biometric data between wild and domestic cats may be always possible. Furthermore, he says that time and place may influence the size distribution of domestic cats. Besides, being the cat a medium-sized animal, it is difficult to predict how the selection pressures would modify the body size of a wild animal. O’Connor completes his discussion pointing out that sympatric wild and domestic cats are freely interbred and then they produce many hybrid forms.

If we take into account the parameters that determine the transition between wild and domestic species, accepted for most mammals that man has domesticated over thousands of years, it can be seen from data provided by the literature and confirmed in this study that the morphological characters related to a domestic cat are similar to those relating to a wildcat. In addition, the morphometric study of the skull detects modifications that do not result in behavioral changes such as to indicate the cat living in our homes as a domestic animal, as defined by Clutton Brock (2001). The term of “taming” better suits to a species which for necessity of food coexistence (commensalism) approached the man and has changed only behavioral traits associated with better living conditions allowed by living with the man.

RIASSUNTO

Gatto selvatico e domestico: domesticazione o ammansimento?

Il presente studio indaga sul rapporto tra gatto selvatico e domestico, mettendo in relazione i dati craniometrici su soggetti selvatici, presenti in letteratura, con quelli relativi a reperti di gatto selvatico e domestico della collezione osteologica del Museo Anatomico Veterinario del Dipartimento di Scienze Veterinarie dell’Università di Pisa. La nostra indagine è iniziata con la definizione di domesticazione, la sua datazione storica (circa 11.000 anni fa) ed il legame con le modificazioni del sistema di vita umana, con un graduale passaggio ad una economia di agricoltura ed allevamento. Dalla letteratura, una specie animale si definisce domestica se può essere modificata per nascere e crescere in cattività, presentare scarsa aggressività, essere specie gregaria con la presenza di un capobranco riconosciuto e capace di fornire una produzione (lana, latte, carne, lavoro) all’uomo.

Il processo di domesticazione, accanto a variazioni comportamentali, ha indotto anche modificazioni morfologiche come differenze nel mantello (consistenza, lunghezza e colore), riduzione della taglia corporea, dello splancnocranio e delle dimensioni dei denti.

Dai dati comportamentali emerge che le caratteristiche relative ad una specie domestica non trovano corrispondenza con la specie *Felis*: essa è una specie animale solitaria, non riconosce un capobranco, non fornisce prodotti all’uomo, salvo nel passato il suo avvicinamento

nella condivisione del cibo (specie commensale, che ha fornito aiuto nella lotta con i roditori), ha una riproduzione in cattività associata alle varie razze create dall'uomo.

Dai dati craniometrici relativi ai reperti museali e paragonati con quelli in letteratura, emerge che le differenze tra la forma selvatica e la forma domestica sono in range trascurabili e relativi alle dimensioni inferiori del morfotipo domestico rispetto al selvatico. I rilievi ossei legati all'inserzione dei muscoli masticatori (fossa temporale, cresta nucale, processo coronoideo della mandibola) nel soggetto domestico appaiono meno accentuati, insieme ad una linearizzazione delle suture interparietali e frontoparietali, dati questi che concordano con una relativa perdita di caratteristiche predatorie.

Dall'analisi congiunta dei dati comportamentali con quelli morfometrici è possibile concordare con l'attuale definizione che afferma come il gatto domestico non sia stato domestificato ma ammansito per una mutua convenienza nella convivenza con l'uomo.

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