

Why to Study Opossums?

¿Por qué Estudiar las Zarigüeyas?

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SUMMARY: Due to the very important role in Brazilian ecosystems, studying the anatomy of opossums is extremely relevant for their natural preservation and possible clinical and surgical interventions with captive animals. These marsupials occupy diversified niches being well distributed throughout the Brazilian territory. They collaborate in the control of urban and agricultural pests such as rodents and insects. They are also excellent dispersers of seeds through their feces. The conclusion is that opossums can be a great model for the study of the anatomy of wild animals.

KEY WORDS: Veterinary Education; Anatomy; Wild Animals; Opossum.

INTRODUCTION

Nowadays marsupials only occur in the Americas and Australia although fossil marsupials have been discovered on every continent in the world. The genus *Didephis* belongs to the phylum Chordata, the order Didelphimorphia and the family Didelphidae. This is considered the largest family of American marsupials. This type of animal is popularly called opossum and a specimen is presented as a synanthropic animal because it is not domesticated but lives nearby and benefits from humans and their dwellings. In Brazil, the white-eared opossum *Didelphis albiventris* tends to occupy higher altitudes in the western part of the continent, in drier regions on the east coast and also in the cooler southern regions (Tyndale-Biscoe, 2005) (Fig. 1).

An opossum's gestational intra-uterine period lasts only 13 days and new offspring can be born twice a year. The number of puppies per litter is between 8 and 10. Since the puppies are born very small and still embryologically immature, they remain inside the marsupium until its morphogenesis is completed (Bertasoli *et al.*, 2015).

The animals belonging to the Didelphidae family are little marsupials ranging between 10 g to 3 kg on average. Their diet is considered generalist and may include fruits, invertebrates and very small vertebrate animals, occasionally carrion, flowers, nectar and gum trees classifying them as omnivorous. Their behaviour shows that they have night habits and are known to be lonely animals (Silva *et al.*, 2006).

Curiously these animals were once considered a culinary delicacy in Brazil during colonial times. Opossum meat is cited as one of the sources of animal protein appreciated in the diet of Europeans who arrived in the country during the period of the great Portuguese navigations (Hue, 2009).

Knowledge of the morphology in wild mammals is valuable because it provides baseline anatomic information and may collaborate with veterinarian medical and surgical clinics. In the white-eared opossum skull there are clinically relevant anatomic structures and many of these features are easily palpated in the surface anatomy of live animals (Inamassu *et al.*, 2017).

Diagnostic imaging methods are widely used in wild animals having clinical and surgical importance for this species treatment. Unfortunately many opossums are killed or injured when crossing roads at urban perimeters or by suffering from dog and cat bites when attacked going into houses. So they are considered amongst wild animals as having the highest occurrence of roadkill on Brazilian highways. The main indications for conducting computed tomography (CT) exams on opossums is for the diagnosis of fractures. Usually they present severe single or multiple fractures as well as traumatic brain injury and the prognosis depends on the extent of lesions and neurological conditions. Broken bones in opossums have similar orthopedic surgery indications as those presented for pets and, therefore, follow the same surgical techniques (Silva *et al.*).

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Fig 1. White-eared opossum invading house on the outskirts of São Paulo State (Brazil) near the banks of the Tietê river. Images from authors.

Medical imaging also establishes a database of healthy versus pathologic conditions and can be used for forensic anatomy in legal veterinary medicine. Like other animals of native, wild or migratory fauna, opossum are protected by the Brazilian environmental crimes law which prohibits killing, persecuting, hunting, catching or using these animals in any other way without a permit or authorization from the competent authority (Brasil, 1998). From this point of view, postmortem computed tomography (PMCT) is a valuable tool for identification and documentation of osteological structures in wild animals (Kot *et al.*, 2018).

Additionally, CT scans can also be converted to a 3D printable bone to produce synthetic pieces for teaching and learning processes about these animals. Technological advances in 3D printing are already widely used for human medicine. Therefore, biomodels have been obtained with an increasingly expressive reduction of financial investments. This fact is certainly making it more affordable for veterinary use too. Although rapid prototyping still crawls with early steps within Veterinary Medicine, there are innumerable clinical, educational and experimental possibilities for its application (Hespel *et al.*, 2014).

Concluding, opossums can be a great model for the study of the anatomy of wild animals. Opossum structures can be built artificially by adding layer upon layer of synthetic material. In recent years additive manufacturing technologies have advanced from design and fitting validation to biomedical, rapid tooling, tissue engineering and arts. Therefore, it can also clearly produce veterinary biomodels (Corcodel & Ilies, 2018).

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RESUMEN: Las zarigüeyas desempeñan un papel muy relevante en los ecosistemas brasileños, siendo extremadamente importante estudiar su anatomía para su preservación natural y posibles intervenciones clínicas y quirúrgicas de los animales en cautiverio. Estos marsupiales ocupan nichos diversificados y están bien distribuidos en todo el territorio brasileño. Colaboran en el control de plagas urbanas y agrícolas, como roedores e insectos. También son excelentes dispersores de semillas a través de sus heces. Por lo tanto, se concluye que las zarigüeyas pueden ser un gran modelo para estudiar la anatomía de los animales salvajes.

PALABRAS CLAVE: Educación Veterinaria; Anatomía; Animales Salvajes; Zarigüeya.

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