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Book review

M.S. Fischer, K.E. Lilje, J. Lauströer, A. Andikfar (illustrations): Hunde in Bewegung (Dogs in motion), VDH-Service GmbH/Franckh-Kosmos Verlags-GmbH & Co. KG, Dortmund/Stuttgart (2011). 207 pp., 25 colour plates, 134 colour illustrations, DVD (400 movies, X-ray movies and 3D animations), 49.95€, ISBN: 9783440130759.

This book provides an abundance of fascinating insights into the locomotion of dogs, so far a nearly unknown area, presented in a scientific style which is generally understandable. Thus, the extensive collection of data and images has been compiled in a richly illustrated publication. "Dogs in motion" impresses not only with scientific results, and sets new standards animating the course of motion into video sequences, the illustrations serve two ways, they are instructive and aesthetic. Time and again, it is a great pleasure for me to enjoy the illustrations, produced by Lauströer and Andikfar.

This very special book does not exclusively address scientists but targets all dog owners and people interested in dogs (or in anatomy of mammals) in general, as outlined in the introduction. Added to the book is a DVD with extensive footage containing high speed videos of selected dogs, X-ray films and many animations.

An innovative illustrative style brings dog anatomy to life and illustrates the skeleton, and the muscles and connective tissues in locomotion. Based on the results of the largest study on the subject ever carried out, an experiment which involved 327 dogs from 32 different breeds, the book delivers completely new insights into the motion sequences performed by dogs. The accompanying DVD features more than 400 movies, X-ray films and 3D animations and demonstrates both the variability and uniformity of dog locomotion with precision and clarity. Prior studies of locomotion in dogs focused on dogs' locomotion disorders while others centre on particular aspects of locomotion. Exact motion sequences within the locomotor system were unknown until Fischer and his team started the study of healthy dogs in motion. "Dogs in motion" includes the comprehensive findings of a study of more than 300 dogs and how they move in pacing, trotting or galloping. The dogs were studied with several techniques to reveal how they move. Martin Fischer and Karin Lilje used high-speed X-rays as well as infrared imaging based on reflective dots positioned on the dogs to record details of their movements from both the side and the front. By combining these methods, they got data about the movement of dogs in a precision so far unknown. Interestingly, they have found that no matter what breed of dog was looked at, the patterns of movement match. Though the gaits of many breeds may appear very different, the underlying motions of bones, muscles and connective tissues are not so different after all. Taking the proportions of the front legs of the dogs, Fischer et al. found that these were nearly identical in all dog breeds. Regarding the total length of the foreleg, the length of the humerus is always exactly 27 percent. From this can be concluded that all dogs run very similarly – whether toy breed or German Shepherd or Great Dane.

The study shows that displays and textbooks until now have been incomplete or even erroneous particularly when it comes to the heights of corresponding parts of the front and hind limbs. The scapula, representing the shoulder girdle in canids, and the Os coxae are often depicted at the same level, whereas the true placement of these joints is actually different. Rather femur (thigh) and scapula correspond, as do humerus and tibia/fibula and forearm and middle foot. According to the authors, the shoulder blade and forearm are moving in matched motion with the thigh and middle foot, even though that is different than we previously thought. Hip and shoulder joint of the animals are not on the same level, these joints do not correlate with each other. And they are not the centre of rotation in the movements. The centre of rotation of the frontlegs is the scapula. The scapula is only connected to the skeleton through muscles (a kind of synsarkosis). The actual shoulder joint remains nearly immobile during the process of movement.

The great variety of domestic dogs moves fundamentally similarly, domestication-induced variability in morphology as extreme forms by selective breeding did not alter these fundamental similarities.

It would be fascinating to compare all those highly interesting insights into the locomotion of dogs with those of a "wolf in motion", to get an idea of changes due to domestication referring to the process of movement. A hand-reared wolf before sexual maturity could be moved and measured like the dogs. Possibly, the underlying motions will not be so different.

Fischer and Lilje have shed light on the course of movement in dogs. Their findings will also alter academic teaching. As far as I am concerned, "Dogs in motion" should become an essential part of anatomy teaching in courses of veterinary medicine and zoology.

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