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POPULAR ARTICLE

POTENTIAL ROLE OF ANATOMY IN VETERINARY FORENSICS

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ABSTRACT

Anatomy is the branch of science that deals with studying biological structures. Veterinary anatomy deals with the structure and forms of organs and tissues of principal domestic animals and birds. These biological structures are studied in gross anatomy, histology, embryology, etc. These studies have been used to differentiate different species, and as a result, they have a critical role in forensic identification. The body's different systems can be studied in detail at gross or microscopic levels. Also, veterinary forensics is a newly emerging field where a veterinarian is expected to identify the remains of the carcass to solve veterolegal cases. Thus, the various forms of anatomical knowledge may be applied depending upon the carcass or specimen availability.

KEYWORDS: Forensics, Anatomy, Veterinary, Animal, Identification

INTRODUCTION

The term forensic refers to the implementation of scientific knowledge to solve legal problems. It is based on the scientific analysis of physical evidence from the crime scene, and thus it plays a crucial role in the investigation. It is emerging as a different branch in the veterinary sciences, but its application in veterinary science is not as standardized as in human forensics. Still, it continues to develop and attain recognition due to changes in veterinarian knowledge to investigate the cases of animals. This has been possible due to the availability of research publications and other educational opportunities in veterinary forensics. Anatomy

plays an important role in veterinary forensic investigations. Also the forensic science needs collaboration among anatomists who are interested to deal with forensic aspects.

IMPORTANCE OF ANATOMY

Anatomy is the branch of life science which deals with the shape and structure of the organisms. Forensic veterinary anatomy intends to determine, examine and identify preserved or unpreserved body parts of the animal remains. It plays a major role in identifying sex, breed, age, height along with examining the cause of death. The anatomical knowledge may be remarkably useful along with forensic techniques to determine the identity of animal remains. Thus, it is vital to have deep knowledge of the actual aspect of forensic veterinary anatomy.

Animal identification in forensic science is crucial because it analyses animal remains, e.g. hair or bone. The animal remain investigation can be helpful to identify meat adulteration in restaurants. Thus, animal identification also plays an integral role in cases of illegal trades. There are various animal species identification methods, including bone identification, embryo identification, hair morphology, dental anatomy, iris biometrics, muzzle printing and DNA analysis.

BONE IDENTIFICATION

The skeleton of each species has a unique biological identity varying with shape, size and density of bone. The knowledge of the detailed structure of bones is of great importance in animal height estimation, sex determination, and determination of age and ancestry. The bones in different species have different features and characteristics to those species, and the knowledge of these features proves to be very beneficial in the identification of bones. Further, a thorough knowledge of bone anatomy at the histological level can be used to distinguish a mammalian bone from a non-mammalian bone.

The pelvic girdle and skull bones are commonly used for sex determination. Examining the pelvic girdle includes the measurement of conjugate diameter, transverse diameter, inclination of pelvis, ischial arch, size of the pelvic cavity and obturator foramen to determine sex with great accuracy. The examination of the skull includes the examination of the temporal line, the eye sockets, the supraorbital ridge, nuchal lines and the mastoid process for the determination of sex.

EMBRYO IDENTIFICATION

Comparative embryology deals with comparative ontogeny to learn the development process in various species. The different species have a different gestational age of the fetus;

thus, the development of organs also varies. Thus, by examining the remnants of the fetus, the idea of fetal age and species can be taken. Furthermore, the determination of dimensions of ossification centers has been identified as a most beneficial method for estimating the age of a fetus. Thus, a very important and applicable role has been played by embryology in forensic studies.

HAIR MORPHOLOGY

The gross and histological examination of hair is another important tool that can be used to identify animal species. Hairs are composed primarily of the protein keratin and defined as slender outgrowths of the skin of mammals. Hair cast is considered the simplest, accurate and cheap method for identifying species. The hairs in each species have typical length, colour, shape, root appearance and internal microscopic features that distinguish one animal from another. The microscopic features include the micrometric analysis of hair shaft, medullary diameter, cortex thickness and medullary vacuolated cells. The identification of these features plays a very important role in species identification.

DENTAL ANATOMY

The dental anatomy in forensics plays great role as each species have a unique dental formula and type of teeth. Dental morphology is also very useful to identify the age and gender of a particular species. The branch which deals with the comparison of morphology of various animal teeth depending upon differences in diet is known as Comparative odontology.

IRIS MORPHOLOGY

Iris is the annular region of the eye which the pupil and sclera surround. The iris pattern is unique to individual species and distinguishes between the left and right eye. Thus the animal species have been identified based on unique iris pattern. This uniqueness is due to randomly distributed immutable structures like connective tissue, stromal fibres, ciliary processes etc., which do not change appreciably over time. Thus, due to its high accuracy, iris recognition is reliable for forensic purposes.

MUZZLE PRINTING

The numerous grooves on the surface markings of muzzle has a definite pattern which may be used to identify the animal. This method is useful in identifying the animal as in human fingerprints and may also be employed on an organized farm to avoid frauds made in insurance. The main drawback of this technique is that the collection of paper-based muzzle prints is inconvenient and time-consuming, and the images formed by this technique do not have

sufficient quality. Also, it needs special skills to handle and restrain the animal and get the pattern on paper. Still, this technique is beneficial for identifying an animal's age, breed characterization and production performance.

DNA ANALYSIS

DNA consists of a chain of nucleotides, forming an animal's genetic makeup. It can be accessed from any part of the body. However, it is mainly isolated from bone, blood, teeth and hair. The DNA profile of every animal is unique to them and thus may be used for their identification. Therefore, by adopting this method, the identification of individual animals at the molecular level can be done.

CONCLUSION

Anatomical science is vital in the forensic investigation or forensic education. It creates opportunity and collaboration among anatomists and other forensic scientists for the exchange of ideas. A collective approach of advanced forensic tools with different anatomical knowledge would be more beneficial in the field of forensic science in future. Thus this collaboration proves great for forensic investigations and employment opportunities.

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