

## **Wildlife Forensics: An Emerging Field in Conservation of Wildlife**

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### **Abstract:**

*Wildlife is an essential part of wholesome environment which needs the special care and attention towards its preservation and prevention of crimes through effective legal and scientific mechanisms. Now world has moving towards the inclusion of technology in every sphere of human life. Here law and science are mediums of achieving the ends for the betterment of lives and welfare of humans. Forensic science has been emerging as a great aid in conducting the effective investigation against wildlife crimes. This article points out certain methods of forensic science in relation to the law in India, and their utility, so that the cherished right of wholesome environment can become a reality.*

**Key Words:** *Forensic Science, Wildlife, Environment, Law, Evidence, Crime*

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### **I. Introduction:**

Forensic Science is, in simple term, application of various branches of sciences in the areas of law. In *Subhash Kumar v. State of Bihar*<sup>1</sup> Supreme Court of India has recognized the Right to Wholesome Environment for everybody, and undoubtedly, wildlife has been the vital contributor in wholesome environment, without which we cannot imagine the world as good as it is today. Thus the need arise of protection and conservation of wildlife in its natural state. Today one of the single biggest global challenges is the trafficking of animals and their derivatives, the cost of which is estimated at US \$10–20 billion per year, roughly 5% of the international drug trade<sup>2</sup>. Although, India has The Wildlife (Protection) Act, 1972, yet, the crime against wild animals going on at intense rate causing the fear of extinction of the same. Problem often arise when investigation agencies failed to establish the guilt of accused persons after nabbing them or failed even at investigation stage to gather sufficient evidence against the culprits.

Now time has change and it is the need of the time to investigate the crimes against wild animals by using modern scientific technology and methods, because a vigil can be keep on the movements of animals as well as of humans in forests by using the electronic equipments like CCTV Cameras. In this endeavour, wildlife forensics can be of extreme use. Wildlife forensics is an emerging field which has been applied extensively by the Investigation Agencies because it is useful not only in monitoring the health and well-being of wild animals in the jungle, but most importantly, it is useful in getting relevant evidence against the perpetrators of crime. This effort involves a number of different players drawn from the international community, national police agencies, NGOs and forensic specialists<sup>3</sup>.

### **II. Scientific Methods of Identification:**

There are two kinds of methods of identification of animals in case if they injured or hunted and their remains later found. These two methods are (1) Morphological Methods, and (2) Chemical Methods.

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<sup>1</sup> . AIR 1991 SC 420.

<sup>2</sup> . Wison-Wilde L (2010): Wildlife Crime: A Global Problem 6 Forensic Science in Medicine and Pathology 225.

<sup>3</sup> . L.S. Bell (2011): Forensic Science in Support of Wildlife Conservation Efforts-Morphological and Chemical Approaches (Global Trends), 23 Forensic Science Review 29.

### **III. Morphological Methods:**

The morphological methods used in wildlife forensics are utilized primarily for identification and to ascertain cause and manner of death. These methods are based on anatomical identification of tissues or body elements and require a considerable understanding of comparative anatomy at the macroscopic and microscopic scale. Some of the Morphological Methods are discussed below:

#### **A. Osteology**

Gross osteology uses the unique appearance or morphology of bony elements of the skeleton to make identifications. However, animal identifications are far more difficult to make because there are so many possibilities and inter- and intra-species variants. Where whole or partial bony elements survive, the bony joints, overall size and shape, and ligamentous insertion sites provide diagnostic identifiers (characteristic traits) of species and are ranked collectively<sup>4</sup>.

It thus becomes possible to identify a single bony element depending on its diagnostic attributes. This approach is also used to estimate minimum numbers of individuals present by using a single skeletal element such as, say, right proximal femur. This is important where many body parts are collected together for shipment and an estimation of animal count is required. When dentition is present, the chance of identification vastly increases, since dentition is unique to most species<sup>5</sup>.

#### **B. Microscopy;**

Where fragmentary material is recovered, microscopic identification is possible with animal material and a sizable literature exists. A useful review by Hillier and Bell<sup>6</sup> outlines the different microscopic morphologies associated with animals, and how they differ from one another as well as from humans. One success using microscopic identification has been its application to the problem of identifying traded ivory. The principal source for ivory is the elephant, either Asian or African—or alternatively, from the extinct Pleistocene mammoth. Although trade in Asian and African elephant ivory is prohibited (with occasional internationally permitted sales contradicting this statement), trade in mammoth ivory is unrestricted, and its exploitation has existed for centuries. Most mammoth ivory originates from Siberian deposits.

#### **C. Necropsy:**

Necropsy is the animal equivalent of the human autopsy and is performed by a trained veterinarian, with a sub-speciality in pathology. It is included in the morphological methods section since it is classically anatomical in nature, and relies heavily on visual observation, radiography, and microscopy<sup>7</sup>. Other tests may be performed, such as toxicology and histopathology, but it remains very much a visual hands-on investigation. For wildlife crimes, the necropsy is important where determinations of cause and manner of death are required. In British Columbia, Canada, black bears are poached by traffickers for their gall bladders, and their carcasses or parts are subsequently illegally exported to China to supply the traditional medicine industry. Using this example, a necropsy can determine what organs have been removed and also how that animal was killed. Depending on the condition of the body a time-of-death estimate might also be made. This type of information is immensely important to police investigators and to international organizations attempting to localize traffickers and their methods. It is also important forensic evidence for the court.

### **IV. Chemical Methods:**

Some of the important Chemical Methods are discussed below:

#### **A. Toxicology:**

Forensic toxicology usually involves two separate efforts: first, to identify chemical compounds that have been synthesized from animals illegally; and second, to identify poisoning, either deliberate or accidental. Analyses usually involve thin layer chromatography (TLC) or high-performance liquid chromatography (HPLC) and are undertaken by specialist chemists. Samples are taken either during necropsy or from confiscated organs/tissues or other derivatives. One of the most well-documented wildlife crimes is the slaughter of bears for their body parts, particularly the gall bladders. The harvesting of bile from bear gall bladders is an ancient practice in China, and the bile is considered a potent healing ingredient in traditional Chinese medicine. This

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<sup>4</sup>. Lyman RL (2001) : *Vertebrate Taphonomy*; 5 Cambridge University Press: Cambridge, U.K..

<sup>5</sup>. Hillson S (2005) : *Teeth*; 154 Cambridge University Press: Cambridge, U.K..

<sup>6</sup>. Hillier ML, Bell LS (2007): *Differentiating human bone from animal bone: a review of histological methods*; 52 *Journal of Forensic Science* 249.

<sup>7</sup>. Cooper JE, Cooper ME (2008): *Forensic veterinary medicine: A rapidly evolving discipline*; 4 ; *Forensic Science in Medicine and Pathology* 75.

potency has driven a black market trade in bear gallbladders from all over the world, and the value of these organs has jumped significantly: in 1970 a kilo of gall bladder cost US \$200; today gall bladders can trade as high as US \$50,000<sup>8</sup>

### **B. Poisoning:**

Where a poisoning incident has taken place and samples are taken in a well-documented time-frame, it is often possible to identify the poisoning agent. Validation and verification are possible due to extensive chemical reference libraries. However, the physiology of different species and the degradation metabolites can make identification more difficult. Vultures are under significant threat in different parts of the world and deliberate carbofuran poisoning of vultures in Kenya was detected as toxic residues in beak, feet, muscle, and soil<sup>9</sup>. Carbofuran is known to be highly toxic to birds and is banned as an agricultural pesticide. But in Kenya it is legally used for certain agricultural practices, plus, in many countries, there is a general lack of regulation. This poison is administered by baiting/lacing a carcass to deliberately attract and kill secondary predators such as vultures. This method has been documented and can cause mass death of vultures from one carcass alone.

In Spain, a monitoring study revealed that targeted poisoning caused a large number of vulture deaths across the country, and the compounds found to be most used were aldicarb (38.6%), carbofuran (31.3%), and strychnine (16.6%)<sup>10</sup>. The main motivation for this type of wildlife crime is a desire to irradiate or reduce avian predator populations who are deemed in competition with land owners and farmers

### **C. Stable Isotopes:**

Stable light isotope tracking of human and mammal remains in geographic space which is also known as biogeolocation, biosurveillance, and isoscapes. The initial interest in this field was focused on reconstructing past climate temperatures, where fossil mammal bone and teeth were utilized as proxy indicators of climate temperature. Archaeologists adapted this temperature relationship to answer questions concerning geographical movement of past human populations<sup>11</sup>. Forensic science has a direct application for this type of work, since knowledge of where someone lived either months or years prior to death can help narrow a missing-person search. The potential to expand this kind of work into wildlife forensics is obvious<sup>12</sup> since it can address the question, "Where did this come from?" and the jurisdictional implications that go with that.

### **D. Genus-Specific Peptide Markers:**

An emergent archaeological method developed for the identification of different mammal residues in potsherds or recovered as bone fragments, could also be applied to wildlife questions concerning identity<sup>13</sup>. The results indicate that this is a viable method for separating species at the genus level, and managed to successfully separate the difficult question mentioned earlier: the differentiation of sheep and goat. The authors make the point that this method might be used as an alternative to DNA identification, where DNA might be contaminated; or, as a method to monitor food authenticity. Certainly, were these peptide markers expanded for more mammals, this method would make a valuable addition to solving problems concerning identity

## **V. Legal Aspect:**

It is submitted that protection and preservation of wildlife including all flora and fauna found in the forest is the foremost task of Environmental Laws. Obviously, any person who violates wildlife in any way deserve an adequate punishment according to the provisions of the specific given law, if any, else he must be

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<sup>8</sup> . Feng Y, Siu K, Wang N (2009): Bear bile: Dilemma Of Traditional Medicinal Use And Animal Protection; 5 Journal of Ethnobiol Ethnomed 1.

<sup>9</sup> . Otieno PO, Lalah JO, Virani M, Jondiko IO, Schramm KW (2010): Carbofuran And Its Toxic Metabolites Provide Forensic Evidence For Furadan Exposure In Vultures (*Gyps Africanus*) In Kenya; 84 Bull Environ Contam Toxicol 536.

<sup>10</sup> . Hernandez M, Margalida A (2009): Poison-Related Mortality Effects In The Endangered Egyptian Vulture (*Neophron Percnopterus*) Population In Spain; 55 European Journal of Wildlife Residence 415.

<sup>11</sup> . Bell LS, Lee-Thorp JA, Elkerton A (2010): Sailing Against The Wind: Reply To Millard And Schroeder: 'True British Sailors': A Comment On The Origin Of The Men Of The Mary Rose; 37 Journal of Archaeological Science 683.

<sup>12</sup> . Aggarwal J, Habicht-Mauche J, Juarez C (2008): Application Of Heavy Stable Isotopes In Forensic Isotope Geochemistry: A Review; 23 Application Geochemical 2658.

<sup>13</sup> . Buckley M, Collins M, Thomas-Oats J, Wilson J C (2009): Species identification by analysis of bone collagen using matrix assisted laser desorption/ionization time-of-flight mass spectrometry; 23 Rapid Communication Mass Spectrom 3843.

brought to justice under national criminal or civil law, provided that such laws covering such an act as wrongs against wildlife.

Further, as everyone knows that Law is dynamic and not static and therefore, as society evolves, law has to keep in consonance with the changing social order. Law is the instrument of societal change and the judiciary has the responsibility of interpreting the law for the greater good.<sup>14</sup> Therefore, it is clear that the judicial mind must stay in touch and keep in step with the advancement of humanity. To combat organized environmental crimes, its detection, investigation and prevention methods have to be employed synchronously<sup>15</sup> so that they all together yield effective results. If criminals are using new technology, whether scientific or not, in committing the crimes, the enforcement agencies have to be used to the new techniques, as above-mentioned, in solving such crimes. If the enforcement agencies do not use these new technologies for solving such complicated the crimes, it would be very difficult to detect the perpetrators of such crimes. Therefore, in the context of the changing organized modern criminal who are taking shelters behind and making full use of new sophisticated technologies. Krishna Iyyer J. Remarked, “the courts self-criminate themselves if they keep the gates partly open for culprit to flee the justice under the guise of interpretative enlargement of golden rule of criminal jurisprudence.”<sup>16</sup>

## **VI. Conclusion:**

At present forensic science is playing pivotal role in criminal justice system. With the help of forensic science it becomes possible to solve the crime and detect the criminal. It is really very helpful to criminal justice system. As already mentioned above, from the point of view of survival and environment, all societies are undergoing through drastic social changes all around the world, at a very rapid pace as environmental awareness evoked in them as result of intense use of social media platforms. Similarly, India has also changed from a colonial subject race to a democratic republic. Sizeable industrial complex has sprung up. The transport facilities have been revolutionized. There is a growing shift from a rural society to an urban one. All these alterations have made the old techniques of criminal investigation obsolete. In the British days the police was so much feared that once it had laid its hands upon an individual, he would be compelled to ‘confess’ to any crime, he may not have even known. The fear is vanishing now. The use of ‘third degree’ techniques used in those days does not find favor with the new generation of police officers and judges.

The field of activities of the criminal is widening day by day at a terrific rate. Formerly, the criminals were usually local, now we find that national or international criminal is a common phenomenon. Smuggling, drug trafficking, financial frauds and forgeries offer fertile and ever expanding fields. All this pose a serious challenge before the law enforcement agencies as well as before the Courts. Role of scientific experts in criminal investigations become vital now as most of the crimes in modern times need thorough and complete investigation beyond any shadow of doubt. Thus, use of modern scientific methods in investigation and collection of evidence in crimes against wildlife is a well-come step.

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<sup>14</sup>. Philosophy propounded by Jeremy Bentham and John Stuart Mills.

<sup>15</sup>. Nathuni Yadav v. State of Bihar (1998)9 SCC 238 at 242.

<sup>16</sup>. Nandini Sathpathy v. P.L. Dani &Anr. AIR 1978 SC 1025 at 1032.