классифицированы как одиночные, множественные, касательные, сквозные и слепые; находились они в области головы, шеи, грудной клетки, живота, конечностей и тазовой части туловища. Огнестрельные ранения в результате браконьерства являются одной из главных причин гибели амурских тигров.

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CHAPTER 9

Injuries in Amur tigers

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There are approximately 300 mammalian species found in Russia; of these 74 are included in the Red Data Book of the Russian Federation (Danilov-Danilyan 2001). One in five mammal species is considered rare or endangered. There are a variety of adverse factors that contribute to shortening a species' life, and use of firearms by humans has been a prominent factor for some time. The Amur tiger (*Panthera tigris altaica*) is extremely vulnerable to this threat.

The Amur tiger is an indicator of ecosystem health in the southern Russian Far East. Factors that directly or indirectly affect tiger populations can be divided into three groups: direct anthropogenic destruction, reduced prey availability, and habitat degradation, primarily in the form of timber harvest and increased disturbance (Darman et al. 2006).

Injuries are one of the most common causes of Amur tiger death. Injuries disrupt the integrity of the body's tissue as it is usually accompanied by tissue loss. Deep penetrating injuries, which affect muscle, bone or internal organs, are by definition a combination of injuries. Depending on their location, as well as their depth and breadth, tiger injuries are either mechanical or traumatic. Mechanical injuries are the result of various physical actions (such as from a gunshot, bite, etc.).

Materials & Methods

We conducted necropsies and morphological studies of Amur tigers from 2007–2011 as part of a monitoring program of infectious and non-infectious wildlife diseases in Primorskii Krai.

Pathological necropsies were conducted under natural light conditions in a dissection room of the Interdisciplinary Research Laboratory at the Primorskaya State Academy of Agriculture (PSAA). The specimens used in this study were tiger carcasses brought to PSAA's Institute of Animal Husbandry and Veterinary Medicine under the direction of the Department of the Interior, and in accordance with agreements with the federal "Inspection Tiger" task force, the Office for Conservation, Control and Wildlife Management of Primorskii Krai, and the Federal Service for Supervision of Natural Resources in Primorskii Krai. We conducted standard partial evisceration necropsies.

Results & Discussion

From 2007 to 2011, we examined 20 individual tigers, all of which were brought to our laboratory during winter and spring. We found that tiger deaths were caused by disease or the influence of anthropogenic factors, resulting directly or indirectly from contact with humans. Some tigers were killed in direct conflict situations with humans (Fig.). An analysis of causes of tiger mortalities shows that injuries are a driving factor.

Necropsies of dead tigers have revealed injuries from various causes. "Closed" wounds are injuries under the skin that affect tissue, bone, blood vessels and nerves without rupturing the skin. Examples of closed wounds found in tigers include head injuries, fractured bones from vehicle collisions, damage to joints, and soft tissue injuries caused by encounters with other animals. "Open" wounds are injuries that rupture the skin, muscle, or bones. In addition to deep and penetrating wounds, we considered superficial injuries to be open wounds as well.

Superficial wounds are scrapes that only damage the vascular epidermis. Such injuries likely occurred during the process of capturing prey, or during fights with other animals. At abrasion sites we also noted swelling caused by mechanical irritation, lack of hair, and corneal dystrophy. Penetrating wounds were characterized as those that ruptured the epidermis, dermis, subcutaneous tissue, muscle, and internal organs. Examples of these injuries found on tigers were gunshot wounds, cuts, punctures, lacerations, and bite wounds.

Complicated wounds in tigers, i.e. major traumas of soft tissues, open fractures, crushing injuries with tissue abrasion and traumas that tore tissue, were the results of violent blows by blunt objects, usually the result of vehicle collisions. Factors influencing the introduction and development of the infection included: wound

condition and degree of wound contamination, the amount of damaged tissue, disturbance of the blood supply, wound age and nature of the wound.

Poor physical condition, specific metabolic disorders, senescence, poor nutrition and other factors always negatively impact the capacity of the immune system to respond and promote conditions favorable for infection. Inflammation in deep wounds is more likely than in subcutaneous wounds, because objects penetrating the tissue (infected teeth or bullets) introduce pathogens into the tissue, where they can develop in a nutrient-rich medium. Intrusions of crushed tissue, blood clots, metal bullet components, hair, wooden or plant fragments worsen the condition within a wound. Bullet wounds, crushing injuries, avulsive wounds, and bite wounds should be treated as infections.

The tiger is a predator with instinctual and stereotypical behavior. In some cases its natural response is to attack using teeth and claws. Tigers can be aggressive in situations such as intraspecific or interspecific encounters, competition, self-defense, play, response to hunter's actions, etc. The potential for such responses makes it clear that any animal, irrespective of sex, age or size, that encounters another animal of the same or a different species, can injure and be injured during an attack. Most of the wounds made by one animal to another are bite wounds. Even bite wounds that appear to be minor and without bleeding can lead to local or general infections. A bite can be considered a combination of different impacts, and in encounters there is the possibility of multiple bites. There are large volumes of microbes in an animal's mouth and teeth and during a bite these microbes are introduced into tissue, allowing the infection process to begin. Therefore the impact of an animal bite occurs at multiple traumatic levels (mechanical, chemical, biological and stress). During a bite, laceration by the teeth disrupts tissue continuity and function, as well as the blood and lymphatic vessels and nerves. Depending on the type of injury, the anatomy of the wounded body part, and pathogens introduced into the tissue, tigers had confined (abscesses) or diffuse suppurative inflammation (phlegmon), sepsis and gangrenous emphysema. Hematomas, lymphedema, necrotic and bruised tissues and fluids associated with wounds after a bite provide an excellent medium for the development of an infection.

In one case a single bite resulted in skin punctures that were closed, resulting in ideal conditions for the development of anaerobic bacteria, especially in the hypoderm where there is a lack of vascularization or low vascularization. The process became generalized (purulent resorptive fever, sepsis) and the animal died.

The animals we investigated that died after bite wounds were mostly males, which were apparently wounded during encounters with other large males. Such encounters were probably the result of territorial conflicts.

Carcasses of tigers killed by gunshot wound were brought to our laboratory every year from 2008–2010. Most of these tigers had been poached; only two of them died in conflict situations. Bullet wounds are similar to stab wounds or bruises, and are characterized by a blunt-edged surface wound with necrosis and a burned surface

around the entry hole. Hematomas were present around the bullet wound and the wound cavity had an irregular shape. When conducting necropsies of tigers we often observed a curvilinear bullet track. Gunshot wounds usually had both entry and exit holes. Wounds were characterized by inequalities in damage to the tissue crushing in and around the wound canal. The most common gunshot wounds noted during necropsies were: fractures of ribs, leg bones and skull as well as crushing vital internal organs followed by internal and external bleeding. Gunshot wounds in tigers were classified as single, multiple, deflecting, passing through, and hidden. Wounds were present in the head, neck, chest, abdomen, legs and pelvis regions. One of the main causes of mortality in Amur tigers is gunshot wounds associated with poaching attempts.

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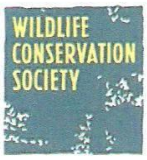

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Болезни и паразиты диких животных Сибири и Дальнего Востока России

Монография

Diseases and parasites of wildlife in Siberia and the Russian Far East

Monograph

Владивосток
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Болезни и паразиты диких животных Сибири и Дальнего Востока России: монография / под ред. И.В. Серёдкина и Д.Г. Микелла. – Владивосток: Дальнаука, 2012. – 224 с.

Diseases and parasites of wildlife in Siberia and the Russian Far East: monograph / I.V. Seryodkin and D.G. Miquelle, editors. Vladivostok: Dalnauka, 2012. 224 p.

Монография посвящена результатам исследований болезней и паразитов диких животных в разных регионах Сибири и Дальнего Востока России: от Якутии до Камчатки. Большое внимание уделяется проблемам распространения инфекционных и паразитарных заболеваний у хищных млекопитающих. Показаны потенциальное влияние болезней на популяции диких животных и роль домашних животных и человека в распространении инфекций. Обсуждается значение данной темы в вопросах сохранения популяций редких и промысловых видов животных и управления ими. Книга предназначена для широкого круга читателей: ветеринаров, биологов, врачей, охотоведов, экологов, студентов и аспирантов этих специальностей, а также специалистов природоохранных организаций и административных учреждений.

Книга подготовлена и напечатана при финансовой поддержке Общества сохранения диких животных (WCS), являющегося негосударственной природоохранной организацией, деятельность которой базируется на научных исследованиях. Задача общества – сохранение диких животных и экосистем путем разработки и применения новейших научных подходов, основанных на полевых исследованиях, для решения критических экологических проблем.

Табл. 18, ил. 21, библ. 278.

This monograph is devoted to studies focusing on wildlife diseases and parasites in Siberia and Russian Far East, from Yakutia to Kamchatka. Much attention is paid to the spread of infectious and parasitic diseases in carnivores. The potential impact of diseases on wildlife populations and the role of domestic animals and humans in the spread of such infections are discussed, as is the significance of this topic for conservation and management of populations of rare and commercially-valuable animal species. This book is intended for a wide range of readers: veterinarians, biologists, doctors, game biologists, ecologists, students and graduate students of these professions, as well as for professional environmental organizations and government agencies.

This book was prepared and published with financial support from the Wildlife Conservation Society (WCS), a non-governmental science-based conservation organization. WCS's goal is the conservation of wild places and wildlife through the development and application of new scientific approaches based on field studies that address critical environmental problems.

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