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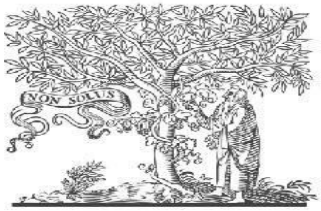

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A STUDY OF IMPORTANCE OF WILDLIFE FOR CONTROL OF INFECTIOUS DISEASES

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ABSTRACT
Parasites may also directly become prey during their free-living life cycle stages. Most parasites include free-living stages to get from one host to the next. In this free-living stage, parasites are extremely vulnerable to predation by non-host predators. Another type of direct predation on parasites involves parasites that attach themselves to the outside of their hosts (ectoparasites). Ectoparasites may also be vulnerable and can be consumed by other animals. Finally, parasites can also serve as prey or host resources for other parasites. In the following, we explain the different cases where parasites become prey and discuss the ecological effects of predation on parasites for the parasites, their hosts and the predators. Finally, when parasites act as prey they may contribute to the non-host predator does diet, in some cases constitute a significant proportion of energy intake. However, not all predators of infected organisms are suitable down-stream hosts and parasites may thus be 'accidentally' and indirectly consumed by predators and, therefore, not result in successful transmission.

KEYWORDS: Predators, Wildlife Infections, Ectoparasites, non-host predator

INTRODUCTION

A variety of biological invasions have been linked to trait-mediated interactions, including those of wild oat (Avena fatua) in California, fire ants (Solenopsis invicta) in North America, and amphipod crustaceans (Gammarus) in freshwaters of the United Kingdom. This is because parasites frequently alter the behaviour or physiology of their hosts. Mutual intraguild predation (IGP), in which prospective rivals devour one another, governs many species' native/invader relationships. A formidable intraguild predator, Gammarus pulex, may be harmed by parasite infection, which changes both attack rates and consumption rates. When Echinorhynchus truttae (Acanthocephala) infects G. pulex, peak predation rates (functional responses) are increased by 30%, whereas IGP on the native G. duebeni is almost halved (prey mortality data). Smaller G. duebeni predation is reduced by two to thrice, but their sensitivity to G. pulex predation is doubled when they are infected with Pleistophora mulleri (Microspora).

While trematode-infected shellfish show a 37.5% reduction in predation, which affects the composition of the algal community, bunchgrass-infected barley yellow dwarf

virus (Nasella pulchra) has a 50% reduction in biomass, which affects competition with invasive species in spite of low infection-induced mortality rates (Littorina littorea). To the best of our knowledge, parasite-induced trait-mediated effects and their implications for the community have not yet been conceptually investigated. Trait-mediated indirect interactions may have profound and often paradoxical effects on populations and community structure, as shown by predator–prey and host–parasite models. To add trait-mediated effects into population models, the coefficients associated with trait parameters might be modified. We utilise this technique to study how parasites affecting two predation attributes, hunger (predation rate) and susceptibility (to predation), impact population dynamics and community composition for two species engaging in IGP.

Because of the country's unique geological history, India is situated at the crossroads of three main faunal regions of the world: the Paleoarctic, the Paleotropical: Ethiopian, and the Paleotropical: Indomalayan. There is also a considerable deal of biogeographic heterogeneity inside the nation, which is caused by a wide range of terrain, soil, and bioclimate. Indian biogeography is divided into a variety of zones, biotic provinces and biomes.

This inherent biogeographic variability, along with human alterations that have taken place over millennia, has resulted in the Indian fauna's tremendous species richness and variety. Compared with other mammal faunas, India's Carnivora order is unusually diversified. India is home to 24% of the world's extant carnivore species while covering just 2.2% of its total geographical area. Large predators, such as ungulates and monkeys, are included in this group of carnivores, which includes eight distinct species. Big cats include the tiger (Panthers tigris), lion, leopard, snow leopard, cheetah (Acionvx lubatus - now extinct), canis lupus, and dhole, all of which can be found in Africa (Cuon alpinus). There are a number of unique mammalian assemblages across the nation, each with its own particular population of huge predators and their prey.

As disease ecology develops, the parasite-as-predator paradigm has yielded valuable insights. The comparison has also been used to generate theories about how parasites interact with one other inside hosts and how parasites drive species incursions into new environments. Parasites, like predators, may act as a mediator in what seems to be a competition between different hosts, leading to the elimination of one host in favour of another. In addition, parasites may operate as keystone species, increasing host species diversity by selecting targeting competitively better host species, owing to tradeoffs between competitive abilities and antiparasite defences in hosts. Antipredator behaviour concepts, such as optimal levels of defence under different levels of predation and resource abundance, tradeoffs between antipredator defence and reproduction, and gregarious social behaviour under the risk of predation, have been found to be relevant in parasite–host systems as well.

Host gregariousness may diminish the per capita assault rate of parasites hunting for hosts, and antiparasite defences are expensive to hosts and trade off with reproductive effort. In the parasite ecology literature, another predator–prey concept called intraguild predation has been incorporated: a top predator (called a "intraguild predator") eats both a prey species (called a "intraguild prey") and the resource of the intraguild prey. When one parasite (like the intraguild predator) infects hosts already infected with another (like the intraguild prey), it kills the host as well as that original parasite, and similar models have been used to explain such systems. The incorporation of parasites into food webs has been more delayed than other parts of predator–prey ecology into parasite–host ecology. Until recently, food webs were mostly formed of interactions between predators and prey, but this is no longer the case. Rather of defining parasite–host connections as trophic interactions based on whether or not a parasite eats host tissue, parasite ecologists have begun to include parasites into food webs. However, for parasites that don't feed on their hosts, it may be more acceptable to use more broad interaction web terminology. This technique has proved useful in predicting aspects of the food web, such as the efficiency of energy transmission across trophic layers.

Changes in the environment are endangering wildlife by decreasing the availability of desirable food. The majority of big mammals alter their eating habits in response to changes in their physiological and reproductive status, and as a result, animals become more vulnerable to infection when food is scarce. These animals may leave their natural habitats in quest of food and come into touch with ill domestic animals, or they may modify their eating patterns and eat whatever is available to them, which might be deadly. There are just a few reports that back up this assertion. The availability of food for wild animals has grown more difficult in the current climate. Changing environmental conditions are only one source of difficulty; others include the loss and degradation of wilderness areas, the increasing marginalisation of forest-dwelling populations who are dependent on natural resources, and the consequent contraction of individual protected area boundaries.

RELATIONSHIP BETWEEN MAN AND WILDLIFE

At the same time that the Almighty created every kind of living being on the planet, he also assigned each of those organisms a specific home in nature where they might coexist happily. Since the dawn of time, humans have been totally reliant on animals in their natural habitat. There is no doubt that animals have had a profound influence on human spirituality, culture, and society from time immemorial. Symbolic animals were utilised as god and goddess in ancient times by the Romans, Greeks, and Egyptians, as well as the Hindus in India.

The name or body of animals is now closely tied with art, culture, religion, national symbols, sports teams, and even corporate branding. Every country has its own national animal or bird or emblem that it uses to depict animals as a sign of its pride and

prestige as a nation in the national status. Animals are treated with the utmost respect in India. The Ashoka Pillar, India's national symbol, shows a variety of animals and their significance in human life and philosophy, as well as in governmental policy. Good government is symbolised by the pillar's depiction of lions, bulls, and horses. Wild animals have been regarded as 'Vahan' of God and Goddess in Indian temples from the dawn of time.

The buffalo-demon is slain by the goddess Durga, who rides a tiger, indicating that animals are essential to prosperity and triumph. The Jataka and Panchatantra include tales that explain the customary connection between people and wild animals in nature. Humans, on the other hand, are surrounded by animals. Man has lived in the forest alongside other creatures since the dawn of time. The forest was home to all living things, including humans. During that ancient period, mankind were surrounded by a plethora of beautiful creatures and vibrant aquatic life, as well as chirping birds and lush grasslands. Early humans formed civilizations and hunted animals for nourishment while causing the least amount of environmental harm possible. However, as human history reveals, scientific and technological advancement has often resulted in the devastation of natural habitats and animals. The human brain underwent a miraculous transformation throughout the course of evolution. Man's brain, according to scientists at the time, was more advanced than that of any other living creature at the time. Humans and other animals have evolved over a million years, creating the distinct differences between man and wild animals. The most notable physical shift was from the narrow crested skull of the early man to the modern day man's S-curved spine and smooth, rounded skull, which we see today. Humans have a wide range of physical characteristics that set them apart from other species.

The human race was distinct from all other species and notably mammals because of their larger brains and intellect as a result of these physical advancements. As a result, the shape of the human brain altered, and so did the way people lived their lives. Man has strived to improve himself through time, and that effort has taught him to distance himself from the forest and its inhabitants.

To gather food, our ancestors initially learned to utilise sticks and stones. Flint and animal bones were used as weapons by later Neanderthals. From animal skins they produced clothing for the Cro-Magnon people. Human civilisation grew and developed as a result of the discovery of fire. Humans began using animal meat, bones, and skins to domesticate wild animals for their own purposes. They also used natural materials such as wood, leaves, and twigs to construct their dwellings. Such a development cut humans apart from the rest of nature, separating them from the woods and other creatures.

WILD ANIMALS IN URBAN/PERI-URBAN AREAS

One of the primary factors in species extinction is urbanisation. Native species are unable to adapt to urbanization's environmental changes, resulting in a loss of species diversity in the city centre. It is

important to note, however, that urbanization's influence on biodiversity relies on the biological structure of the urban and surrounding regions. Natural ecosystems in resource-poor nations are replaced by densely populated, homogeneous towns, while suburban landscapes extend into agricultural land in industrialised ones. Adaptable wild animals may find urban and peri-urban situations enticing.

This area's biodiversity often outpaces that seen in more natural settings, because to the close proximity and variety of habitat types (e.g. gardens and forest remnants). In industrialised nations, the supply of food resources (such as food waste, pet food, and garden produce) is significantly greater in urban and periurban regions than in rural or natural settings. Adaptable species may thrive in urban and periurban regions, where they can thrive at much larger concentrations than in more natural or rural areas. Generally speaking, these animals eat a wide variety of foods. Identify the differences Synanthropic generalist species, able to tolerate a wide range of urban conditions;

- Natural resource-based urban adapters that can thrive in an urban environment while still relying on the natural world
- People who make a living by exploiting the riches of the city. It is up to urban environments to decide the range and density of urban wild animals.

There are anthropogenic disturbances of a wide variety (noise and traffic, presence of people and companion animals, etc.) that vary in severity between urban and rural areas, which select for the capacity of each species to cope with these circumstances. It has been shown that certain wild animals are not only able to handle urbanisation, but are also drawn to metropolitan areas as a result. Many of these highly adaptable species are key reservoirs for vector-borne illnesses, and so changes in the makeup of animal groups in urban and periurban settings are essential for vector-borne infections.

Vector populations will be impacted if some wild animals become scarcer. Humans and domestic animals have a greater risk of zoonotic illnesses from ticks that have recently been found in urban and peri-urban regions across the globe. A growing number of investigations are being conducted in an effort to better comprehend the intricate mechanisms at play in these new changes.

MAMMALIAN WILDLIFE OF IMPORTANCE FOR THE CONTROL OF INFECTIOUS DISEASES IN COUNTRIES SURROUNDING

Preventing and controlling the spread of infectious illnesses that infect several hosts requires an understanding of how a pathogen is maintained within an ecosystem. Humans and domestic animals may be infected by germs that originate in wildlife. True maintenance hosts (reservoirs), spill-over hosts or dead-end hosts are all examples of wildlife that may serve as hosts.

Wild animals may nevertheless serve as helpful sentinels for pathogen activity in an environment, even if the first two scenarios are less critical for disease management. Many species of mammals are found in the

Baltic Sea region, but not all are equally significant in the ecology of illnesses that affect people and domestic animals.

Because hunters constitute a high-risk population for zoonotic infections, a large amount of information is gleaned through the monitoring of hunted animals. Raccoon dogs (Nyctereutes procyonoides), red fox (Vulpes vulpes), and alveolar echinococcosis (Echinococcus multilocularis) and trichinosis all have wild canid hosts (Trichinella sp.).

The wolf, on the other hand, plays a minor part. The pathogen disease dynamics of an area may be altered by an invading species, as is the case with raccoon dog (e.g. rabies). In addition to the lynx and brown bear (Ursus arctos and Lynx lynx), other big carnivores (Lynx lynx) play an important role in Trichinella sylvatic cycles. Some infections may be transmitted by ungulates, such as the wild pig (Sus scrofa).

Some of these diseases may have a considerable impact on both domestic animal output (like African swine fever) and human health (like Trichinella) (e.g. Brucella suis). Wild boar and red deer (Cervus elaphus) are sources of bovine TB in several regions of Europe (Mycobacterium bovis).

It's important to note that small rodents and lagomorphs (e.g., hantaviruses, tularemia and European bat lyssavirus) transmit a number of serious infections that are handled elsewhere. Though several infectious illnesses have been identified in insectivors and mustelids, they are mostly the result of cross-contamination.

POTENTIAL OF VIRAL DISEASES IN THE BIRD POPULATION

Bird populations are a dynamic reservoir for a wide variety of viruses because of their great genetic diversity, intense mobility, and erratic density fluctuations. To mention just a few, a variety of factors, such as species-specific (genetic) background, individual constitution, population dynamics, geographic location, and season all play important roles in the persistence of these agents in wild birds. Habitat fragmentation, environmental degradation, and the shift to large-scale industrial chicken production are all anthropogenic influences that must be considered. Viruses of avian origin with zoonotic potential might evolve as a result of accidental spill-over infections. Some 50 years ago, the importance of aquatic wild bird populations as reservoirs of influenza A viruses (IAV) was discovered.

There are at least 16 hemagglutinin and 9 neuraminidase subtypes in the aquatic wild bird metapopulation and innumerable variations of each, including several with zoonotic potential. To bridge the gap between water wild bird habitats and chicken farms, several peri-domestic passerine species may serve as hosts The most significant APMV-1 serotype for poultry, in addition to IAV, infects aquatic wild birds. To far, 12 APMV serotypes have been identified. Whereas in wild aquatic birds there are no clinical indications, in poultry they may produce a very dangerous condition known as Newcastle disease, which can be fatal. Aquatic wild birds are also reservoirs for other viruses, including duck adenovirus-1, which causes egg drop

syndrome in layer hens, and a slew of coronaviruses.. Ornithophilic mosquitoes transmit the West Nile virus (WNV) in an avian cycle, and passerines are the major hosts of the virus.

Several European nations have recently had WNV outbreaks or viral activity. WNV may be transmitted great distances by migratory birds, and the presence of WNV antibodies in resident bird populations indicates that the virus is present in the area. The absence of WNV-reactive antibodies in resident birds and of WNV-specific RNA in all investigated bird samples was found in virological and serological surveillance in over 4,000 migratory and resident birds caught in Germany between 2007 and 2013, indicating that there is currently no evidence of WNV circulation in Germany. The Usutu virus (USUV), a close relative of WNV, has lately been responsible for a number of bird flu outbreaks in southwest Germany.

Close-meshed monitoring is the only way to keep track of the flow and dynamics of viral infections in avian populations, particularly those in the Baltic area, because of their high volatility. Any risk assessment involving the spread of illnesses at the points where wild birds, poultry, and humans interact must start with this kind of information.

EMERGING INFECTIOUS DISEASES OF WILDLIFE— THREATS TO BIODIVERSITY AND HUMAN HEALTH

Pathogenic infectious illnesses have emerged in the last two decades, such as acquired immunodeficiency syndrome, multidrug-resistant TB, and tick-borne infections, posing a significant worldwide danger to human health. There are several underlying causes for the emergence of anything new. Human-to-human transmission of zoonotic infections is one example of this continuum of host-parasite interactions between wild and domestic animals. We've compiled a list of EIDs that focus on wildlife in this study.

Wildlife EIDs are defined and categorised using the same criteria used to describe human EIDs, and they are categorised according to their unique traits that are "emerging" or new and their epizootic origins.

Early human colonisation of the world and the spread of exotic infections have many similarities with current human EIDs. Similar to the introduction of smallpox by Spanish conquistadors, the migration of livestock during colonisation brought a new set of infections to the Americas. During the late 1880s and early 1890s, the rinderpest pandemic in Africa was a model for the introduction, spread, and effect of severe foreign infections on animal populations. It was only in 1889 that this extremely contagious morbillivirus illness, which is endemic to Asia, was brought to Africa. To get from Kenya to the Cape of Good Hope, the panzootic front travelled 5000 kilometres in ten years, decimating the buffalo population by 90 percent and producing secondary impacts on predator populations and local tsetse fly extinction. In eastern Africa, the prevalence of rinderpest continues to pose a danger to bovid populations.

Influenza, cholera, and other infectious disease pandemics may have a devastating effect on human populations. A lack of knowledge and reporting, especially in the early years of European expansion, very definitely understates the real prevalence of such clear-cut panzootic outbreaks of illnesses in animals. Only when agriculture or human health were in danger were wildlife illnesses deemed relevant in the past. The hazard of wildlife illnesses is currently considered more seriously due to outbreaks of disease in endangered species, increased veterinarian participation, and breakthroughs in host-parasite population biology.

DEVELOPMENT OF STATUS OF WILDLIFE THROUGH INTERNATIONAL CONVENTIONS

Laws for conservation of animals and preservation of natural resources are the living law within the purview of environmental laws. Environmental laws are the evolution of international laws which is founded on third generation human rights or right to solidarity. Though international rules are soft laws yet it has been understood by all countries that the requirement of adoption of worldwide standards in the local statute for better future. The obligation of the state to safeguard the environment is now generally acknowledged principle in all nations. In Corfu Channel Case, the international law gave birth to the notion of "state liability" for pollution emerging inside one's own boundaries.

The same obligation of the state is also addressed in the United Nations Conference on the Human Environment, Stockholm, 1972. The statement reads "the natural resources of the world, including the air, water, land, flora and wildlife and particularly representative samples of natural ecosystems, shall be protected for the benefit of current and future generations by careful planning or management, as appropriate." This protection for future generation was very much approved by judiciary in India and incorporated in different international accords likewise.

The protection of animals received its legal standing via several international treaties, conventions, accords and protocols. International conservation law was formed via the establishment of international environmental legislation. Perhaps the first international wildlife pact was formed between France and Britain on 1867 dealing to fisheries. In 1884, the first meeting of International Ornithological Congress was conducted for conservation of birds in international level. In 1902 Convention to Protect Birds valuable for Agriculture was created for restriction on killing of birds. Such sort of worldwide and transnational conventions and accords improved the conservation consciousness as well as status of animals.

An International Committee for preservation of birds between America and European nations were created in 1922. In 1933, the 'Convention pertaining to the Preservation of Fauna and Flora in their Natural State' was held in London, laying the groundwork for current conservation efforts. According to the United Nations Organization, several international treaties on animal conservation

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and ecological development were held after World War II.

International Union for Conservation of Nature (IUCN) has set up an advisory committee on protected areas, which is responsible for designing and managing protected areas as well as promoting conservation networks in such regions. However, following the Stockholm Declaration in 1972, when people all over the globe learned about legal controls on ecological pollution and environmental deterioration, conservation laws and international environmental laws gained vitality. During the Stockholm Conference, the former secretary general of the United Nations, U.Thant said, "whether we like it or not, we are travelling together on a common planet and we have no national alternative but to work together, to make an environment in which we and our children can live a full and peaceful life."

WORLD WIDE FUND FOR NATURE (WWF)

The worldwide creation of the "World Animal Fund" in 1961 was a significant step toward wildlife conservation. World Wildlife Fund (WWF) is an international organisation dedicated to protecting the planet's natural resources. It does this by promoting environmental stewardship, including the preservation of natural areas, habitats, and species.

Sir Peter Scott, a biologist and painter from the United Kingdom, established the World Wildlife Fund in 1961 with the help of the London Zoo's giant panda Chi-Chi as its emblem. UNESCO, IUCN, UNEP and F AO supported the creation of a fund to promote conservation projects for the preservation of wildlife and environment as the world's largest volunteer organisation. This organization's name was changed to "World Wide Fund for Nature" in order to better reflect its mission. Among the primary goals of this organisation was to raise awareness of wildlife conservation and to advocate different policies and programmes related to it. Gland, Switzerland is home to the WWF-International. Conservation efforts of the Nigerian Conservation Foundation (NCF) and WWF have resulted in the protection of more than 2500 species of plants and animals, including the country's last two populations of lowland gorillas.

RELIGIOUS THOUGHTS ABOUT WILDLIFE IN INDIA

India has a long history of environmental conservation and a rich cultural past to back it up. All of India's main faiths make direct or indirect mention of protecting wildlife. The protection of animals and plants has been a religious need since the dawn of time. In ancient Indian mythology, God is said to be everywhere and in everything. Keeping a close relationship with environment and animals has always been an important part of Indian culture. In the notion of a divine world, God establishes supernatural powers to govern the cosmos. Indians should be proud of their ancient religious texts that advocate the adoration of nature for religious purposes.

The Rig-Veda is the oldest of the four Vedas and was provided by the Aryans, who were primarily nature-worshippers. There are several hymns in the Rig-Veda dedicated to the many gods that were seen as being in

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nature, including the sun, moon, sky, and wind. The pre-Aryan nations worshipped a Mother Goddess and engaged in a kind of yogic meditation known as fonn (pronounced "fon"). Worship is an admission of our utter reliance on the natural world. The environment is a major issue in almost all of India's religious traditions. In India, wild animals have a sacred place in both the country's religious and traditional traditions.

Interdependence between humans and animals is reflected in a variety of media, from art to folklore to fairy tales. All of India's main religions have a strong connection to the gods and nature. All faiths' scriptural interpretations show that nature's use and abuse should be kept under check. Throughout all faiths, it is emphasised that man and nature are intertwined and that man should avoid misusing nature. In the opinion of animal rights activist V.R. Krishna Iyer, animal care is an intrinsic element of our national identity. In every instance of animal cruelty, we are committing a kind of violence against the Buddha and Mahavira.

The legacy of the founders of Bharatiya Samskar is sullied by any animal cruelty or animal export. Buddhism was founded on Buddha's own experiences and logical reasoning. A few years ago his views on evolution were much different than they are now. Sikhism believes that life is made up of earth, air, water, fire, and sky in the modern day. "Justice to animal citizens is as fundamental to humanism as social justice is to an exploited people," he said. True Hindus, Buddhists, Jainists, Parsis, Christians and Muslims all believe in the indivisible oneness of creation and the unseen creator's power. As a result, God's vision includes a deep appreciation for animals in their broadest sense. Even whether you're agnostic or spiritual, you can't help but care about your non-human brothers. We may begin our journey toward a greater understanding of nature's balance right now. a component of our cultural legacy." It is a moral and spiritual dilemma, according to Mary Evelyn Tucker, an associate professor of religion at Bucknell University (USA). Our efforts are developing new ways of being religious in the modern world.

CONCLUSION

Specific investigations also need to be done on parasites of other carnivores. The possible positive and negative effects of parasites on carnivore population need to be an important consideration in carnivore conservation strategies. We are still far away from any active management of parasites in the wild. It is increasingly clear however, that the classical image of parasites as Vermin that need to be eradicated' is neither advocated nor possible in the wild. Parasites are indispensable and important part of the complex multispecies ecosystems with complex interactions with various components of the ecosystem. Therefore from the wild life management point of view, we should have a twofold strategy about parasites of endangered species. On the one hand the potentially dangerous parasites and pathogens should be continuously monitored, and on the other, the fundamental ecology of parasites need to

studied well to get more insights into their role in the ecology of endangered species.

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