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## REVISÃO DE LITERATURA

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### Pigeons, an urban pathogenic problem?

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**Resumo:** The pigeon is a “natural” animal inserted into the artificial environment of cities, who provides a new perspective over the dichotomy concepts of Nature and Culture, traditionally understood as mutually exclusive. Ancient Egyptians began using at least 4000 years ago. The abundance of pigeons is positively related to town's area and population, and independent of the surrounding landscape type. The high densities of this urban exploiter species, alongside people in cities provide opportunity for prolonged and frequent contact between humans and animals. This has important consequences, and the greatest number of human–pigeons conflicts arises in larger towns. People have many casual interactions with pigeons that range from feeding in public parks to handling tamed birds nesting on windowsills. They are both reservoirs and horizontal and vertical vectors of infectious diseases, as well as a source of antigens that provoke allergic diseases. Solving the problem of these diseases is a modern and important topic to debate and research. Doing so sustainably should be possible and investigations in this area are necessary for the public safety and health of all, both humans and pigeons alike. This study review some diseases and topics concerning pigeons and their zoonoses in the urban environment.

Palavras-chaves: *Ectopistes*, Health, population

### Pombos, um problema de patogenicidade urbana?

**Abstract:** O Pombo é um animal "natural" inserido no ambiente artificial das cicada's, que fornece uma nova perspectiva sobre os conceitos dicotômico da natureza e da cultura, tradicionalmente entendida como mutuamente exclusivas.. Antigos egípcios começaram a usar pelo menos 4000 anos atrás. A abundância de pombos está positivamente relacionada com a área da cidade e da população, e independente do tipo de paisagem circundante. As altas densidades desta espécie de explorador urbano, ao lado das pessoas nas cidades, proporcionam oportunidade para o contato prolongado e freqüente entre humanos e animais. Isso tem conseqüências importantes, e o maior número de conflitos entre humanos e pombos surge em cidades maiores. As pessoas têm muitas interações casuais com pombos que variam de alimentação em parques públicos para lidar com aves domesticadas aninhamento em reservatório. Ambos são reservatórios e vetores horizontais e verticais de doenças infecciosas, bem como uma fonte de antígenos que provocam doenças alérgicas. Resolver o problema dessas doenças é um tema moderno e importante para o debate e a pesquisa. Fazê-lo de forma sustentável deve ser possível e investigações nesta área são necessárias para a segurança pública e saúde de todos, tanto humanos como pombos. Este estudo revê algumas doenças e tópicos a respeito dos pombos e de suas zoonoses no ambiente urbano.

Key words: *Ectopistes*, saúde, população

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Recebido para publicação em 12/07/2018; aprovado em 23/11/2018

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## INTRODUCTION

The pigeon is a “natural” animal inserted into the artificial environment of cities, who brings to light complex and contradictory relationships between men and animals, providing a new perspective over the dichotomy concepts of Nature and Culture, traditionally understood as mutually exclusive. Representations of pigeons also show the special relationship between this animal and elderly people, children and homeless people, who share with this bird a condition of alterity in contrast to the adult, productive and supposedly rational human being, constituting the effective “landscapes of the other” (Bellenezier, 2014).

The presence of pigeons in the urban zone has become common in the last years. The main factor for this is the destruction of their natural habitats by anthropogenic action. Apart from that, it has no problem adapting to the urban environment. They find food and places which they can make their nests, many times made available by humans.

The focus of the problem is in our specie, the being who causes the instability, who also hurts with the problems caused by the superpopulation of these birds. Because they exist in high densities in urban zone, in most of the cases, they require management. This management is part of the Ecology of Populations. But in the city, this has a very important social component, because pigeons have relations with people (Ferreira, 2014).

Living in urban centers we are constantly subjected to diseases transmitted by synanthropic animals such as dogs, rats and bats. The pigeon is a species almost always present in cities, whose presence in human dwellings can cause serious misfortunes to health, but are not seen with the same seriousness as other synanthropic species. These birds, well adapted to the urban condition, proliferate easily and are housed in our buildings. Their feces, besides dirty, are a conducive medium for the development of pathogenic fungi and their ectoparasites can cause skin irritations (Beck, 2003).

There are few cities that do not hold a significant population of urban pigeons; these birds are ubiquitous in large cities around the world. It is a global and cosmopolitan animal - adjectives that are generally not used to describe animals, but are accurate to describe the urban pigeon (Bellenezier, 2014).

## DEVELOPMENT

### Importance of Pigeons Historically and Rising Prominence in the Urban Zones

Ancient Egyptians began using pigeons for ceremonial and culinary purposes at least 4000 years ago, and later as harbingers of the progress of the Nile's annual flood. Ancestors of some modern breeds such as the resplendent fantails and enormous, amusingly-named runts were probably developed at least 860 and 2000 years ago, respectively. The temporal origins of many other fancy breeds are lost to antiquity, but the ancient geographic centers of domestic pigeon diversity appear to be the Middle East and South Asia, modern India and Pakistan (Shapiro e Domyan, 2003).

While several of the approximately 300 species of pigeons and doves (family Columbidae) are kept as pets, the term domestic pigeon usually refers to breeds of *Columba livia*, the rock pigeons. Rock pigeons are native to Europe, North Africa, the Middle East, and South Asia, and they were probably domesticated at several times and places. Archeological evidence points to human use of pigeons as a food source as early as the Pleistocene (~10,000 years ago) in the Fertile Crescent, though whether this entailed domestication is not known (Shapiro e Domyan, 2003).

The current geographic range of *Columba livia* extends to all continents except Antarctica. Outside the native range — and even many places within it — rock pigeons are feral. That is, they are free-living descendants of escaped domestics, and some Old World feral populations are probably thousands of years old. Rock pigeons first became feral in North America over 400 years ago, and ongoing natural selection has resulted in their close morphological resemblance to the wild rock pigeons of the Old World (Shapiro e Domyan, 2003).

The abundance of pigeons is positively related to town's area, and independent from the surrounding landscape type. This has important practical consequences, and the greatest number of human–pigeons conflicts arises in larger towns. Simultaneously, in small towns, controlling number of pigeons seems to be much easier. In large towns, pigeons are concentrated mainly in their centers, where old, desirable buildings can be found. However, in small towns, this is not the rule. It seems that there is no general pattern in occupation of various parts of towns by pigeons (Hetmański, 2011 a).

The nesting sites is the other factor that could affect population size of the feral pigeons. However, we think that nesting sites cannot be a limiting factor for this species. The feral pigeon is a species of remarkable nest site choice plasticity. It breeds in cavities, bridges, on balconies, windowsills and many others places. Even in areas of high pigeon density, we often found many potential breeding sites for this species, but not occupied (Hetmański, 2011).

The Feral Pigeon does not deviate from the Homing Pigeon in regard to dispersion behavior, although the two live in different environments. Strong philopatry exhibited by adult pigeons of both varieties is most likely inherited from the Rock Pigeon. The element of safety in the urban environment has not, however, influenced the behaviour of the Feral Pigeon. Such a change could be more beneficial in terms of potentially increased reproductive success for many birds (Hetmański, 2007).

### **Pigeons as Repositories and Vectors**

Birds are one the most interesting and most colorful groups of animals, but they are also accounted for as one of sources of zoonotic factors dangerous to human health. They are both reservoirs and vectors for zoonoses. Zoonoses are infectious or parasitic disease transmitted from animals to humans, either directly through contact with the animal or indirectly through contact with feces or other secretions. Human health problems resulting from contact with birds are associated with bacterial, viral, fungal, and allergenic agents. (Bosert, 2013 in Kozdruń, 2015). Veterinarians, owners of poultry farms, breeders of ornamental birds, zoo personnel and poultry slaughter house workers are at the most risk of zoonoses transmitted by birds. (Kozdruń, 2015) However, these fall outside of the scope of this work, which shall focus on the urban environment.

The high densities of urban exploiter species, precisely such as pigeons, and people in cities provide opportunity for prolonged and frequent contact between humans and animals, which may exacerbate the risk of zoonotic pathogen transmission (Rothenburger et al., 2017). People have many casual interactions with pigeons that range from feeding in public parks to handling tamed birds nesting on windowsills. Feral pigeons pose then a considerable health risk to the population. They are both reservoirs and vectors of infectious diseases and a source of antigens provoking allergic diseases. Breeding sites harbor parasites that may attack humans. A single pigeon nest near human homes is enough to cause serious and long-lasting problems for the inhabitants. (Haag - Wackernagel, 2004). The apparent increased tendency

for animals carrying zoonotic pathogens to originate in residential and disadvantaged, and thus more vulnerable, urban areas is also troubling. Pigeons allergens were detected in school and hospitals, which house vulnerable and immunocompromised people. (Rothenburger et al., 2017)

Disease prevention is probably best attained by educating people to limit contact with these birds (Haag-Wackernagel, 2004), but research can help mitigate public health risks through a cultivation of a healthy urban landscape, better maintenance, planning and design. (Rothenburger et al., 2017).

### Zoonoses in pigeon and human cases

**Table1:** Zoonotic diseases transmitted by pigeons (*Columba livia*) and their effects on humans, from five different articles in five different countries of Europe.

Number of Sampled Pigeons	Study Area	Sampling Time	Zoonotic Species	Percentage of Infected Pigeons	Effects on Humans	Article
62	Madrid, Spain	November of 2006	<i>Chlamydomphila psittaci</i>	59.70%	Fever, headache, numbness, sore throat	Vázquez.B,et al(2010)
27		May of 2007		37.00%		
27		November of 2007		51.80%		
44		November of 2006	<i>Campylobacter jejuni</i>	81.80%	Dyspnea, diarrhea and fever	
22		May of 2007		86.40%		
28		November of 2007		35.70%		
44		November of 2006	<i>Campylobacter coli</i>	0%	Abdominal pain, diarrhea, vomiting and fever	
22		May of 2007		4.50%		
28		November of 2007		0%		
30	Belgium, Brussels	2016	<i>salmonella enteritidis</i>	33%	diarrhea, fever, and abdominal cramps 12 to 72 hours after infection	Haesendonck.R,et al( 2016)
182	Croatia, Zagreb	2003	<i>Chlamydomphila psittaci</i>	96%	Fever, headache, numbness, sore throat	Prukner.R.E,et al( 2005)
124	Spain, Murcia	2004	<i>Enterocytozoon bienewisi</i>	9.70%	chronic diarrhea	Haro.m,et al(2004)
124		2004	<i>E. intestinalis</i>	4%	chronic diarrhea, weight loss, nausea, vomiting, and abdominal pain	
124		2004	<i>E. hellem</i>	0.80%		
504	Italy, Naples	November 2005 to July 2006.	<i>E.coli</i>	100%	vomiting, diarrhea, dysentery and urinary tract	Santaniello.A,et al(2010)

Feral pigeons can harbor as many as 60 different human pathogenic organisms, from viruses and bacteria to fungi and arthropods.

For example, *Chlamydia psittaci* is a virus whose main cause of infections in humans are faces and respiratory secretions of pigeons. (Haag-Wackernagel, 2004) One of the most recent threats identified that concerned the interaction between pigeons and humans is the West Nile Virus, which can be carried and spread among humans by this animal. (Kozdruń. 2015).

There is also a long-recognized link between pigeons and fungal diseases in humans, and pigeons have been linked to the increased incidence of fungal infections in cities, as both human and pigeon populations dramatically increase. Unsurprisingly, almost all investigated populations of feral pigeon were positive for *Cryptococcus* spp.. Literature indicates that *Cryptococcus neoformans* and *Chlamydotheca psittaci* are the most widespread zoonotic pathogens in feral pigeons populations. (Haag-Wackernagel, 2004) Fungal pathogens are often overlooked and underreported, yet they can cause as many deaths as more infamous diseases like tuberculosis or malaria. They are a growing health concern around the globe. (Won Dong Lee, 2017; Brown et al., 2012)

In addition to the afore-mentioned pathogens, we must not omit the importance of the varied parasites hosted by pigeons. They can jump to humans causing distress and potentially transmitting infectious diseases. Arthropods are not to be underestimated, as flea infestations plague poor and rich alike, and more seriously, can also occur in hospitals. (Haag-Wackernagel, 2004) The pigeon tick (*Argas reflexus*) is found in Europe, North America, Africa, and Asia Minor, in places where there are flocks of wild doves and pigeon, nests and breeding sites. These ticks are particularly dangerous for people after the removal of birds from buildings, at which time they search for a new host, and often afflict humans. (Kozdrun 2015).

There is even a condition named after the pigeon, the “pigeon breeder’s lung. Allergic alveolitis (syn. hypersensitivity pneumonitis) is found in 1 to 10% of pigeon breeders, caused by antigens from pigeon feathers and droppings. These allergens are also found among the general urban population, but there is no data on the prevalence of allergic alveolitis in the general population. (Haag-Wackernagel, 2004)

## **CONSIDERATIONS**

According to the information analyzed, the pigeons lives among and has historically been of great use to human being. They were used as food, to transport messages, and also like a domestic animal. But nowadays, the pigeons doesn’t have any overt or specialized use for humans, but nevertheless, this is the main cause that so many pigeons are seem in urban areas.

Notwithstanding that, they are vectors of many pathogens that cause health problems in the human, and this situation can’t be solved in a short time. Some of these diseases are terribly harmful for humans and pigeons alike and some of them are only harmful to humans,

as pigeons carry them asymptotically. To solve the problem of these diseases it is necessary to control the populations of pigeons in urban centers using sustainable actions. Like forbidding the feeding of these animals, and limit other resources used by them and the contact with human beings. There is also the use of environmental education concepts to educate people about these situations.

However, more studies related to the diseases caused by pigeons in human beings are necessary to a better understanding of these impacts, how they come to be, how they can be predicted and which would be the best mitigating measures.

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