

CESTODE PREVALENCE IN COLUMBIDS (AVES, COLUMBIDAE) IN THE MITIDJA PLAIN OF NORTHERN ALGERIA

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Abstract. This study was carried out in four stations of the Mitidja plain (North of Algeria), specifically Blida, Algiers centre, El-Harrach and Boufarik during the year 2021 and consisted of the search for cestodes in columbids. Using the drop-box trapping method, six species of columbids were captured; the Wood Pigeon *Columba palumbus*, the Collared Dove *Streptopelia decaocto*, the Feral Pigeon *Columba livia domestica*, the Turtle Dove *Streptopelia turtur*, the Palm Dove *Spilopelia senegalensis* and the Barbary Dove *Streptopelia risoria*. After isolating the cestodes from the digestive tract of these birds, we stained them with borax carmine. Of the 36 individuals columbids examined, 13 were infected with cestodes (P= 36.11%). We recorded the presence of four species of the genus *Raillietina* (P = 80%) with *R. tetragona*, *R. cesticillus*, *R. echinobothrida*, *Raillietina* sp. and a single species of the genus *Coutugnia* (P = 14%) with *C. digonopora* and finally the genus *Passerilepis* (P = 5.83%) with *P. zimbebel*.

Keywords: Mitidja, Columbidae, trapping, prevalence, cestodes.

Rezumat. Prevalența cestodelor la Columbide (Aves, Columbidae) în Câmpia Mitidja din nordul Algeriei. Acest studiu a fost realizat în patru stații din câmpia Mitidja (nordul Algeriei), mai exact, Blida, centrul Algerului, El-Harrach și Boufarik în anul 2021, care a constatat în căutarea de cestode la columbide. Folosind metoda de capturare cu ajutorul capcanelor cu cutie de picături, au fost capturate șase specii de columbide: porumbelul de pădure *Columba palumbus*, porumbelul cu guler *Streptopelia decaocto*, porumbelul sălbatic *Columba livia domestica*, porumbelul turturel *Streptopelia turtur*, porumbelul palmier *Spilopelia senegalensis* și porumbelul de Barbaria *Streptopelia risoria*. După ce am izolat cestodele din tractul digestiv al acestor păsări, le-am colorat cu borax-carmin. Dintre cei 36 de indivizi de columbide examinați, 13 au fost infectați cu cestode (P= 36,11%). Am înregistrat prezența a patru specii din genul *Raillietina* (P = 80%) cu *R. tetragona*, *R. cesticillus*, *R. echinobothrida*, *Raillietina* sp. și o singură specie din genul *Coutugnia* (P = 14%) cu *C. digonopora* și în final genul *Passerilepis* (P = 5,83%) cu *P. zimbebel*.

Cuvinte cheie: Mitidja, Columbidae, capcană, prevalență, cestode.

INTRODUCTION

Pigeons and turtle doves belong to the order Columbiformes of the family Columbidae which includes 310 species and subspecies with 40 genera (ROUXEL & CZAJKOWSKI, 2004). There are many articles on bird-parasite interactions around the world (FUSKATSU et al., 2007; SYCHRA et al., 2008 et BOGACH et al., 2021). However, in Algeria, little work has been done on pigeon parasites, which includes those of BACIR & BOUSICIMO, 2006; BAZIZ-NEFFAH, 2015 ; BENDJOURI et al., 2018. Indeed, pigeons can suffer from various health problems, but parasitic diseases are particularly common as they harbour a variety of ectoparasites and endoparasites, including nematodes, cestodes and single-celled protozoa (EL-DAKHLI et al., 2019). Among the cestodes that host the columbidae, the genera *Raillietina*, *choanotaenia*, *Passerilepis* and *Davainea* are the most common with over 200 species, of which the genus *Raillietina* is the most common (JADHAV & GORE, 2004).

Columbids can act as a reservoir for several pathogens that can be transmitted to domestic animals, to wildlife and humans via their excrement, their secretions or feather dust. Some pathogens can also be transmitted by eating infected pigeons. In addition, they are sources of antigens that cause allergic diseases (HAAG-WACKERNAGEL et al., 2010). In Algeria, little information is available on the parasitic fauna of columbids. On the other hand, data on parasitic cestodes is practically rare or absent. It is for this reason that we would like to discuss here, by trying to determine some genera of cestode parasites of columbids and their prevalence in the Algerian sahel and the Mitidja. The concerned species are the Wood Pigeon *Columba palumbus* (Linnaeus, 1758), the Collared Dove *Streptopelia decaocto* (Frisvaldszky, 1838), the Feral Pigeon *Columba livia domestica* (Bonnaterre, 1790), the Turtle Dove *Streptopelia turtur* (Linnaeus, 1758), the Palm dove *Spilopelia senegalensis* (Linnaeus, 1766) and the Barbary dove *Streptopelia risoria* (Linnaeus, 1758).

MATERIALS AND METHODS

1. Columbidae catch area

The present study was conducted in the Mitidja plain (36,4° 36,9° N., 1,7° 4,1° E) (Fig. 1). It is the largest sublitoral plain in Algeria (140 000 ha) (IMACHE, 2011). This plain is divided between four wilayas, namely Blida, Tipaza, Algiers and Boumerdès (NACER et al., 2014). The study was carried out on 6 columbidae species: Feral Pigeon, Wood Pigeon, Collared Dove, Turtle Dove, Barbary dove and Palm dove, captured in 4 sites, Blida (36° 30' N., 2° 52' E), Central Algiers (36°45', 3°02' E), El-Harrach (36° 44' N., 3° 07' E) and Boufarik (36°34' N., 2°54' E). These birds are captured between December 2020 and January 2022, by the falling or moulting box trapping method (CHRISTOPHE, 2003) with food bait. In these stations, the columbids have adapted to living in close proximity to humans, around houses, in search of food and nesting materials. The collected pigeons were immediately transported in cages to the laboratory at the National Veterinary School in El Alia for examination.

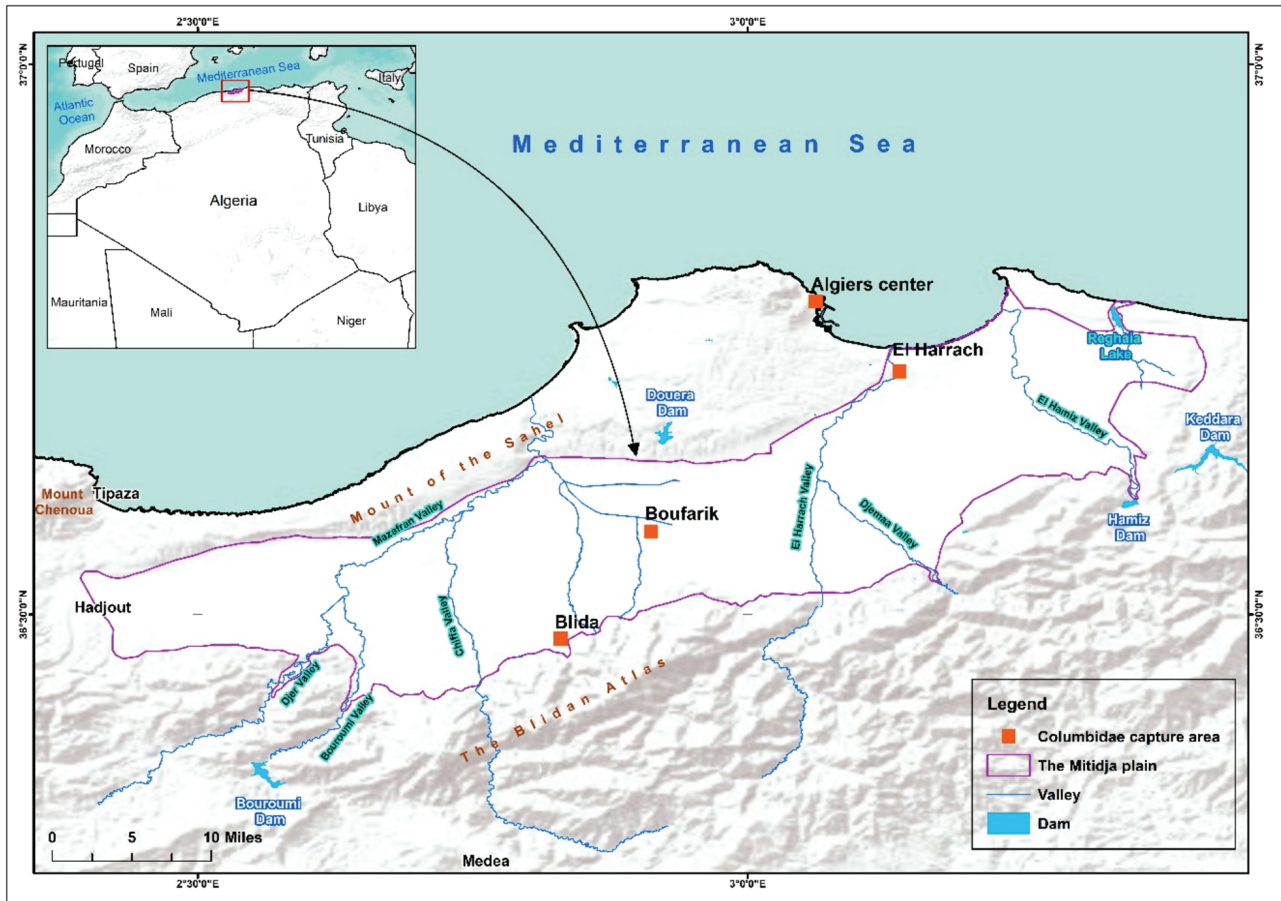


Figure 1. Geographical location of the study site (original, 2022).

2. Parasitology examination

In the laboratory, pigeons and turtle doves were immediately dissected after recovery of the cestodes in their intestines with a fine brush in tap water until they did not move anymore (Fig.2). These were counted and stored in pillboxes containing 10% formalin for at least 24 hours.

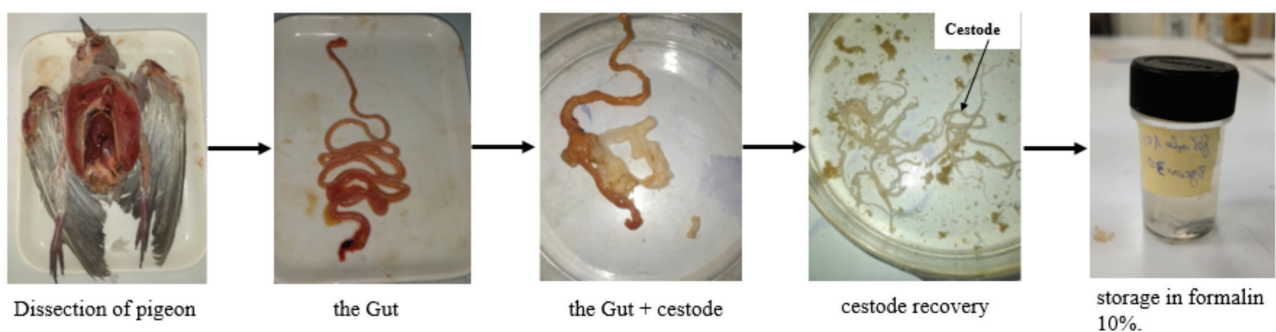


Figure 2. Recovery stages of cestodes in columbids (original, 2022).

3. Cestode assembly

24 hours after setting the pillboxes in 10% formalin, the cestodes are immersed in a distilled water bath with acetic acid added as a fixing solution. After rinsing with tap water, the cestodes are stained with Borax carmine and differentiated in 80% acidified ethanol. These worms were then put into ascending series of ethanol for 10 minutes (70%, 96%, 100%) to dehydrate them and then cleaned with toluene. Finally, they were immersed in Canada balsam on slides that were kept for few days in the oven at 60° (Fig. 3). In addition, the mucosa was scraped to collect the worms 93mbedded in the mucous layer on glass slides for microscopic examination at magnifications (X10, X40) (AUGOT, 2004). The cestodes were identified using keys and descriptions available in the literature, such as DIAKOU et al. (2013), IBRAHIM et al. (2018), SAFI-ELDIN et al. (2019), AL QURASHY et al. (2019) under the assistance of Professor MARNICHE Faiza.

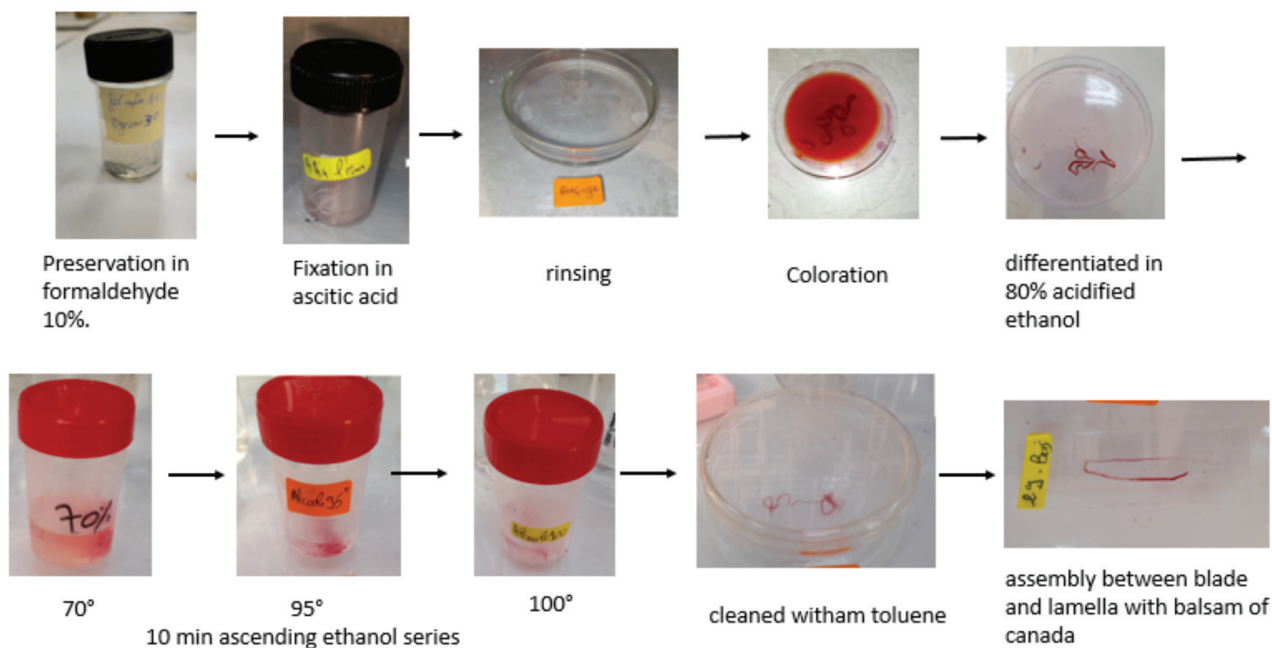


Figure 3. Staging of cestodes (original, 2022).

RESULTS

The results revealed that of the 36 individuals of columbina that were examined, 13 were infected with cestode parasites, resulting in a prevalence of **36.11%** (Tab. 1), in the posterior sections of the small intestine, which was thickened due to high numbers of cestodes and mucus exudate. The infection rates of the male pigeons were higher than for females. Wood Pigeon, Barbary dove and Palm dove specimens are not infected at the four stations. On the other hand, the feral rock pigeon, the Turtle Dove and the collared dove were infected by three genera of cestodes, *Raillietina*, *Cotugnia*, *Passerilepis* (Fig. 4) more precisely, *Raillietina tetragona* (Molin, 1858), *R. cesticillus* (Molin, 1858), *R. echinobothrida* (Méglin, 1880), *Raillietina* sp. *Cotugnia digonopora* (Pasquale, 1890) and *Passerilepis zimbebel* (Dimitrova Georgiev Mariaux & Vasileva 2019) (Fig. 5). The number of cestodes found in feral pigeons in the El-Harrach station was 13 cestodes (100%), in Boufarik 47 cestodes (94%) in feral rock pigeons and 2 cestodes (4%) were recovered from collared doves, in the Algiers station, 13 cestodes (33.33%) and 26 (66.6%) were recovered from feral rock pigeons and no positive case in the Blida region (Fig. 6).

Table 1. Number and species of columbids.

Common name of columbid species	Scientific name	Nu. of Male	Nu. of Female	Total
Feral Pigeon	<i>Columba livia</i>	11	7	18
Wood pigeon	<i>Columba palumbus</i>	1	1	2
Collared Dove	<i>Streptopelia decaocto</i>	2	2	4
Turtle Dove	<i>Streptopelia turtur</i>	6	3	9
Barbary dove	<i>Streptopelia risoria</i>	2	0	2
Palm dove	<i>Spilopelia senegalensis</i>	0	1	1

Nu : number

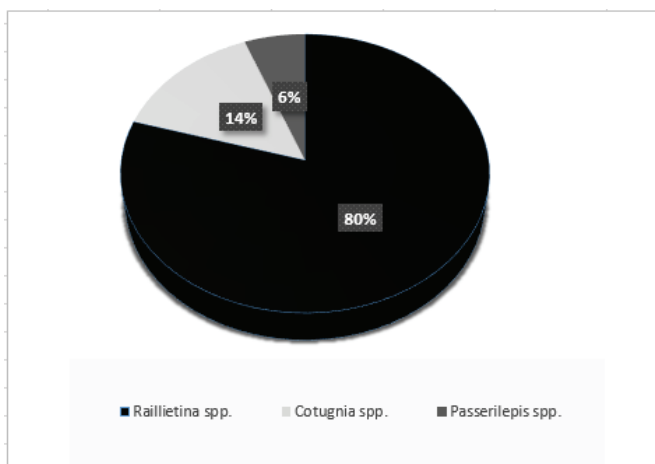


Figure 4. Percentage of cestode genera in columbids.

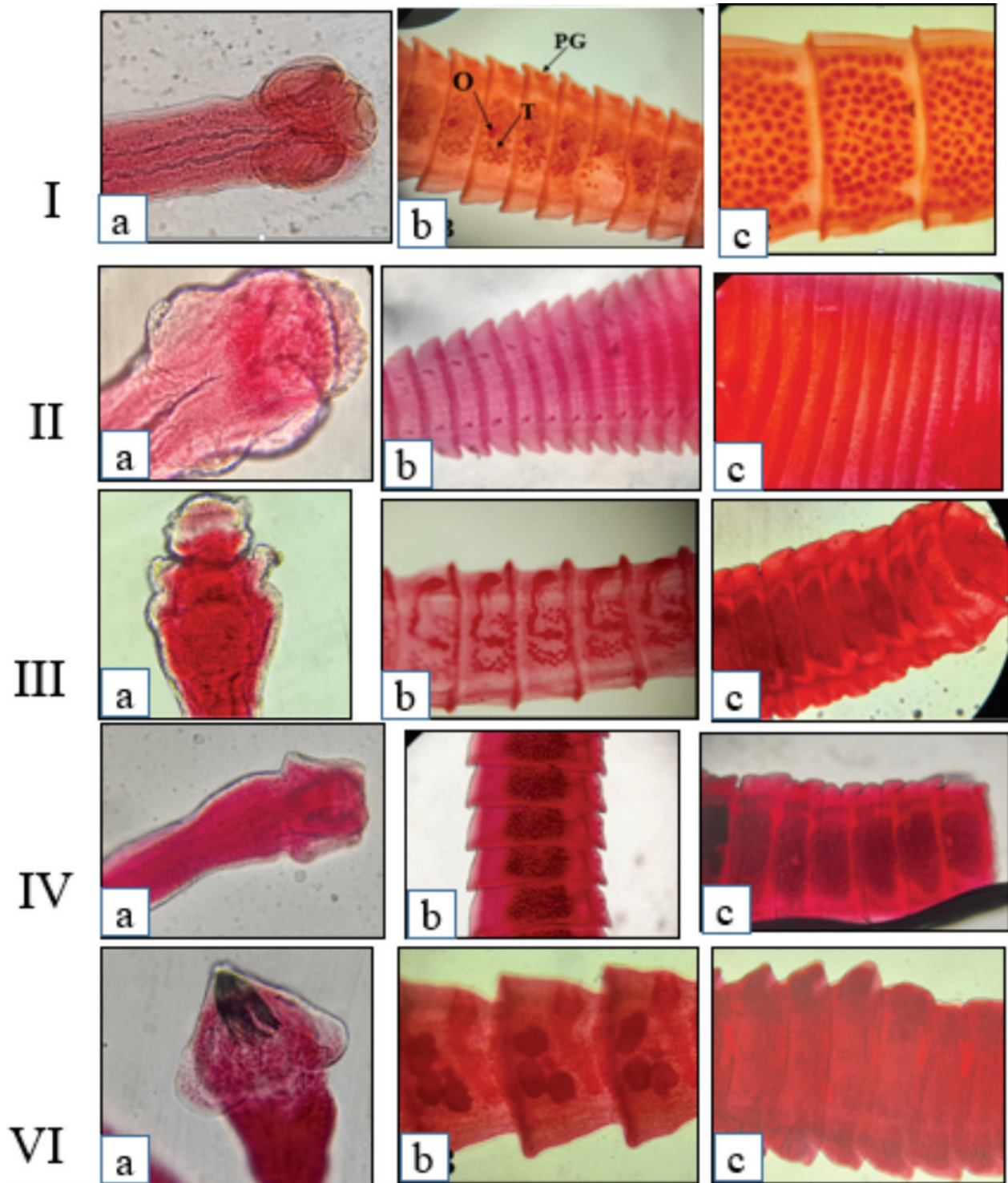


Figure 5. a-Scolex with higher magnification (Gx40). b- Mature proglottids (GP : genital pore, O : ovary, T : testes). c - Pregnant proglottids (original, 2022).

I. *Raillietina tetragona* recovered from *Columba livia*; II. *Raillietina cesticillus* recovered from *Streptopelia turtur*; III. *Raillietina echinobthrida* recovered from *Streptopelia turtur*; IV. *Raillietina* sp. recovered from *Columba livia*; VI. *Hymenolepis* recovered from *Streptopelia turtur*

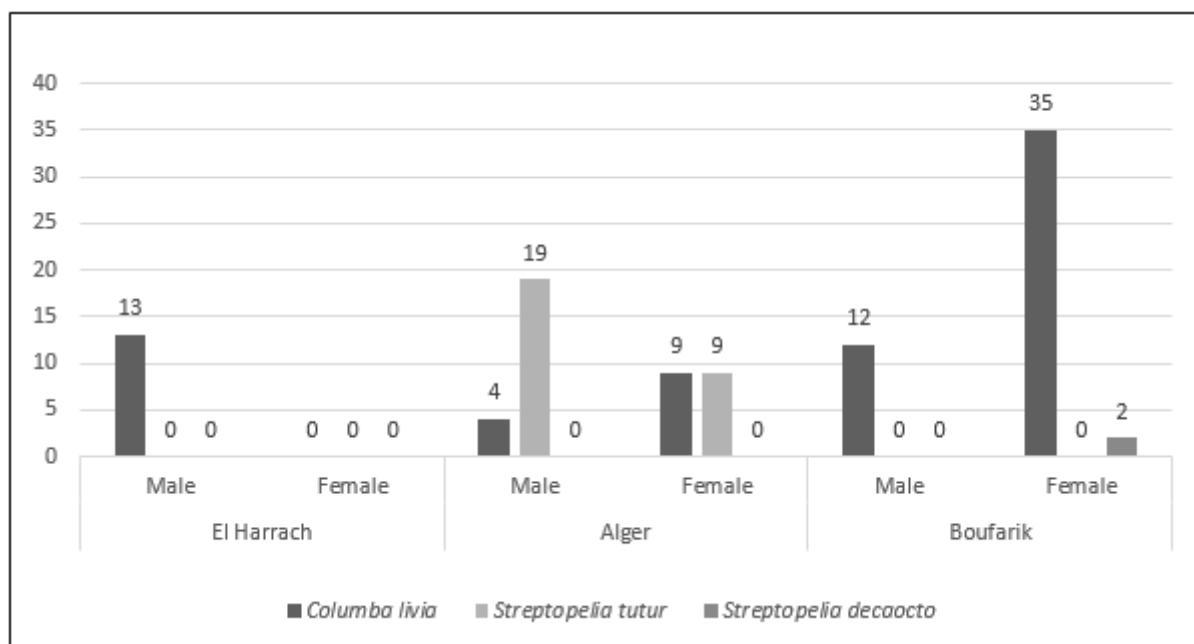


Figure 6. Number of Cestodes found in the intestines of Columbids at different stations.

DISCUSSIONS

Numerous studies have been conducted on the prevalence of cestodes in columbids around the world, including those by DIAKOU et al. (2013), de MEHMOOD et al. (2019) et de GULALIA et al., (2021), and in Africa notably NGHONJUYI et al. (2014), EL-DAKHLY et al. (2016) et MOHAMMED et al. (2019). But it is the first time that such a study has been done in Algeria. Out of 36 captured doves, 13 individuals were infected with multiple cestode species, giving a prevalence of 36.11%. However, the prevalence of rock pigeons (55.6%) was higher than that of all other species, including collared doves (25%) and turtle doves (22.22%). The high prevalence of rock pigeons could be related to the fact that all the birds studied were free-living and had access to suitable intermediate hosts (snails, beetles, bugs, ants and earthworms) for the growth of cestodes. DEMIS et al (2015) noted that pigeons can be infected by consuming intermediate hosts. The prevalence detected in rock pigeons (P = 55.6%) in the present work, corroborates with that obtained by CHAECHI-NOSRATI et al. (2018) in the area of Lahijan, Guilan, Iran (54.5%). Authors from different countries have also worked on the prevalence of cestodes in pigeons and have recorded a prevalence rate lower or close to that reported in the present study. PARSANI et al (2014) who reported 31% in Gujrat, India, EL-DAKHLY et al (2016), who reported the lowest prevalence rate of 7.29% of cestodes in the Ben-Saif province in Egypt, UMARU et al. (2017) in Taraba State, Nigeria found a prevalence of 35%, SADEGHI-DEHKORDI et al. (2019) in Hamedan, Iran recorded a prevalence of 20%, ALKHARIGY et al. (2018) in Tripoli, Libya recorded a prevalence of 35%. Our figures are significantly higher than those recorded by MOHAMMED et al (2019) in Kano State, Nigeria which reported an infestation rate of 48%, and EL-DAKHLY et al (2019) in Aswan, Egypt, a prevalence of 43.33%. Our prevalence is significantly lower than that found in Thessaloniki; Northern Greece by DIAKOU et al. (2013). These authors reported an infestation rate of 70.58%. While KHAN et al (2018) also studied parasitic infestations in pigeons. They recorded an overall prevalence of 66.6% in Malakand, Khyber Pakhtunkhwa, Pakistan. In contrast, AL QURAI SHY et al (2019) in Saudi Arabia noted a higher prevalence of 77.78%.

Overall, all the cestodes collected (101 individuals) from the columbids in the present study, 80 (79.21%) belonged to the *Raillietina* genera, including four species, *R. cesticillus*, *R. echinobothrida* and *R. tetragona* as well as *Raillietina* sp. *Hymenolepis* sp. and *Cotugnia* spp. This goes in line with MOHAMMED et al (2019), GULALAI et al (2021) who recorded that *Raillietina* spp. Is the predominant cestodes in doves. For collared doves (25%), our figures are significantly lower than those recorded by SUHD Y. JASSIM (2016), which reported an infestation rate of 50%.

CONCLUSION

Despite the small number of columbids that were examined, the obtained results indicate that additional studies about cestodes in columbids and other bird species seem to be necessary in different regions of Algeria at different bioclimatic stages. The latter live side by side with humans and can harbour certain pathogens that are far too dangerous to human health, particularly cestodes. *Raillietina* spp. seems to be the most common cestode in columbids in El-Harrach, Boufarik, and Algiers. On the other hand, the specimens brought back from the Blida station are not infected. We have also identified for the first time in Algeria the presence of the *Passerilepis zimbebel* species.

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