



UNIVERSITI PUTRA MALAYSIA

***PREVALENCE RATE OF ECTO AND ENDOPARASITES INFESTATION
IN JAVAN MYNAS***

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FACULTY OF VETERINARY MEDICINE

UNIVERSITI PUTRA MALAYSIA

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2015

**PREVALENCE RATE OF ECTO AND ENDOPARASITES INFESTATION
IN JAVAN MYNAS**

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**A project paper submitted to the
Faculty of Veterinary Medicine, Universiti Putra Malaysia
in partial fulfillment of the requirement for the
DEGREE OF DOCTOR OF VETERINARY MEDICINE**

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It is hereby certified that we have read this project paper entitled Prevalence Rate of Ecto and Endoparasites Infestation in Javan Mynas by Nik Nur Siti Syafura Bt Mohd Roslam and my opinion is that it is satisfactory in terms of scope, quality and presentation of partial fulfillment of the requirement of the course VPD 4999.

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This project is dedicated to my beloved parents;

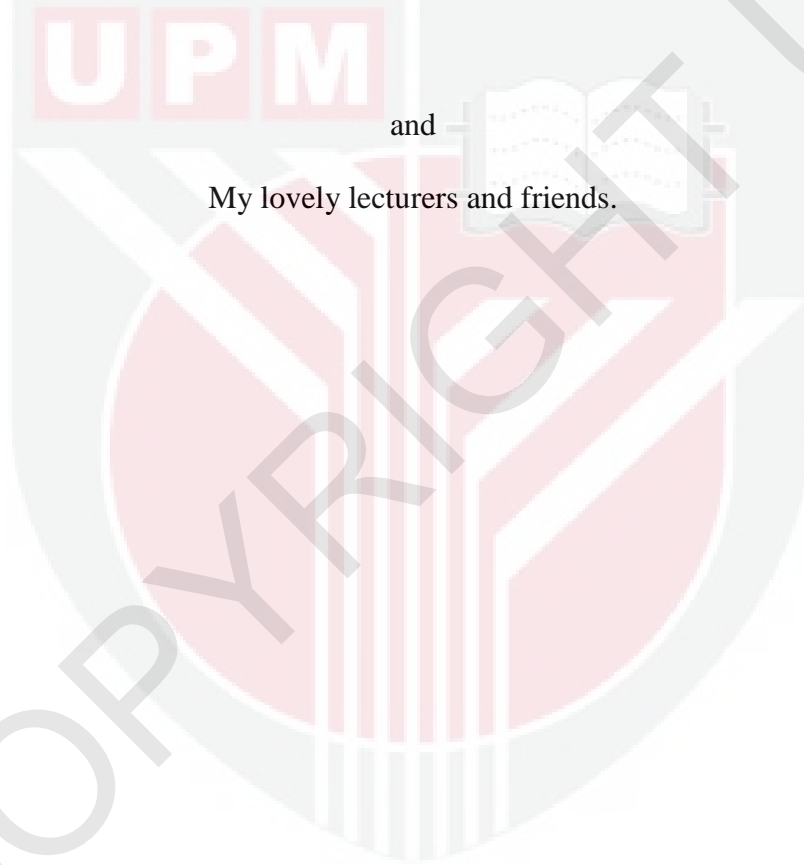
Mohd Roslam bin Musa and Nik Kamariah bt Nik Yaakob,

My super hero siblings:

Nik Ahmad Izanie, Nik Ahmad Zamran, and Nik Ahmad Syahruden

and

My lovely lecturers and friends.



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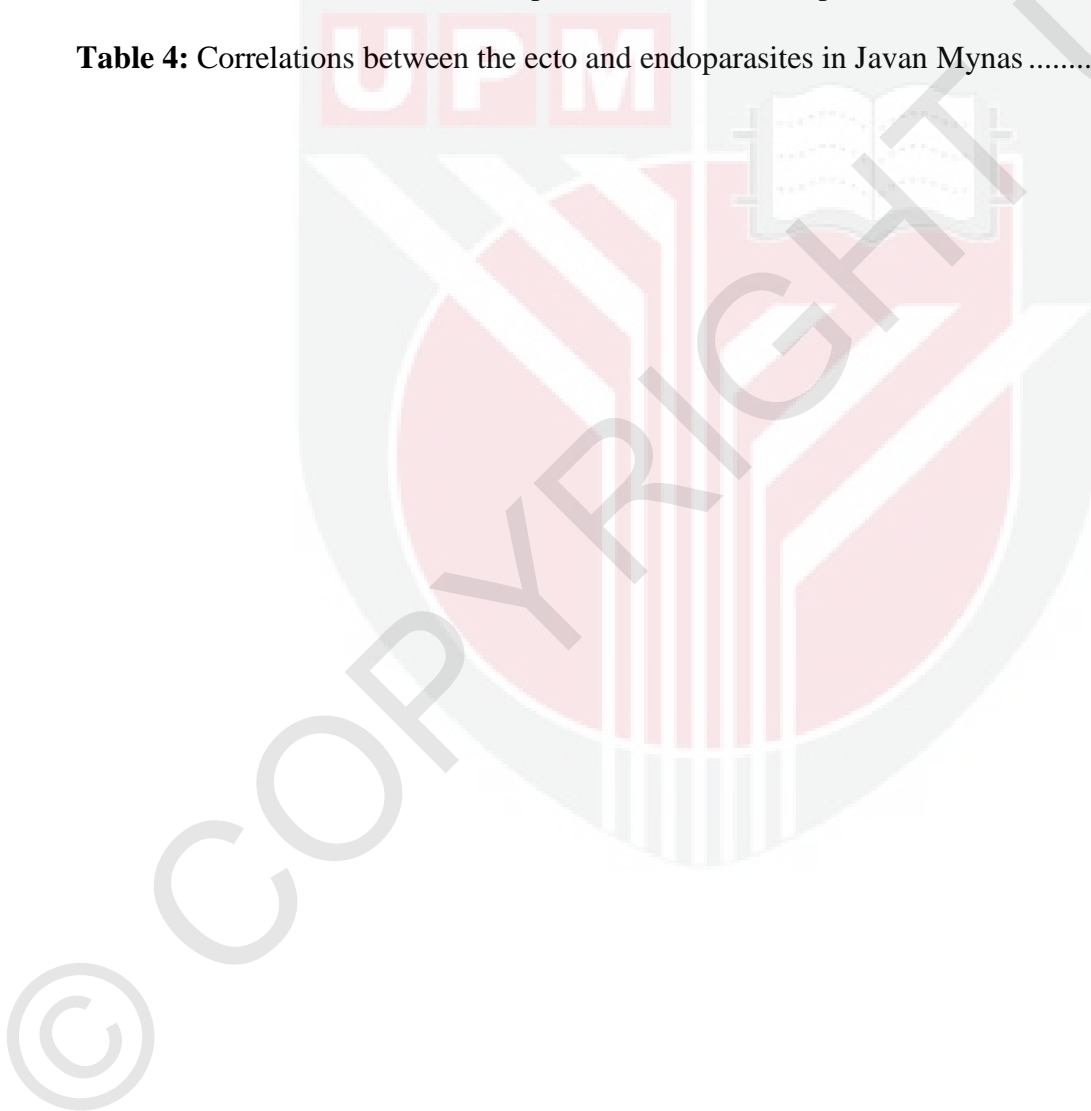
Last but not least, I am truly blessed and thank to Allah for granting me a pair of lovely parents Mohd Roslam bin Musa and Nik Kamariah bt Nik Yaakob and my siblings Nik Ahmad Izanie, Nik Ahmad Zamran, Nik Ahmad Syahruden who are my biggest supporters. A special thanks to Mohd Naim bin Md Sahat for giving advice, encouragement and inexhaustible help.

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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999-Projek

**KADAR PREVALENS EKTOPARASIT DAN ENDOPARASIT PADA BURUNG TIONG
JAWA**

Oleh

Nik Nur Siti Syafura Roslam

2015

Penyelia: Professor Dr Mohamed Ariff Omar

Burung Tiung telah diakui di seluruh negara sebagai perosak yang diperkenalkan dan mempunyai potensi kemudaratan kepada kesihatan manusia, kerosakan tanaman dan persaingan dengan hidupan liar. Kajian ini dijalankan untuk menilai kadar prevalens ektoparasit dan endoparasit pada Burung Tiung Jawa. Sebanyak 19 ekor Burung Tiung Jawa ditangkap daripada satu kawasan liar di Banting, Selangor menggunakan jaring. Pengukuran Burung Tiung Jawa yang diambil ialah berat badan, saiz paruh, kepala, badan, sayap, kaki (tarsus) dan ekor. Kadar jangkitan daripada tiga spesies ektoparasit

ialah kutu *Felicola* sp 21%, *Myrsidea* 79%, dan sengkengit *Falculifer rostratus* 79%. Dua spesies endoparasit telah didapati daripada prosedur bedah siasat, yang merupakan kumpulan nematod *Diplotriana* sp 53% dan *Pelecitus* sp 21%. Nilai korelasi menunjukkan bahwa tidak ada kolerasi yang signifikan antara jumlah ektoparasit dan endoparasit dalam Burung Tiong Jawa. Ini menunjukkan bahawa jika kiraan ektoparasit tinggi, tidak semestinya kiraan endoparasit juga tinggi. Burung Tiong Jawa di Malaysia telah terbukti sebagai pembawa pelbagai spesies ektoparasit dan endoparasit.

Kata kunci: Burung Tiong Jawa, ektoparasit, endoparasit, kadar prevalens

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of course VPD 4999-Project

PREVALENCE RATE OF ECTO AND ENDOPARASITE INFESTATION IN JAVAN MYNAS

By

Nik Nur Siti Syafura Roslam

2015

Supervisor: Professor Dr Mohamed Ariff Omar

Myna spp are well recognized in the country as introduced pests having potential harm to human health, crop damage and competing with native wildlife. This study was undertaken to evaluate the prevalence rate of ectoparasites and endoparasites in Javan Mynas. A total 19 birds of Javan Mynas were captured from the wild in Banting, Selangor using a mist net. The measurements taken were body weight, size of bill, head, body, wing, tarsus, and tail. The infestation rate of three species of ectoparasites were lice *Felicola* sp 21%, *Myrsidea* 79%, and mite *Falculifer*

rostratus 79%. Two species of endoparasites were found from the post mortem procedure, nematode *Diplotrriaena* sp 53% and *Pelecitus* sp 21%. There was no significant correlation between numbers of ectoparasites and endoparasites counted in Javan Mynas. This shows that if there was a higher infestation of ectoparasites, it does not necessarily result in a higher infestation of endoparasites. Javan Mynas in Malaysia are proven to be carriers of many species of ectoparasites and endoparasites.

Keywords: Javan Mynas, ectoparasites, endoparasites, prevalence rate

1.0 Introduction

According to website of www.mygardenbirdwatch.com the Common Myna and Javan Myna are reported to be among the top 10 most commonly sighted birds in Peninsular Malaysia, Sabah and Sarawak in June 2014. It can be concluded that the Myna species is relatively high in number found close to human population. Mynas are communal and commensal and highly vocal throughout the year, making them a public nuisance.

Their dropping is a nuisance to humans (Yap *et al.*, 2002; Brook and Soh, 2003) and is of public health concern. Common mynas pose a human health risk as they carry bird mites such as *Ornithonyssus bursa* and *Dermanyssus gallinae* that may infect humans causing dermatitis, asthma, severe irritation and rashes (Stoner, 1923). The Javan Mynas (*Acridotheres tristis javanicus*) also known as the white vented mynas, are predominantly black in colour, and have white wing patches and are mostly found perching on top of the water buffaloes in paddy fields. The Javan Myna is considered as a pest, especially in urban areas which they prefer to inhabit. Thus the objectives of this study were:

1. To evaluate the prevalence rate of ecto and endoparasites infestation in Javan Mynas.
2. To evaluate the morphological characteristics of Javan Mynas.

2.0 Literature review

2.1 The biology and morphology characteristics of Javan Mynas

The word myna is a local name for starlings from India and surrounding rural areas. In the wild there are thirty species of mynas, some of the species are good vocal mimics. Mynas are classified in Order of Passeriformes and Family Sturnidae. Javan Mynas (Cabanis, 1850) the common name of *Acridotheres javanicus* belong to the Order of Passeriformes comprising of 29 families and belong to the family of Sturnidae (Symthies, 1999). The Javan Myna is a native of Java and Bali but has been introduced to southern Peninsular Malaysia and Singapore, where it is very common (Lim *et al.*, 2003; Wells, 2009).

Morphologically, this family of Sturnidae is categorized by having unique characteristics such as hard and sharp bill, long legs, and short tail which allow them to populate a wide range of habitations (King *et al.*, 1975). These birds also are terrestrial and associated with feeding on the ground. The *Acridotheres* diet includes much higher proportion of insects and other animal matter (Feare and Craig, 1999).

According to Dunchin *et al.*, (2008), *A. javanicus* are believed to show some kinds of behavior while searching for food and these involve walking, jumping, hopping, gleaning, running, and many more. Javan Mynas are social throughout the year and frequently observed in pairs, which are in turn nested within larger groups, especially when food is available in large amount (Wells, 2009). The Javan Mynas breeding cycle can be divided into three stages which are courtship and pair bonding, nesting and incubation, and post-fledging care phases (Kang, 1989).

2.2 Parasites infestation in wildbirds

Avian parasites commonly involve protozoa, helminths and arthropods which include insects and mites. Ectoparasites are organisms which populate the skin or outgrowths of the skin of another organism (the host) for certain periods, and may be disadvantageous to the later. Many ectoparasites are known to be vectors of pathogens, which the parasites typically transmit to hosts while feeding or (occasionally) defaecating (Hopla *et al.*, 1994). The effects differ from benign to acute death occurring in companion and aviary bird species.

Mullen *et al.* (2002) stated in the book entitled *Medical and Veterinary Entomology*, the most species of lice are ectoparasites of wildbirds or mammals distributed into two major groups which are Anoplura (sucking lice) and Mallophaga (chewing or biting lice). The avian Mallophaga (chewing lice) are divided into the suborders Ischnocera and Amblycera (Clayton *et al.*, 1992).

According to Ash (1958), most of the sub-order Ischnocera are feather feeders and Amblycera commonly feed on the blood. The lice can give negative effects on wild birds under certain conditions (Samuel *et al.*, 1982; Cohen *et al.*, 1991; Atkinson *et al.*, 2008). The chewing lice transmitted vertically for example from adults to young, commonly active during nesting period, because of that, chewing lice prevalence usually decreases on adults and on the other hand increases on young birds during this period (Price *et al.*, 2003; Sychra *et al.*, 2008). Several mites are extremely small, especially those belonging to the Acariformes (Hopla *et al.*, 1994).

In recent times, there have been studies that reviewed the role that mites play in the lives of birds of which mites of the birds are detrimental parasites. Among them, some astigmatid mites (suborder Astigmata, order Acariformes) extremely weaken their hosts by feeding on feather pith, tunnelling outwards through the feather, burrowing into the skin and other parts of feather follicles, and invading the lungs, tracheae and air sacs (Proctor and Owens, 2000). Feather mites are obligatory permanent ectoparasites living exclusively on birds (Dabert and Mironov, 1998). The starling (Sturnidae) family bird are infested with many ectoparasites including lice, mites, fleas, flies, and ticks (Boyd, 1951; Clayton *et al.*, 2010; Wolfs *et al.*, 2012; Hornsby *et al.*, 2013).

Endoparasites are classified into intestinal, atrial or they may inhabit body tissues causing serious health problems (Hopla *et al.*, 1994). Different studies have suggested that intestinal parasites could have a strong influence on their host's healthiness and physiology (Hörak *et al.*, 2000; Brawner *et al.*, 2000; Mc Graw and Hill, 2000; Hörak *et al.*, 2004; Jesus and Javier, 2007). Myna spp are susceptible to many diseases including helminthic infection because they eat insects which are their intermediate host (Hassan and Jamshid, 2011).

Helminth presence in many birds usually does not cause much diseases, however the birds with heavy parasites infestation in the intestinal tract may die due to disease or starvation (Clapham, 1957).

2.3 Mode of transmission of parasites

The mechanisms of transmission cycle of an arthropod-borne disease include vertebrate host, vector and one or more vertebrate host. There are two types of modes of transmission consisting of vertical transmission by which the parasites will directly transmit to subsequent life stages within vector population and horizontal transmission which is the passage of parasites between vector and vertebrate hosts (Mullen *et al.*, 2002). Clayton and Tompkins, (1994) stated that horizontally transmitted ectoparasites are more infectious than vertically transmitted ectoparasites.

The arthropods, are not usually involved as vectors of disease agents, because the arthropod consists of the pathogen through the blood meal, before being transmitted to another host they must overcome many obstacles such as hemolymph, muscles, or the reproductive system (Goddard, 2008).

The larval or juvenile stages of a parasite living inside an intermediate host must be transmitted to the parasite's definitive host by the predation (Lafferty, 1999). The stage of the parasites to mature within an intermediate host before they become infective to their definitive host requires some time; from the onset of infectivity to the next host (Poulin, 2010).

3.0 Materials and Methods

3.1 Birds

A total 19 birds were obtained from the wild captured using a mist net consisting of species Javan Myna (*Acridotheres javanicus*) (**Figure 1**) from Teluk Panglima, Batu 10, Banting, Selangor. They were kept for four days in a close netted pen. Samples were collected to determine the status of ecto and endoparasites.



Figure 1: Javan Myna (*Acridotheres javanicus*)

3.2 Measurements of external body characters (body biometrics)

The most widely used measures today include the lengths of the wing chord, tail, tarsometatarsus and bill. Many other external measurements can be recorded, however the details will vary with the species and the nature of the research (Winkler, 1988). In this study 10 out of 19 birds were measured.

3.21 Body weight

In this study, the body weights of the birds were achieved by using a weighting scale and the bird was put into the weighting scale after euthanasia.

3.22 Bill

The measurement of the bill was achieved by restraining the birds by body grab, and the leg being held (at the hock joint) and the another person measured the bill using compasses. In this study, the measurement of the bill was taken from the tip of the bill to the skull (**Figure 2a**).

3.23 Head

The measurement of the head was done by measuring from the distance between the back of the skull and the tip of the bill (**Figure 2b**).

3.24 Size of body (body length)

The measurement was done by laying the bird on ventral recumbency and flattening out the head and neck gently and measuring between the tip of the bill and the tip of the tail.

3.25 Wing length

A flat ruler was used to measure the wing length. The wing length was measured with the wing chord flattened and straightened to get more consistent results. According to Ralph *et al.* (1993) even though several approaches of determining wings are working, the measurement

of the wing chord is recommended, because this is the length most commonly used and most broadly published for North American birds (**Figure 2c**).

3.26 Tarsus

The length of the tarsus was measured by using compasses at the tarsal bone (**Figure 2d**).

3.27 Tail

A flat ruler was used to measure the length of the tail; starting from the base to the tip of the longest tail feathers and was gently flattened and straightened along the ruler to record the results (**Figure 2e**).

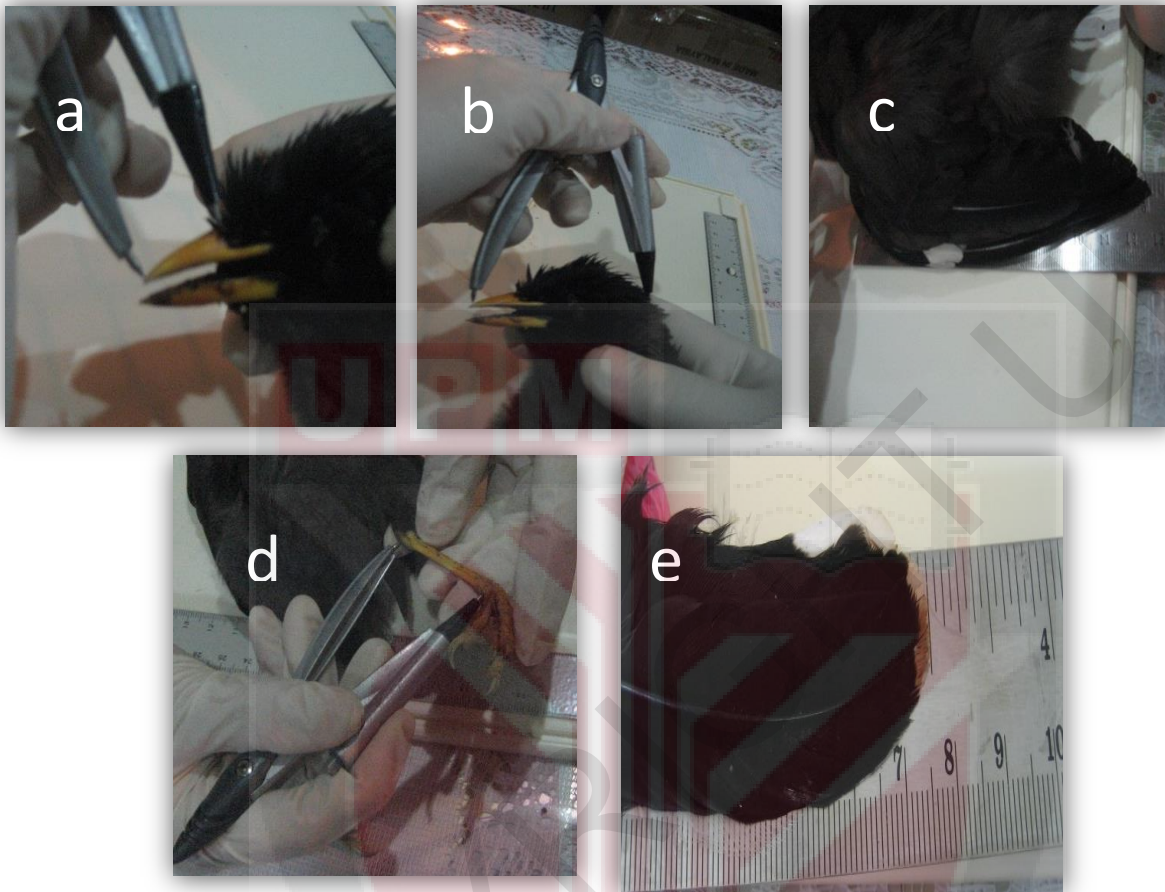


Figure 2: Measurements of Javan Mynas; (a = wing; b = bill; c = tarsus; d = head; e = tail).

3.3 Blood samples

The birds were manually restrained using body grab technique, then brachial vein was swabbed with 75% ethanol and was pricked with 25 G needle and the blood oozed out and was collected using heparinized micro-capillary tubes. Thin blood films were prepared by placing a very small drop of blood from the tip of the micro-capillary tubes at one end of a clean glass slide, the ends of the slide between the thumbs and fore finger were held and cover slip was used to spread, leaving a thin smear and the slide was left to dry at room temperature, fixed in

methanol for two min and stained with 10% Giemsa in phosphate buffer for 30 min. The stained blood film was dried and examined for haemoprotozoa and haemoparasites under 100x magnification under the compound microscope.

3.4 Euthanasia

In the Indian Myna Control Project; *Indian Myna Handbook* funded by Hunter-Central Rivers CMA, stated that the ideal alternatives for euthanizing Mynas are; cervical dislocation, inhalation of carbon dioxide (CO₂), and injection of a barbiturate. In this study, pentobarbital 500 mg/kg was used to euthanize: 0.3 ml per bird was applied by intracelomic and intracardiac injection and the bird was left about 10 min to ensure the bird was dead. Each bird was placed individually in a polyethylene bag along with an appropriate label and kept in a chiller for 3 d to kill all the parasites before examination.

3.5 Endoparasites examination

The internal organs were opened with a scalpel blade by incising the abdominal muscle dorsal to the keel bone. Endoparasites were examined during post mortem and the intestines were collected, inserted into the polyethylene bag which was labeled. The digestion and mucosa of the opened intestine were scraped into the petri dish and examined under stereomicroscope. The helminths were mounted with lactophenol and identified using a compound microscope under 4x, 10x and 40x magnification.

3.6 Ectoparasites examination

The whole body of the birds was soaked with 75% ethanol in a container and left for 30 min. The sediments were examined under a stereo microscope and the ectoparasites were mounted using the Hoyer's medium, left to dry on the slide warmer machine and incubated for one night and proceeded with identification under 10x and 40x magnification using compound microscope.

4.0 Results

4.1 Measurements of external body characters (body biometrics)

The summary of the measurements is presented in Table 1. Similarly, Indian Mynas or Common Mynas were reported by Markula *et al.* (2009) had close measurement to the Javan Mynas which were 23–26 cm long, 82–143 g in weight and a wing-span of 12-14 cm.

Table 1: External body characters measurement of Javan Mynas (*A. javinicus*).

		Mean	S.d	Min.-max	N
Weight	(g)	100.3	0.675	100-102	10
Head	(cm)	5.44	0.190	5-6	10
Bill	(cm)	2.29	0.264	2-3	10
Body length	(cm)	23.71	1.01	22-25	10
Wing	(cm)	13.18	0.301	13-14	10
Tarsus	(cm)	3.28	0.169	3-4	10
Tail	(cm)	7.80	0.258	8-8	10

4.2 Endoparasites

The nematodes identified were *Diplotrriaena sp* (Spiruroidea) (**Figure 3**) and *Pelecitus sp* (Filarioidea) (**Figure 4**). Out of 19 birds examined, 6 were found to have of helminths with prevalence rate of 32%. A total of 67 *Diplotrriaena sp* were found in the small intestine in the 10 birds sampled. The nematodes measured around 13 cm, were milky white; the body was long and slender, mouth simple without lips and presence of a pair of chitinous tridents (Hassan and Jamshid, 2011). A total of four *Pelecitus sp* were found in four birds out of 19 in the body cavity. The worm measured around 3 to 4 cm, white in color with a slender body. The prevalence rate and descriptive statistics of these endoparasites in Javan Mynas are summarized in Table 2.



Figure 3: *Diplotrriaena sp*



Figure 4: *Pelecitus sp*

Table 2: Prevalence rate and descriptive statistics of endoparasites infestation in Javan Myna.

Parasites	Prevalence rate (%)	Mean no. of helminths per bird	Max	Min
Nematodes				
<i>Diplotriaeana sp</i>	53%	6.7	22	1
<i>Pelecitus sp</i>	21%	-	-	-

4.3 Ectoparasites

Three major ectoparasites were identified in the Javan Mynas. They consisted of 2 species of lice and 1 species of mites. All ectoparasites were found in the feathers and body soakings in alcohol. The lice identified were *Felicola sp* (Figure 5), and *Myrsidea sp* (Figure 6) and the mite was *Falculifer rostratus* (Figure 7). The prevalence rate and descriptive statistics of these ectoparasites in Javan Mynas are summarized in Table 3.



Figure 5: *Felicola sp*



Figure 6: *Myrsidea sp*



Figure 7: *Falculifer rostratus*

Table 3: Prevalence rate and descriptive statistics of ectoparasites infestation in Javan Mynas.

Ectoparasites	Prevalence rate (%)	Mean no. of parasites	Maximum	Minimum
Lice				
<i>Felicola sp</i>	21%	-	7	1
<i>Myrsidea sp</i>	79%	3	-	-
Mites				
<i>Falculifer rostratus</i>	79%	9	50	1

The intensity of infestation was the same for mites and lice. The mites *Falculifer rostratus* showed an infestation rate of 79% and a higher mean number of parasites (9). The

prevalence rate of mites *Falculifer rostratus* and louse *Myrsidea sp* were the same 79%. The prevalence rate of *Felicola sp* in Javan Myna was the lowest at 21%.

4.4 Correlation between number of ecto and endoparasites detected in the species.

Table 4: Correlation coefficients between the ecto and endoparasites in Javan Myna

	<i>Falcurifer rostratus</i>	<i>Diplotriaena sp</i>
<i>Myrsidea sp</i>	-0.267 (p=0.402)	-0.609 (p=0.109)
<i>Falcurifer rostratus</i>	-	0.026 (p=0.957)

There was no significant correlation between numbers of ectoparasites and endoparasites counted in Javan Mynas. This indicated that if there was a higher infestation of ectoparasites, it does not necessarily result in a higher infestation of endoparasites.

5.0 Discussion

In this study the intensity of infestation for mites *Falculifer rostratus* and louse *Myrsidea sp* were the same 79%. *Falculifer rostratus* can be found in Eurasia, northern Africa, North and South America (Jacek and Serge, 1999). Sychra *et al.* (2014) stated that nineteen birds (17 %) of 6 species were parasitised with 292 chewing lice belonging to three genera – *Brueelia*, *Myrsidea* and *Penenirmus*. This can be concluded that the infestation rates of mites and lice are high in Javan Mynas.

In this study, the birds had numerous oocysts in their feces. According to Keymer *et al.* (1962) several species of passerine birds frequently harboured coccidia and sometimes the birds would not show any evidence of pathogenicity in heavy infestation. The result of this study revealed that *Diplotriaeana sp* were counted high in the birds' gastrointestinal tracts, with an infestation rate of 53% and mean of (6.70). This was because Myna spp are susceptible to many diseases, including helminth infections. Insects are one of the major sources of food for Myna spp, which are acting as intermediate host. The distribution of these worms is reported to be worldwide as reported by Hassan and Jamshid, (2011).

Bartlett, (2009) stated that the genus of *Pelecitus* have 160 species that infect mammals and especially the birds. In this study, the *Pelecitus sp* were counted in 4 out of 20 birds and were found in the body cavity and even though the infestation rate 21% was low, yet the *Pelecitus sp* also have been reported as infecting birds of 30 families (Bartlett, 2009). This can be concluded that the *Pelecitus sp* is in the group of nematodes commonly infecting birds.

6.0 Conclusion

In this study the infestation rate of the 2 species of ectoparasites; the lice *Myrsidea sp* and the mite *Falculifer rostratus* and 1 species of endoparasites; *Diplotriana sp* exceeded 50%. Javan Mynas in Malaysia are proven carriers of many species of parasites which include ectoparasites and endoparasites. Javan Mynas are carriers of mites (*Falcurifer sp*), lice (*Myrsidea sp* and *Felicola sp*) and nematodes (*Diplotriana sp* and *Pelecitus sp*).

7.0 Recommendations

In order to have better understanding on *A. javanicus* infestation of ecto and endoparasites, future study should be extended to include other Myna species from other localities. Besides the thin blood smear, the wet blood mount should also be done to detect the presence of microfilaria, so the blood collection supposedly taken from the cardiac puncture or the metatarsal vein located above the tarsometatarsal joint (hock) on the median side of the leg to get the high blood volume to be examined. The electronic caliper is recommended to be used for the morphological characteristics measurement to get more accurate statistics.

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8.0 Appendix

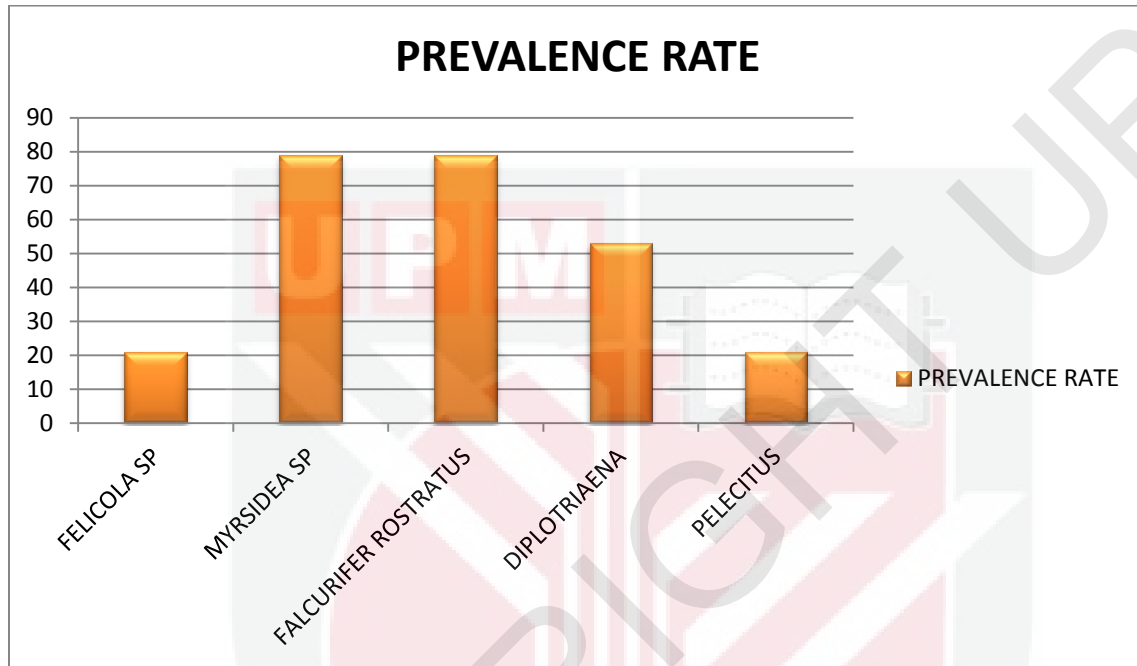


Figure 1: Overall prevalence rate of ecto and endoparasites in Javan Mynas.