PARASITES OF THE EDIBLE-NEST SWIFTLET, *AERODRAMUS* SP. IN PERAK, MALAYSIA

By

YAHASMIDA BINTI YAACOB

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirement for the Degree of Master of Veterinary Science

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DEDICATION

THE JOURNEY OF LIFE

Thank you Allah
as you always there for this fragile soul…
Alhamdulillah
for given the chance to experience this beautiful journey…
This journey,
When no one listens, you listen…
When no one trusts, you trust…
When it's stuck, you show solutions…
When it's lost, you guide…
When it's hurt, you heal…
When it's hard, you simplify…
When it's sad, you entertained…
When it's lonely, you accompany…
When alone, you always there…
When the world is gone, you'll always there…
Alhamdulillah….
*(The Journey of Life*2012-2015)*

Abstract of thesis submitted to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Veterinary Science

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By

YAHASMIDA BINTI YAACOB

May 2015

Chairman : Rehana Abdullah Sani, Ph.D.
Faculty : Veterinary Medicine

A study was carried out to investigate the presence of internal and external parasites of the edible-nest swiftlet, *Aerodramus* sp. in urban and agricultural land in Perak, Malaysia. The urban locations represent the samples taken from town and city areas and the agricultural land represent samples collected from areas located outside towns or in the plantations. A total of 94 swiftlets were examined from both urban and agriculture land. Seventy-eight birds were collected from ranching premises and 16 wild-caught birds from Perak comprising adults and juveniles of both sexes were examined for ecto-parasites, endo-parasites and haemo-parasites. Ninety edible-birdnest (EBN) were also examined for ecto-parasites. Blood samples were collected from a total of 64 birds; 16 blood films were made and 48 blood samples were spotted onto FTA® paper and tested using Polymerase Chain Reaction (PCR) method. From the 48 birds, 22 birds were from the urban area and 26 birds were from agricultural land areas. PCR results showed 46 out of 48 blood samples (95.84%) were positive for blood parasites. All positive PCR products were sent for DNA sequencing and confirmation. A total of 46 blood samples were positive for *Haemoproteus columbae* (95.84%) and one sample was positive for *Plasmodium* sp. (2.09%). Fifty-seven fresh faeces were collected from the bird and examined for intestinal protozoa, coccidia oocysts, ova and larvae using direct faecal smears revealed absence of intestinal protozoa, coccidia oocysts, ova or larvae. There were three species of cestodes recovered from the bird samples. They were *Pseudochoanotaenia* sp., *Pseudangularia* sp. *and Neoliga* sp. The nematode was identified as belonging to the Order Spirurida. Two species of trematodes were identified from the samples namely *Prosthogonimus* sp. and *Plagiorchis* sp. Ecto-parasites were also collected for identification. A total of 11 mite species found on the

birds were Cheyletiellidae, cf. *Laminalloptes* sp. (Type 1), cf. *Laminalloptes* sp. (Type 2), cf. *Dubininia* sp., *Ornithonyssus bursa*, cf. *Pterodectes amarochalinus*, cf. Acaridae, cf. *Cheyletus* sp., cf. Rhinonyssidae (*Ptilonyssus* sp.), cf. Laelapidae and *Cheyletus* sp. The nests contained the same types of mites except for cf. Acaridae, cf. Rhinonyssidae (*Ptilonyssus* sp.) and *Cheyletus* sp. All lice found on the birds and in the nest were identified as the genus *Dennyus*. Neither ticks nor fleas were recovered from the birds or the EBN. The study revealed no significant relationship between the locations (urban and agricultural land) and occurrence rate of parasitic infestation in edible-nest swiftlet, *Aerodramus* sp. in Perak ($P>0.05$).

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia, sebagai memenuhi keperluan untuk Ijazah Sarjana Sains Veterinar

PARASIT PADA BURUNG WALIT, *AERODRAMUS* SP. YANG TERDAPAT DI PERAK, MALAYSIA

Oleh

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Satu kajian telah dijalankan untuk menyelidik kehadiran ekto-parasit dan endo-parasit pada perumah burung walit, *Aerodramus* sp. dari kawasan bandar dan tanah pertanian sekitar negeri Perak, Malaysia. Kawasan bandar mewakili sampel yang diambil dari kawasan bandar manakala tanah pertanian adalah mewakili sampel yang diambil dari kawasan selain dari kawasan bandar atau dari kawasan pertanian lainnya. Sejumlah 94 burung walit telah diperiksa dari kedua-dua lokasi. Tujuh puluh lapan burung walit didapati dari premis perladangan burung walit dan 16 burung walit yang ditangkap merangkumi burung walit dewasa dan remaja dari kedua-dua jantina telah diperiksa untuk ekto-parasit, endo-parasit dan parasit dalam darah. Sembilan puluh sarang burung walit (EBN) juga diperiksa untuk ekto-parasit. Sampel darah diambil dari 64 ekor burung walit, 16 sampel darah dititik atas slaid kaca dan 48 sampel darah dititis atas kertas FTA® dan diuji menggunakan teknik PCR. Daripada 48 burung walit, 22 burung didapati dari kawasan bandar dan 26 burung diperolehi dari kawasan pertanian. Keputusan ujian PCR mendapati 46 daripada 48 sampel darah (95.84%) adalah positif parasit darah. Kesemua sampel yang positif ujian PCR dihantar untuk penjujukan dan pengesahan DNA. Sejumlah 46 sampel darah adalah positif *Haemoproteus columbae* (95.84%) dan satu sampel positif *Plasmodium* sp. (2.09%). Lima puluh tujuh guano segar didapati dari burung telah diperiksa untuk protozoa, oosit koksidia, telur dan larva menggunakan kaedah calitan najis. Walaubagaimanapun, tidak memperolehi protozoa, oosit koksidia, telur atau larva. Terdapat tiga spesis cestod daripada sampel burung iaitu *Pseudochoanotaenia* sp., *Pseudangularia* sp. dan *Neoliga* sp. Nematod pula dikenalpasti sebagai terdiri daripada Order Spirurida. Dua spesis trematod telah dikenalpasti iaitu *Prosthogonimus* sp. dan *Plagiorchis* sp. Ekto-parasit juga dikumpul untuk pengecaman. Spesis ekto-parasit yang ditemui ialah Cheyletiellidae, cf. *Laminalloptes* sp. (Jenis 1), cf. *Laminalloptes* sp. (Jenis 2), cf. *Dubininia* sp., *Ornithonyssus bursa*, cf. *Pterodectes amarochalinus*, cf. *Acaridae*, cf. *Cheyletus* sp., cf.

Rhinonyssidae (*Ptilonyssus* sp.), cf. Laelapidae dan *Cheyletus* sp. EBN mempunyai jenis ekto-parasit yang sama kecuali untuk cf. Acaridae, cf. Rhinonyssidae (*Ptilonyssus* sp.) dan *Cheyletus* sp. Kesemua kutu yang ditemui pada burung walit dan sarangnya dikenalpasti dari genus *Dennyus*. Tiada sengkenit dan pinjal dikumpul dari burung atau sarang. Keputusan analisa statistik tidak menunjukkan hubungan yang berkeertian di antara lokasi (dalam bandar dan tanah pertanian) dan kehadiran parasit dalam perumah burung walit, *Aerodramus* sp. di negeri Perak ($P>0.05$).

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LIST OF ABBREVIATIONS

ETP	Economic Transformation Programme
NKEA	National Key Economic Areas
GNI	Gross National Income
EPP	Entry Point Project
BO	Business Opportunity
EBN	Edible-bird Nest
DVS	Department of Veterinary Services
CoE	Center of Excellence
R&D	Research and Development
SALT	Good Farm Practice Scheme
GAHP	Good Animal Husbandry Practice
VRI	Veterinary Research Institute
SEM	Scanning Electron Microscopy
PCR	Polymerase Chain Reaction
NCBI	National Center for Biotechnology Information
DNA	Deoxyribonucleic Acid
SPSS	Statistical Package for Social Science
mM	Millimolar
FTA	Flinders Technology Associates
MF	Microfilaria
cf.	Latin word, confer- commonly read as ‘compare’ in English. This abbreviation advices reader to consult other materials.

CHAPTER 1

GENERAL INTRODUCTION

According to Cranbrook *et al*. (2013), Malaysia has two species of white-nest swiftlet. They are i) grey-rumped swiftlet, (*Aerodramus inexpectatus*, with subspecies *Aerodramus inexpectatus germani* and *Aerodramus inexpectatus perplexus)*, and ii) brown-rumped swiftlet, (*Aerodramus fuciphagus*, with subspecies *Aerodramus fuciphagus fuciphagus* and *Aerodramus fuciphagus vestitus*). White-nest swiftlet (*Aerodramus fuciphagus*) and the black-nest swiftlet (*Aerodramus maximus*) contribute the most to edible-birdnest (EBN) trade in the world.

Swiftlet distribution extends from the western Indian Ocean through southern continental Asia, Indonesia, Palawan Island in the Philippines, northern Australia and New Guinea to islands of the west and south Pacific (Lim, 2011). However, only Indonesia (Mardiastuti and Mranata, 1996), Thailand, Malaysia, Vietnam and Myanmar (Lim, 2011) in South-east Asian region that produces edible-nests (Chantler and Driessens, 2000) of commercial quantities.

The current EBN industry in Malaysia is RM1.5 billion and growing at an estimated 20% annually, with the target export value of RM5 billion by the year 2020 is therefore of great economic potential to the farmers and the country. In order to achieve this target, it is important that all information about the edible-nest swiftlet and EBN is scientifically researched and documented. The Malaysian Government has appointed Universiti Putra Malaysia (UPM) as the EBN Center of Excellence (CoE) to lead research and development (R&D) in order to gather baseline information about the EBN industry and ensure the sustainability of the industry and its competitiveness. For instance, little is known about parasitism in edible-nest swiftlet in Malaysia although EBN has been commercially traded since the Ming Dynasty around 1368- 1644 (Lim, 2011).

The aim of this study is to determine the occurrence rate of ecto-parasites, endo-parasites and haemo-parasites of *Aerodramus* sp. and to identify parasites found in two types of locations (urban and agricultural land) in Perak state, Malaysia. This is to ensure that there is no zoonotic disease risk associated with edible-nest swiftlet ranching and potential pathogens for the consumption of EBN. Other than that, Department of Veterinary Services (DVS), Malaysia also received many public complaints concerning the bird parasites being a nuisance to public health especially from ranching premises build near residential areas. Furthermore, there is no baseline data on the status and possible diseases that might impose health risk to the neighborhood.

Two types of swiftlet ranching premises locations were chosen in the study. They were urban and agricultural land. The urban sites represent the swiftlet ranching premises mainly built in shop lots in town and cities. The agriculture land sites represent ranching premises located outside of town areas, built in the paddy fields, oil palm plantation and fruit orchards in Perak.

These objectives will be addressed using the following hypothesis:

(i) Parasitic infestation is associated with the location of edible-nest swiftlet ranching premises.

The specific objectives of the study are:

(i) To determine the occurrence rate of ecto-parasites, endo-parasites and haemo-parasites of edible-nest swiftlet, *Aerodramus* sp. found in two types of locations (urban and agricultural land) in Perak state, Malaysia.
(ii) To identify ecto-parasites, endo-parasites and haemo-parasites found in edible-nest swiftlet, *Aerodramus* sp.

REFERENCES

Acha, P. N., & Szyfres, B. (2003). Section C. Arthropods. In *Zoonoses and communicable diseases common to man and animals. Volume 3.* (pp.328). Washington, DC. Pan American Health Organisation, World Health Organisation.

Adang, K. L., Oniye, S., Ajanusi, O. J., Ezealor, A. U., & Abdu, P. A. (2008). Gastrointestinal helminths of the domestic pigeons (*Columba livia domestica* Gmelin, 1789 Aves: Columbidae) in Zaria, Northern Nigeria. *Science World Journal, 3*(1), 33-37.

Ahmed, F. E., & Mohammad, A. H. H. (1978). *Haemoproteus columbae*: Course of infection, relapse and immunity to reinfection in the pigeon. *Zeitschrift für Parasitenkunde., 57*, 229-236.

Allander, K., & Bennet, G. F. (1995). Prevalence and intensity of haematozoan infection in a population of great tits parus major from Gotland, Sweden. *Journal of Avian Biology, 25*, 69-74.

Anderson, R. C., Chabaud, A. G., & Willmott, S. (Eds.). (1974). *CIH keys to the nematode parasites of vetebrates* (First ed.). England: Commonwealth Agricultural Bureaux.

Anh, N. T. L., Phuong, N. T., Ha, G. H., Thu, L. T., Johansen, M. V., Murrell, D. K., & Thamsborg, S. M. (2008). Evaluation of techniques for detection of small trematode eggs in faeces of domestic animals. *Veterinary Parasitology, 156*(3–4), 346-349. doi:http://dx.doi.org/10.1016/j.vetpar.2008.05.021

Appleby, B. M., Anwar, M. A., & Petty, S. J. (1999). Short-term and long-term effects of food supply on parasite burdens in tawny owls, *Strix aluco*. *Functional Ecology, 13*, 315-321.

Arn, H. (1960). *Biologische studien am alpensegler*. Solothurn: Verlag Vogt-Schild AG.

Atkinson, C. T. (2008a). Avian malaria. In C. T. Atkinson, N. J. Thomas & D. B. Hunter (Eds.), *Parasitic diseases of wild birds* (First ed., pp. 35-45). Iowa: Wiley Blackwell.

Atkinson, C. T. (2008b). *Haemoproteus*. In C. T. Atkinson, N. J. Thomas & D. B. Hunter (Eds.), *Parasitic diseases of wild birds* (First ed., pp. 13-34). Iowa: Wiley Blackwell.

Atkinson, C. T., Forrester, D. J., & Greiner, E. C. (1988). Pathogenicity of *Haemoproteus melegridis* (Haemosporina: Haemoproteidae) in experimentally infected domestic turkeys. *Journal of Parasitology, 74*(2), 228-239.

Atkinson, C. T., & Van Riper III, C. (1991). Pathogenicity and epizootiology of avian hematozoa: *Plasmodium, Leukocytozoon* and *Haemoproteus.* In J. L. Loye, & M. Zuk (Eds.), *Bird-parasite interactions: Ecology, evolution and behaviour.* (pp. 20-48). New York: Oxford University Press.

Atkinson, C. T. (1999). Haemosporidiosis. In M. Friend, & J. C. Franson (Eds.), *Field manual of wildlife diseases* (pp. 193-199). USA: United States Geological Survey.

Auger, P., Nantel, J., Meunier, N., Harrison, R. J., Loiselle, R., & Gyorkos, T. W. (1979). Skin acariasis caused by *Dermanyssus gallinae* (de geer): An in-hospital outbreak. *Canadian Medical Association Journal, 120*(6), 700-703.

Baker, J.R. (1967). A review of the role played by the Hippoboscidae (Diptera) as vectors of endoparasites. *Journal of Parasitology, 53*: 412-418.

Barbosa, A., Merino, S., & Cuervo, J. J. e. a. (2002). Effects of feather lice on the flight behavior of male barn swallows (*Hirundo rustica*). *The Auk, 119*, 213-216.

Barraclough, R. K., Robert, V., & Peirce, M. A. (2008). New species of haematozoa from the avian families Campephagidae and Apodidae. *Parasite (Paris, France), 15*(2), 105-110.

Barros-Battesti, D. M., Arzua, M., Pichorim, M. & Keirans, J. E. (2003). *Ixodes* (Multidentatus) *paranaensis* n. sp. (Acari: Ixodidae) a parasite of *Streptoprocne biscutata* (Sclater, 1865) (Apodiformes: Apodidae) birds in Brazil. *Memórias do Instituto Oswaldo Cruz, 98*: 93-102.

Bartlett, C. M. (1993). Lice (Amblycera and Ischnocera) as vectors of *Eulimdana* spp. (Nematoda: Filarioidea) in charadriiform birds and the necessity of short reproductive periods in adult worms. *Journal of Parasitology, 79*, 85-91.

Bartlett, C. M. (2008). Filarioid nematodes. In C. T. Atkinson, N. J. Thomas & D. B. Hunter (Eds.), *Parasitic diseases of wild birds.* (pp. 439-462). Iowa: Wiley Blackwell.

Basu, R. R., Bhowmik, M. K., & Sasmal, N. K. (1982). Some common cestode parasites and pathology caused by them in ducks in and around Culcutta. *Indian Journal of Poultry Science, 17*, 219-223.

Beer, J. R., & Cook, E. F. (1957). A method for collecting ectoparasites from birds. *The Journal of Parasitology, 43*(4), p. 445.

Behnke, J., McGregor, P., Shepherd, M., Wiles, R., Barnard, C., Gilbert, F., & Hurst, J. (1995). Identity, prevalence and intensity of infestation with wing feather mites on birds (passeriformes) from the Setubal Peninsula of Portugal. *Experimental & Applied Acarology, 19*(8), 443-458. doi:10.1007/BF00048263

Bendell, J. S., & Fleischer, R. C. (2005). A restriction enzyme-based assay to distinguish between avian haemosporidians. *Journal of Parasitology, 91*, 683-685.

Bennet, G. F. (1993). Phylogenetic distribution and possible evolution of the avian species of the Haemoproteidae. *Systematic Parasitology 26*: 39-44.

Bennet, G. F. & Fallis, A. M. (1960). Blood parasites of birds in Algonquin Park, Canada, and a discussion of their transmission. *Canadian Journal of Zoology. 38*: 261-273.

Bennet, G. F., Nieman, D. J., Turner, B., Kuyt, E., Whiteway, M., & Greiner, E. C. (1982). Blood parasites of prairie anatids and their implications in waterfowl management in Alberta and Saskatchewan. *Journal of Wildlife Diseases, 18*, 287-296.

Bennet, G. F., Caines, J. R. & Whiteway, M. A. (1986). Avian Haemoproteidae. 22. The haemoproteids of the avian families Apodidae (swifts), Bucconidae (puffbirds), and Indicatoridae (honeyguides). *Canadian Journal of Zoology. 64*(3): 766-770.

Bennet, G. F., & Peirce, M. A. (1986). Avian haemoproteidae. the haemoproteids of the parrot family Psittacidae. *Canadian Journal of Zoology, 64*, 771-773.

Bennet, G. F., & Peirce, M. A. (1990). The haemoproteid parasites of the pigeons and doves (family Columbidae). *Journal of Natural History, 24*, 311-325.

Bennett, G. F., & Bishop, M. A. (1991). The haemoproteids (Apicomplexa: Haemoproteidae) of the flowerpeckers of the avian family Dicaeidae (passeriformes). *Systematic Parasitology, 18*, 159-165.

Bennett, G. F., Aguirre, A. & Cook, R. S. (1991). Blood parasites of some birds from northeastern Mexico. *Journal of Parasitology, 77*:38-41.

Bennett, G. F., Whiteway, M. A., & Woodworth-Lynas, C. B. (1982). Host-parasite catalogue of the avian haematozoa. *Memorial University of Newfoundland Occasional Papers in Biology, No.5*, 243.

Bennet, G.F & Peirce, M.A. (1988). Morphological form in the avian Haemoproteidae and an annotated checklist of the genus *Haemoproteus* Kruse, 1890. *The Journal of Natural History, 22*: 1683-1696.

Bennett, G., Bishop, M., & Peirce, M. (1993). Checklist of the avian species of *Plasmodium marchiafava* & *celli*, 1885 (apicomplexa) and their distribution by avian family and wallacean life zones. *Systematic Parasitology, 26*(3), 171-179. doi:10.1007/BF00009724

Bennett, G., Peirce, M., & EarlÃ©, R. (1994). An annotated checklist of the valid avian species of *Haemoproteus, Leucocytozoon* (Apicomplexa: Haemosporida) and hepatozoon (Apicomplexa: Haemogregarinidae). *Systematic Parasitology, 29*(1), 61-73. doi:10.1007/BF00009839

Bensch, S., Stjernman, M., Hasselquist, D., Ostman, O., Hansson, B., Westerdahl, H., & Pinheiro, R. T. (2000). Host specificity in avian blood parasites: A study of *Plasmodium* and *Haemoproteus* mitochondrial DNA amplified from birds. *Proceedings: Biological Sciences, 267*(1452), 1583-1589.

Berggren, A. (2005). Effect of the blood-sucking mite *Ornithonyssus bursa* on chick growth and fledging age in the North Island robin. *New Zealand Journal of Ecology, 29*(2), 243-250.

BerthovÃ¡, L., ValkiÅ«nas, G., & OrszÃ¡ghovÃ¡, Z. (2012). The first report of nine species of haemosporidian parasites (Haemosporida: *Haemoproteus, Plasmodium* and *Leucocytozoon*) in wild birds from Slovakia. *Biologia, 67*(5), 931-933. doi:10.2478/s11756-012-0094-x

Biamonte, E., Sandoval, L., ChacÃ³n, E., & Barrantes, G. (2011). Effect of urbanization on the avifauna in a tropical metropolitan area. *Landscape Ecology, 26*(2), 183-194. doi:10.1007/s10980-010-9564-0

Bishop, M. A., & Bennett, G. F. (1992). Host-parasite catalogue of the avian haematozoa, supplement 1 and bibliography of the avian blood-inhabiting protozoa, supplement 2. *Memorial University of Newfoundland Occasional Papers in Biology, No.15*, 246.

Bize, P., Roulin, A., Tella, J. L., Bersier, L., & Richner, H. (2004). Additive effects of ectoparasites over reproductive attempts in the long-lived alpine swift. *Journal of Animal Ecology, 73*(6), 1080-1088.

Bock, D. (1984). The life cycle of *Plagiorchis spec. 1*, a species of the *Plagiorchis elegans* group (Trematoda, Plagiorchiidae). *Zeitschrift für Parasitenkunde, 70*(3), 359-373. doi:10.1007/BF00927822

Bock, D., & Janssen, O. (1987). The life-cycle of *Plagiorchis maculosus* (Rudolphi, 1802) Braun, 1902 (Trematoda: Plagiorchiidae), a parasite of swallows (Hirundinidae). *Systematic Parasitology, 9*(3), 203-212. doi:10.1007/BF00010855

Bona, F. V. (1994). Family Dilepididae Railliet et Henry, 1909. In L. F. Khalil, A. Jones & R. A. Bray (Eds.), *Keys to the cestode parasites of vertebrates.* (pp. 443-538). Wallington, UK: CAB International.

Booth, D. T., Clayton, D. H., & Block, B. A. (1993). Experimental demonstration of the energetic cost of parasitism in free-range hosts. *Proceedings of the Royal Society of London, 253* 125-129.

Bourne, D. Physical examination of birds. Retrieved from http://wildpro.twycrosszoo.org/s/00man/veterinarytechniques/PhysicalExamination_birds.htm

Bray, R. A., Gibson, D. I., & Jones, A. (Eds.). (2008). *Keys to the trematoda*. UK: CAB International and Natural History Museum.

Broad, S. (1995). Swiftlet nest: Feeding a booming market. The *International Union for Conservation of Nature* (*IUCN*) *Bulletin*, *26*(1), 22.

Brown, N. S. (1974). The effect of louse infestation, wet feathers and relative humidity on the grooming behavior of the domestic chicken. *Poultry Sciences. 53*: 1717-1719

Brown, C. R., & Brown, M. D. (1986). Ectoparasitism as a cost of coloniality in cliff swallows (*Hirundo pyrrhonota*). *Ecology, 67*, 1206-1218.

Brown, C. R., Brown, M. B., & Rannala, B. (1995). Ectoparasites reduce long-term survival of their avian host. *Proceedings: Biological Sciences*, *262*(1365), 313-319.

Burt, D. R. R. (1938). A new avian cestode, *Pseudochoanotaenia collocaliae gen*. et sp. nov. (Dipylidiinae) from *Collocalia unicolor unicolor*. *Ceylon Journal of Science (B), XXI*(1)

Burt, M. D. B. (1969). Cyclophyllidean cestodes from birds in Borneo. *National History Museum, 17*, 283-346.

Bush, A. O. (1990). Helminth communities in avian hosts: Determinants of pattern. In G. W. Esch, A. O. Bush & J. M. Aho (Eds.), *Parasite communities: Patterns and processes* (pp. 197-232). New York: Chapman and Hall.

Bush, A. O., & Holmes, J. C. (1986). Intestinal helminths of lesser scaup ducks: Patterns and association. *Canadian Journal of Zoology, 64*, 132-141.

Camfield, A. (2004). Apodidae. Retrieved from http:animaldiversity.ummz.umich.edu/accounts/apodidae

Campbell, B., & Lack, E. (1985). *A dictionary of birds.* Vermillion: Buteo Books.

Chantler, P. (1999). Order Apodiformes. In J. del Hoyo, A. Elliott & J. Sargatal (Eds.), *Handbook of the birds of the world: Barn-owls to hummingbirds* (Volume 5 ed., pp. 388-457). Barcelona: Lynx Edicions.

Chantler, P., & Driessens, G. (2000). *Swifts: A guide to the swifts and treeswifts of the world* (Second Edition ed.). East Sussex: Pica Press.

Christie, F., & Hochuli, D. (2009). Responses of wasp communities to urbanization: Effects on community resilience and species diversity. *Journal of Insect Conservation, 13*(2), 213-221. doi:10.1007/s10841-008-9146-5

Clayton, D. H. (1990). Mate choice in experimentally parasitized rock doves: Lousy males lose. *American Zoologist, 30*, 251-262.

Clayton, D. H., & Moore, J. (1997). *Host-parasite evolution: General principles and avian models*. Oxford, UK: Oxford University Press.

Clayton, D. H., & Tompkins, D. M. (1995). Comparative effects of mites and lice on the reproductive success of rock doves (*Columba livia*). *Parasitology, 110*, 195-206.

Clayton, D. H., & Walther, B. A. (1997). Collection and quantification of arthropod parasites of birds. In D. H. Clayton, & J. Moore (Eds.), *Host-parasite evolution: General principles and avian models.* (pp. 419-440). Oxford: Oxford University Press.

Clayton, D. H., Adams, R. J., & Bush, S. E. (2008). Phthiraptera, the chewing lice. In C. T. Atkinson, N. J. Thomas & D. B. Hunter (Eds.), *Parasitic diseases of wild birds* (1st ed., pp. 515-526). US: Wiley Blackwell.

Clayton, D. H., Lee, P. L. M., Tompkins, D. M., & Brodie III, E. D. (1999). Reciprocal natural selection on host-parasite phenotypes. *American Naturalist, 154*(261), 270.

Clayton, D. H., & Moore, J. (Eds.). (1997). *Host-parasite evolution: General principles and avian models*. Oxford, England: Oxford University Press.

Clayton, D. H., Price, R. D., & Johnson, K. P. (2006). Two new species of *Dennyus* (*Collodennyus*) chewing lice (Phthiraptera: Amblycera: Menoponidae) from swiftlets (Apodiformes: Apodidae). *Proceedings of the Entomological Society of Washington*, USA. , *108*(2) 306-311.

Clayton, D. H., Price, R. D., & Roderic D.M. (1996). Revision of *Dennyus* (*Collodennyus*) lice (Phthiratera: Menoponidae)) from swiftlets, with descriptions of new taxa and a comparison of host-parasite relationships. *Systemic Entomology, 21*, 179-204.

Clayton, D. H., Bush, S. E., & Johnson, K. P. (2004). Ecology of congruence: Past meets present. *Systematic Biology, 53*(1), 165-173. doi:87H1QPXWL287QBTA [pii]

Clayton, D. H., Gregory, R. D., & Price, R. D. (1992). Comparative ecology of neotropical bird lice (Insecta: Phthiraptera). *Journal of Animal Ecology, 61*(3), 781-795.

Clayton, D. H., & Drown, D. M. (2001). Critical evaluation of five methods for quantifying chewing lice (Insecta: Phthiraptera). *The Journal of Parasitology, 87*(6), 1291-1300.

Courtney, G. R. (1933). Relapse and associated phenomena in the *Haemoproteus* infection of the pigeon. *American Journal of Hygiene, 18*, 133-160.

Cohen, S., Greenwood, M. T., & Fowler, J. A. (1991). The louse *Trintoton anserinum* (Amblycera: Phthiraptera), an intermediate host of *Sarconema eurycerca* (Filarioidea: Nematoda), a heartworm of swans. *Medical and Veterinary Entomology, 5*, 101-110.

Cole, R. A., & Friend, M. (1999). Miscellaneous parasitic diseases. In E. A. Ciganovich (Ed.), *Field manual of wildlife disease* (pp. 249-258). USA: USGS.

Coles, B. H. (2007). Parasitic diseases of birds. In B. H. Coles (Ed.), *Essentials in avian medicine and surgery* (3rd ed., pp. 313-333). UK: Blackwell Publishing.

Collins, C. (2001). Swifts. In C. Elphick, J. Dunning & D. Sibley (Eds.), *The Sibley guide to bird life and behaviour.* (pp. 353-356). New York: Alfred A. Knopf.

Colloff, M. J. (2009). In Findlay A. (Ed.), *Dust mites*. Australia: CSIRO Publishing.

Cornwell, G. W., & Cowan, A. B. (1963). Helminth populations of the canvasback (*Aythya valisineria*) and host-parasite-environmental interrelationships. *Transections of the 28th North American Wildlife and Natural Resources Conference.* The Wildlife Management Institute, Washington, DC. *28th* 173-199.

Cotgreave, P., & Clayton, D. H. (1994). Comparative analysis of time spent grooming by birds in relation to parasite load. *Behaviour, 131*, 171-187.

Cox, F. E. G. (1987). Interactions in protozoan infections. *International Journal for Parasitology, 17*, 569-575.

Cranbrook, E. o. (1984). Report on the birds' nest industry in the Baram district and at Niah, Sarawak. *Sarawak Museum Journal, 33*(54), 145-170.

Cranbrook, E. O., Lim, G. W., Koon, L. C., & Rahman, M. A. (2013). The species of white-nest swiftlets (Apodidae, Collocaliini) of Malaysia and the origins of house-farm birds: Morphometric and genetic evidence. *Forktail*, (29), 107-119.

Crockett, D. B. (1967). A method for collecting feather lice (Mallophaga). *Journal of the Kansas Entomological Society, 40*(2), 192-194.

Dabert, J., & Mironov, S. (1999). Origin and evolution of feather mites (Astigmata). *Experimental & Applied Acarology, 23*(6), 437-454. doi:10.1023/A:1006180705101

Dawson, R. D. & Bortolotti, G. R. (2000). Effects of hematozoan parasites on condition and return rates of American kestrels. *The Auk. 117*: 373-380.

Degroote, L. W., & Rodewald, P. G. (2008). An improved method for quantifying hematozoa by digital microscopy. *Journal of Wildlife Diseases, 44*(2), 446-450. doi:44/2/446 [pii]

De la Puente, J. M., Merino, S., Tomas, G., Moreno, J., Morales, J., Lobato, E., Belda, E. J. (2010). The blood parasite *Haemoproteus* reduces survival in a wild bird: A medication experiment. *Biology Letters, 6*(5), 663-665. doi:10.1098/rsbl.2010.0046 [doi]

Delahay, R. J. (1999). Cestodians in red grouse in Scotland. *Journal of Wildlife Diseases, 35*, 250-258.

Delgado-V., C. A., & French, K. (2012). Parasite–bird interactions in urban areas: Current evidence and emerging questions. *Landscape and Urban Planning, 105*(1–2), 5-14. doi:http://ezproxy.upm.edu.my:2099/10.1016/j.landurbplan.2011.12.019

De-Rojas, M., Mora, M. D., Ubeda, J. M., Cutillas, C., Navajas, M., & Guevara, D. C. (2002). Phylogenetic relationships in rhinonyssid mites (Acari: Rhinonyssidae) based on ribosomal DNA sequences: Insights for the discrimination of closely related species. *Parasitology Research, 88*, 675-681.

DeVaney, J. A. (1976). Effects of the chicken body louse, *Menacanthus stramineus*, on caged layers. *Poultry Science, 55*(1), 430-435.

Di Palma, A., Giangaspero, A., Cafiero, M. A., & Germinara, G. S. (2012). A gallery of the key characters to ease identification of *Dermanyssus gallinae* (Acari: Gamasida: Dermanyssidae) and allow differentiation from *Ornithonyssus sylvarium* (Acari: Gamasida: Macronyssidae). *Parasites and Vectors, 5*(104), 1-10. doi:doi:10.1186/1756-3305-5-104

Dimitrova, Y., Mariaux, J., & Georgiev, B. (2013). *Pseudangularia gonzalezi* n. sp. and *Gibsonilepis swifti* (Singh, 1952) n. g., n. comb. (Cestoda, Dilepididae) from the house swift, *Apus affinis* (J.E. Gray) (Aves, Apodiformes) from Franceville, Republic of Gabon. *Systematic Parasitology, 86*(3), 215-233. doi:10.1007/s11230-013-9445-4

Dorrestein, G. M. (2009). Passerines. In T. N. Tully, G. M. Dorrestein & A. K. Johnes (Eds.), *Handbook of avian medicine,* (2nd ed., pp. 169-208). Philadelphia: Saunders Ltd.

Dubiec, A., & Zagalska-Neubauer, M. (2006). Molecular techniques for sex identification in birds. *43*(1), 3-12.

Emerson, K. C., & Price, R. D. (1968). A new species of *Dennyus* (Mallophaga: Menoponidae) from the Malaysian spine-tailed swift. *Proceedings of the Biological Society of Washington, 81*, 87-90.

Enout, A., Lobato, D., Diniz, F., & Antonini, Y. (2012). Chewing lice (Insecta, Phthiraptera) and feather mites (Acari, Astigmata) associated with birds of the Cerrado in Central Brazil. *Parasitology Research, 111*(4), 1731-1742. doi:10.1007/s00436-012-3016-5

Epstein, J. H., McKee, J., Shaw, P., Hicks, V., Micalizzi, G., & Dasak, P. (2007). The Australian White Ibis (*Threskiornis molucca*) as a reservoir of zoonotic and livestock pathogens. *Ecohealth*, *3*, 290-298.

Ewing, H. E. (1930). The taxonomy and host relationships of the biting lice of the genera *Dennyus* and *Eureum*, including the descriptions of a new genus, subgenus and four new species. *Proceedings of the United States National Museum*, Washington D.C, *77* 1-16.

Fain, A. & Bochkov, A.V. (2002). On some new or little known species of parasitic cheyletidae (Acari: Prostigmata). *Acarologia*. *2*: 145-160.

Fallon, S. M., Bermingham, E., & Ricklefs, R. E. (2005). Host specialization and geographic localization of avian malaria parasites: A regional analysis in the Lesser Antilles. *The American Naturalist, 165*(4), 466-480. doi:AN40490 [pii]

Fallon, S. M., & Ricklefs, R. E. (2008). Parasitemia in PCR-detected *Plasmodium* and *Haemoproteus* infections in birds. *Journal of Avian Biology*, *39*(5), 514-522. doi:10.1111/j.0908-8857.2008.04308.x

Fowler, J. A., & Cohen, S. (1983). A method for the quantitative collection of ectoparasites from birds. *Ringing and Migration, 4*(3), 185-189.

Friedl, T. P., & Groscurth, E. (2012). A real-time PCR protocol for simple and fast quantification of blood parasite infections in evolutionary and ecological studies and some data on intensities of blood parasite infections in a subtropical weaverbird. *Journal of Ornithology, 153*(1), 239-247. doi:10.1007/s10336-011-0735-9

Friend, M., Franson, J. C., & Ciganovich, E. A. (Eds.). (1999). Euthanasia In: *Field manual of wildlife diseases: Birds* (2nd ed.). US: United States Geological Survey (USGS), Biological Resources Division.

Fukatsu, T., Koga, R., Smith, W. A., Tanaka, K., Nikoh, N., Sasaki-Fukatsu, K. & Clayton, D. H. (2007). Bacterial endosymbiont of the slender pigeon louse *Columbicola columbae* allied to endosymbionts of grain weevils and tsetse flies. *Applied and Environmental Microbiology, 73*, 6660-6668.

Galkin, A. K. (1983). [Cestodes of the common swift (*Apus apus*) of the Kurish Spit.] (in Russian). *Trudy Zoologicheskogo Instituta AN SSSR, 121*, 57-67.

Galloway, T. D. (2005). Ectoparasites from native and introduced birds from Christchurch and surrounding areas, New Zealand. *Tuhinga, 16*, 13-20.

Galvan, I., Barba, E., Piculo, R., Canto, J. L., Cortes, V., Monros, J. S., Proctors, H. (2008). Feather mites and birds: An interaction mediated by uropygial size? *Journal Evolutionary Biology, 21*, 133-144.

Garamzegi, L. Z. (2011). Climate change increases the risk of malaria in birds. *Global Change Biology, 17*(5), 1751-1759. doi:10.1111/j.1365-2486.2010.02346.x

Garamszegi, L. Z. (2010). The sensitivity of microscopy and PCR-based detection methods affecting estimates of prevalence of blood parasites in birds. *The Journal of Parasitology, 96*(6), 1197-1203.

Gaud, J., & Atyeo, W. T. (1996). Feather mites of the world (Acarina, Astigmata): The supraspecific taxa. part 1. *Annual of Museum Royal Africa Central Science Zoology, 277*, 3-193.

Georgiev, B. B., & Murai, E. (1993). *Pseudangularia europaea* sp. n. and other cestode (Cyclophyllidea: Dilepididae and Paruterinidae) from the common swift, *Apus apus* (Aves: Apodiformes) in Hungary. *Parasitologica Hungarica, 26*, 15-26.

Georgiev, B., & Bray, R. (1991). *Notopentorchis cyathiformis* (FrÃ¶lich, 1791) n. comb. and *N. iduncula* (Spassky, 1946) (Cestoda: Paruterinidae) from palaearctic swifts (Aves: Apodiformes), with a review of the genus *Notopentorchis burt*, 1938. *Systematic Parasitology, 20*(2), 121-133. doi:10.1007/BF00007388

Gering, E., & Atkinson, C. T. (2004). A rapid method for counting nucleated erythrocytes on stained blood smears by digital image analysis. *The Journal of Parasitology, 90*(4), 879-881. doi:10.1645/GE-222R [doi]

Gill, F., (1995). *Ornithology*. (2nd ed.). New York: W.H. Freeman and Company.

Gimba, F. I. e. a. (2014). Haemoparasites of domestic poultry and wild birds in Selangor. *Malaysian Journal of Veterinary Research, 5*(1), 43-51.

Godfrey, R. D. Jr, Fedynich, A. M., & Pence, D. B. (1987). Quantification of hematozoa in blood smears. *Journal of Wildlife Diseases, 23*(4), 558-565.

Greiner, E. C., Bennet, G. F., White, E. M., & Coombs, R. F. (1975). Distribution of the avian hematozoa of North American. *Canadian Journal of Zoology, 53*, 162-1787.

Greve, J. H. (1986). Parasitic diseases. In M. E. Fowler (Ed.), *Zoo and wild animal medicine* (2nd ed., pp. 233-251). Philadelphia: W.B Saunders.

Hamstra, T. L., & Badyaev, A. V. (2009). Comprehensive investigation of ectoparasite community and abundance across life history stages of avian host, 1-9. doi:10.1111/j.1469-7998.2008.00547.x

Harshbarger, J. C., & Raffensperger, E. M. (1960). An evaluation of coding systems for estimating populations of the shaft louse, *Menopon gallinae. 54*(1), 74-76.

Haukos, D., & Neaville, J. (2003). Spatial and temporal changes in prevalence of a cloacal cestode in wintering waterfowl along the gulf coast of Texas. *Journal of Wildlife Diseases, 39*, 152-160.

Heeb, P., Kolliker, M., & Richner, H. (2000). Bird-ectoparasite interactions, nest humidity, and ectoparasite community structure. *Ecology, 81*(4), 958-968.

Heinz, M. (2008). Life cycle of *Prostogonimus macrochis. Encyclopedia of parasitology*. Berlin: Springer Berlin Heidelberg.

Hellgren, O., Waldenstrom, J., & Bench, S. (2004). A new PCR assay for simultaneous detection of *Leucocytozoon*, *Plasmodium* and *Haemoproteus* from avian blood. *Journal of Parasitology, 90*, 797-802.

Hillgarth, N. (1996). Ectoparasite transfer during mating in ring- necked pheasants *Phasianus colchicus*. *Journal of Avian Biology, 27*, 260-262.

Hillgarth, N. & Wingfield, J. C. (1997). Parasite-mediated sexual selection: Endocrine aspects. In D. H. Clayton, & J. Moore (Eds.), *Host-parasite evolution: General principles and avian models* (pp. 78-104). New York, USA: Oxford University Press.

Horak, P., Ots, I., Vellau, H., Spottiswoode, C. & Moller, A. P. (2001). Carotenoid-based plumage coloration reflects hemoparasite infection and local survival in breeding great tits. *Oecologia. 126*: 166-173.

Houwen, B. (2002). Blood film preparation and staining procedures. *Clinics in Laboratory Medicine, 22*(1), 1-14.

Hudson, P. J., Dobson, A. P. & Newborn, D. (1992). Do parasites make prey vulnerable to predation? Red grouse and parasites. *Journal Animal Ecology, 61*: 681-692

Huffman, J. E. (2008). Trematodes. In C. T. Atkinson, N. J. Thomas & D. B. Hunter (Eds.), *Parasitic diseases of wild birds* (1st ed., pp. 225-245). Iowa: Wiley Blackwell.

Huffman, J. E., & Roscoe, D. E. (1989). Experimental infection of waterfowl with *Sphaeridiotrema glubulus* (Digenea). *Journal of Wildlife Diseases, 25*, 143-146.

Hughes, A. M. (1976). The subclass acari. In: *The mites of stored food and houses*. 2nd edition. London: Her Majesty's Stationery Office, 1-5.

Hunter, J. E., Gutierrez, R. J., & Franklin, A. B. (1994). Ectoparasites of the spotted owl. *Journal Raptor Research, 28*(4), 232-235.

Hussein, V. M., Zakaria, M. & Zamri, R. (2008). Comparison of bird species composition in relation to different disturbance level in tropical lowland forest in Peninsular Malaysia. *The Malaysian Forester, 71:* 173–186.

Ibrahim, S. H., Teo, W. C., & Baharun, A. (2009). A study on suitable habitat for switlet farming. *UNIMAS E-journal of Civil Engineering, 1*(1), 1-7.

Ishtiaq, F., Gering, E., Rappole, J. H., Rahmani, A. R., Jhala, Y. V., Dove, C. J., Fleischer, R. C. (2007). Prevalence and diversity of avian hematozoan parasites in Asia: A regional survey. *Journal of Wildlife Diseases, 43*(3), 382-398. doi:43/3/382 [pii]

Janssen, O., & Bock, D. (1990). Identification and prevalence of two plagiorchiid trematodes from Hirundinidae in their intermediate and definitive hosts in the surroundings of Ulm, FRG. *Parasitology Research, 76*(5), 451-453. doi:10.1007/BF00933556

Jarvi, S. I., Schultz, J. J., & Atkinson, C. T. (2002). PCR diagnostics underestimate the prevalence of avian malaria (*Plasmodium relictum*) in experimentally-infected passerines. *Journal of Parasitology, 88*(1), 153-158.

Johnson, K. P., & Clayton, D. H. (2003). The biology, ecology and evolution of chewing lice. In R. D. Price, R. A. Hellemhal, R. L. Palma, K. P. Johnson & D. H. Clayton (Eds.), *The chewing lice: World checklist and biological overview.* (pp. 449-476)

Johnson-Delaney, C. A. (1996). Zoonotic parasites of selected exotic animals. *Seminars in Avian and Exotic Pet Medicine, 5*(2), 115-124. doi:http://ezproxy.upm.edu.my:2099/10.1016/S1055-937X(96)80024-7

Junquera, P. (2013). *Choanotaenia infundibulum*, parasitic tapeworm of poultry and other birds. Retrieved from http://parasitipedia.net/index.php?option=com_content&view=article&id=2590&Itemid=2872

Kang, N., Hails, C. J., & Sigurdsson, J. B. (1991). Nest construction and egg-laying in edible-nest swiftlets *Aerodramus* spp. and the implications for harvesting. *Ibis, 133*(2), 170-177.

Kang, N., & Lee, P. G. (1991). The edible-nest swiftlets *Aerodramus* spp. *Nature Malaysiana, 16*, 44-51.

Karstad, L., Sileo, L., Okesh, G., & Khalil, L. F. (1982). Pathology of *Paradilepis scolecina* (Cestoda: Dilepididae) in the white-necked cormorant (*Phalacrocorax carbo*). *Journal of Wildlife Diseases, 18*, 507-509.

Kew, P. E., Wong, S. F., Lim, P., & Mak, J. W. (2014). Structural analysis of raw and commercial farm edible bird nests. *Tropical Biomedicine, 31*(1), 63-76.

Kew, P.E (2012). Isolation and identification of mites associated with raw and commercial edible birdnests (EBNs). (Degree thesis, International Medical University, Malaysia).

Khalil, L. F., Jones, A., & Bray, R. A. (Eds.). (1994). *Keys to the cestode parasites of vertebrates*. UK: CAB International.

Kheysin, Y. M. (1972). Localization of the various stages of the coccidian life cycle within the host. In K. S. Todd (ed.), translated by F. K. Pious, Life Cycles of Coccidia of Domestic Animals. *University Park Press, Baltimore* p. 121-143.

Kirkpatrick, C. E., & Smith, T. B. (1988). Blood parasites of birds in Cameroon. *The Journal of Parasitology, 74*(6), 1009-1013.

Knee, W. (2008). Five new species of Rhinonyssidae (Mesostigmata) and one new species of *Dermanyssus* (Mesostigmata: Dermanyssidae) from birds of Alberta and Manitoba, Canada. *Journal of Parasitology, 94*, 348-374.

Knee, W., Proctor, H., & Galloway, T. (2008). Survey of nasal mites (Rhinonyssidae, Ereynetidae and Turbinoptidae) associated with birds in Alberta and Manitoba, Canada. *Canada Entomologist, 140*, 364-379.

Knowles, S. C. L., Palinauskas, V., & Sheldon, B. C. (2010). Chronic malaria infections increase family inequalities and reduce parental fitness: Experimental evidence from a wild bird population. *Journal of Evolutionary Biology, 23*, 557-569.

Knowles, S. C., Wood, M. J., Alves, R., Wilkin, T. A., Bensch, S., & Sheldon, B. C. (2011). Molecular epidemiology of malaria prevalence and parasitaemia in a wild bird population. *Molecular Ecology*, *20*(5), 1062-1076. doi:10.1111/j.1365-294X.2010.04909.x [doi]

Knox, D. P., Redmond, D. L., Skuce, P. J., & Newlands, G. F. J. (2001). The contribution of molecular biology to the development of vaccines against nematode and trematode parasites of domestic ruminants. *Veterinary Parasitology*, *101*(3–4), 311-335. doi:http://ezproxy.upm.edu.my:2099/10.1016/S0304-4017(01)00558-1

Kolonin, G. V. (2008). Birds as hosts of ixodid ticks (Acarina, Ixodidae). *Entomological Review, 88*(8), 1012-1015.

Koon, L. C., & Cranbrook, E. o. (2002). What are swiftlets? *Swiftlets of Borneo builders of edible nests.* (pp. 7-13). Kota Kinabalu: Natural History Publications (Borneo).

Krantz, G. W. (1978). *A manual of acarology* (2nd ed.). Corvallis: Oregon State University Bookstore Inc.

Krasnolobova, T. A. (1960). The biology of prosthogonimids, the agents of disease in poultry. Dissertation, summarized in K. I. Skrjabin (eds.) Trematodes of animal and man. Vol. 19.

Krasnolobova, T. A. (1982). [Review of the life cycles of trematodes of the genus *Plagiorchis* and related genera, *Plagioglyphe* and *Metaplagiorchis* (Trematoda, Plagiorchidae).] (in Russian). *Trudy Gel'Mintologicheskof Lab Akad Nauk SSR, 31*, 23-60.

Krone, O. (2007). Endoparasites. In D. M. Bird, & K. L. Bildstein (Eds.), *Raptor research and management techniques* (pp. 318-327). US, Canada: Hancock House Publishers.

LaPointe, D.A, Atkinson, C.T & Samuel, M.D. (2012). Ecology and conservation biology of avian malaria. *Annals of New York Academy of Sciences*. *1249*: 211-226.

Lal, M. (1937). Studies on the trematode parasites of birds. *Proceedings of the Indian Academy of Sciences - Section B, 5*(2), 33-44. doi:10.1007/BF03048177

Langham, N. (1980). Breeding biology of the edible nest swiftlet *Aerodramus fuciphagus*. *Ibis, 122*, 447-461.

Lashev, L. D., Bouchukov, A. K., & Penchev, G. (1995). Effect of testosterone on the pharmacokinetics of sulphadimidine and sulphachloropyrazine in roosters: A preliminary report. *British Veterinary Journal, 151*, 331-336.

Lau, A. S. M., & Melville, D. S. (1994). *International trade in swiftlet nests with special reference to Hong Kong.* Cambridge: TRAFFIC International.

Lee, C. C., & Amin-Babjee, S. M. (1993). New host records of parasites in the Malayan red jungle fowl. *Pertanika Journal Tropical Agriculture Science, 16*(2), 107-110.

Lee, P. L. M., & Clayton, D. H. (1995a). Population dynamics of swift (*Apus apus)* ectoparasites in relation to host fitness. *Ecological Entomology, 20,* 43-50.

Lee, P. L. M., & Clayton, D. H. (1995b). Population biology of swift (*Apus apus)* ectoparasites in relation to host reproductive success. *Ecological Entomology, 20*, 43-50.

Legler, M., Wolken, S., Epe, C., Thomas, P. & Kummerfeld, N. (2008). Cestode and intestinal trematodes of common swifts (*Apus apus*) in the area of Hanover (Germany) and the use of praziquantel for treatment. Retrieved from http://www.commonswift.org/4843Legler-et-al.html

Ledger, J.A. (1971). A review of *Dennyus* (Phthiraptera: Menoponidae) parasitic on the avian genera *Apus* and *Cypsiuris*. *Journal of the Entomological Society of South Africa*. 34. 37-56.

Leh, C. M. U. (1993). *A guide to birds' nest caves and birds' nest of Sarawak.* Sarawak: The Sarawak Museum.

Lehmann, T. (1993). Ectoparasites: Direct impact on host fitness. *Parasitology Today, 9*, 8-13.

Lim, C. K., & Cranbrook, E. o. (1999). Cave swiftlet. In B. E. Smythies (Ed.), *The birds of Borneo* (4th ed., pp. 75-102). Malaysia: Natural History Publication (Borneo).

Lim, C. K., & Cranbrook, E. o. (2002). *Swiftlet of Borneo: Builders of edible nests.* Kota Kinabalu: Natural History Publications (Borneo).

Lim, C. K. (2011). Opportunity and sustainability of swiftlet farming in Malaysia. *International Conference and Training on Swiftlet Ranching*, Kuala Terengganu, Terengganu.

Lipovsky, L. J. (1951). A washing method of ectoparasite recovery with particular reference to chiggers (Acarina-Trombiculidae). *Journal of the Kansas Entomological Society, 24*(4), 151-156.

Lourie, S. A., & Tompkins, D. M. (2000). The diets of Malaysian swiftlets. *142*, 596-602.

Loye, J. F., & Zuk, M. (Eds.). (1991). *Bird-parasite interactions: Ecology, evolution and behaviour*. Oxford: Oxford University Press.

Macy, R. W. (1965). On the life cycle of the trematode *Prosthogonimus cuneatus* (Rudolphi, 1809) (Plagiorchiidae) in Egypt. *Transactions of the American Microscopical Society, 84*(4), 577-580.

Mahsol, H. H., Sapaat, A., Hamid, N. H., Mahyudin, A., & Ahmad, A. H. (2012). Ectoparasite infestation amongst caves' swiftlets (Orders: Apodiformes; family Apodidae) at Suriba, Simud Putih and Akar caves in Kinabatangan, Sabah, Malaysia. *48th Annual Scientific Conference of the Malaysian Society of Parasitology and Tropical Medicine*, Grand Season Hotel, Kuala Lumpur, *48* 59.

Mardiastuti, A., & Mranata, B. (1996). Biology and distribution of Indonesian swiftlets with a special reference to *Collocalia fuciphaga* and *Collocalia maxima. Technical Workshop on Conservation Priorities and Actions for Sustainability of Harvesting and Trade in Nest of Swiftlets of the Genus Collocalia that Feature Prominently in the Bird Nest Trade.* Surabaya.

Mardiastuti, A., Mulyani, Y. A., & Gultom, T. A. C. (1997). Breeding success of edible-nest swiftlets in a man-made nesting habitat. *Media Konservasi. 5*(2), 81-83.

Margolis, L., Esch, G. W., Holmes, J. C., Kuris, A. M., & Schad, G. A. (1982). The use of ecological terms in parasitology (report of an ad hoc committee of the American society of parasitologists). *The Journal of Parasitology, 68*(1), 131-133.

Marshall, A. G. (1981). *The ecology of ectoparasitic insects*. London: Academic Press.

Marzal, A., De Lope, F., Navarro, C., & Moller, A. P. (2005). Malarial parasites decrease reproductive success: An experimental study in a passerine bird. *Oecologia, 142*, 541-545.

Mayer, J & Donnelly, T.M. (2013). *Clinical veterinary advisor, birds and exotic pets 1: Clinical veterinary advisor*. United States of America, USA: Elsevier Health Sciences

McCallum, H. I. & Dobson, A. P. (1995). Detecting disease and parasite threats to endangered species and ecosystems. *Trends in Ecology and Evolution, 10*, 190-194.

McClure, H. E., & Ratanaworabhan, N. (1971). *Some ectoparasites of the birds of Asia*. Bangkok, Thailand. U. S Army Research and Jintana Printing Ltd. Part.

McClure, H. E., Poonswad. P, Greiner, E. C. & Laird, M. (1978). *Haematozoa in the birds of eastern and southern Asia*. Memorial University of Newfoundland, St. John's, Newfoundland, Canada.

McLaughlin, J. D. (2008). Cestode. In C. T. Atkinson, N. J. Thomas & D. B. Hunter (Eds.), *Parasitic diseases of wild birds* (1st ed., pp. 261-276). Iowa: Wiley Blackwell.

Medway, L. (1969). Studies on the biology of the edible-nest swiftlets of South-east Asia. *Malayan Nature Journal*. *22*(2), 57-63.

Mendes, L., Piersma, T., Lecoq, M., Spaans, B. & Ricklefs, R. E. (2005). Disease-limited distributions? Contrasts in the prevalence of avian malaria in shoe bird species using marine and freshwater habitats. *Oikos*, *109*: 396-404.

Merino, S., Moreno, J., Sanz, J. J., & Arriero, E. (2000). Are avian blood parasites pathogenic in the wild? A medication experiment in blue tits (*Parus caeruleus*). *Proceedings of the Royal Society of London. 267*(B) 2507-2510.

Mironov, S. V., & O Connor, B. M. (2013). Two new genera of mites of the family Hypoderatidae (Acari: Astigmata) from swifts and their nests (Apodiformes: Apodidae) from the Philippines. *International Journal of Acarology, 39*(3), 209-234.

Mohammad, O. B., Hussein, H. S., & Elowni, E. E. (1988). The ant, *Pachycondyla sennaarensis* (Mayr) as an intermediate hosts for the poultry cestode, *Raillietina tetragona* (Molin). *Veterinary Research Communications, 12*, 325-327.

Moller. A. P. (1994). Parasites as an environmental component of reproduction in birds as exemplified by the swallow *Hurindo rustica*. *Ardea, 82*: 161.

Moller, A. P. (2008). Flight distance and blood parasites in birds. *Behavioral Ecology, 19*(6), 1305-1313.

Moller, A. P. (2010). Host-parasite interactions and vectors in the barn swallow in relation to climate change. *16*, 1158-1170. doi:10.1111/j.1365-2486.2009.02035.x

Moller, A. P. (1990a). Parasites and sexual selection: Current status of the Hamilton and Zuk hypothesis. *Journal Evolutionary Biology, 3*, 319-328.

Moller, A. P. (1990b). Effects of parasitism by a haematophagous mite on reproduction in the barn swallow. *Ecology, 71*(6), 2345-2357.

Moller, A. P. (1993). Ectoparasites increase the cost of reproduction in their hosts. *Journal of Animal Ecology, 62*, 309-322.

Moller, A. P. and Neilsen, J. T. (2007). Malaria and risk of predation: a comparative study of birds. *Ecology. 88*: 871-881.

Moller, A. P., Soler, J. J., & Vivaldi, M. M. (2010). Spatial heterogeneity in distribution and ecology of western Palearctic birds. *Ecology, 91*, 2769-2782.

Møller, A. P. (1987). Intraspecific nest parasitism and anti-parasite behaviour in swallows, *Hirundo rustica*. *Animal Behaviour, 35*(1), 247-254. doi:http://ezproxy.upm.edu.my:2099/10.1016/S0003-3472(87)80230-0

Monnig, H. O. (1938). A new spirurid nematode from a mangoose. *Livro Jub. Travassos.* Rio de Jan. pp.333-336.

Moyer, B. R., & Clayton, D. H. (2004). Avian defences against ectoparasites. In H. F. van Emden, & Rothschild (Eds.), *Insect & bird interactions and over* (pp. 241-257). UK: UK, Intercept.

Moyer, B., Gardiner, D., & Clayton, D. (2002). Impact of feather molt on ectoparasites: Looks can be deceiving. *Oecologia, 131*(2), 203-210. doi:10.1007/s00442-002-0877-9

Msoffe, P. L. M., Muhairwa, A. P., Chiwanga, G. H., & Kassuku, A. A. (2010). A study of ecto and endo-parasites of domestic pigeons in Morogoro municipality, Tanzania. *African Journal of Agricultural Research, 5*(3), 264-267.

Mumcuoglu, K. Y. (1990). A technique for quantitative evaluation of ectoparasitic mites and insects of domestic animals. *Experimental & Applied Acarology, 9*(1-2), 97-101. doi:10.1007/BF01198987

Murata, K. (2002). Prevalence of blood parasites in Japanese wild birds. *64*(9), 785-790.

Mushi, E. Z., Binta, M. G., Chabo, R. G., Mathaio, M., & Ndebele, R. T. (1999). *Haemoproteus columbae* in domestic pigeons in Sebele, Gaborone, Botswana. *Journal of Veterinary Research, 66*, 29-32.

Nadchatram, M. (2005). House dust mites, our intimate associates. *Tropical Biomedicine, 22(1).* 23-37.

Navarro, C., de Lope, F., Marzal, A., & Moller, A. P. (2004). Predation risk, host immune response, and parasitism. *Behavioral Ecology, 15*, 629-635.

Nelson, W. A., Bell, J. F., Clifford, C. M., & Keirans, J. E. (1977). Interaction of ectoparasites and their hosts. *Journal Medical Entomology, 13*, 389-428.

Nerassen, T. G., & Holmes, J. C. (1975). The circulation of cestodes among three species of geese nesting in the Anderson River Delta, Canada. *Acta Parasitologica Polonica, 23*, 277-289.

Ng, S. H. (2000a, January 19). Birds nest business at 'swallow hotels'. *The Star.*

Ng, S. H. (2000b, January 21). Group to check out 'swift hotels'. *The Star.*

Nordling, D., Anderson, M., Zohari, S., & Gustafsson, L. (1998). Reproductive effort reduces specific immune response and parasite resistance. *Proceedings Royal Society London, 265*(B), 1291-1298.

OConnor, B. M. (2009). Mites. In V. H. Resh, & R. T. Cardé (Eds.), *Encyclopedia of insects (second edition)* (pp. 643-649). San Diego: Academic Press. doi:http://ezproxy.upm.edu.my:2099/10.1016/B978-0-12-374144-8.00178-8

Okanga, S., Cumming, G. S., Hockey, P. A. R., Grome, M., & Peters, J. L. (2013). A comparison of techniques employed in detection of avian malaria infection, South Africa. *48*(2), 309-317. doi:http://dx.doi.org/10.3377/004.048.0215

Olof, H., Waldenström, J., & Bensch, S. (2004). A new PCR assay for simultaneous studies of *Leucocytozoon, Plasmodium* and *Haemoproteus* from avian blood. *The Journal of Parasitology, 90*(4), 797-802.

Oppliger, A., Richner, H., & Christe, P. (1994). Effect of an ectoparasite on lay date, nest-site choice, desertion and hatching success in the great tit (*Parus major*). *Behavioural Ecology, 5*, 130-134.

Ots, I., & Horak, P. (1998). Health impact of blood parasites in breeding great tits. *Oecologia, 116*, 441-448.

Page, R. D. M., Lee, P. L. M. & Becher, S. A.A different tempo of evolution in birds and their parasitic lice. Retrieved from http://taxonomy.zoology.gla.ac.uk/rod/posters/swifts.html

Page, R.D.M., Clayton, D.H. & Paterson, A.M. (1996). Lice and co-speciation: A response to Barker. *International Journal for Parasitology*, 26, 213-218.

Palma, R. L. (1978). Slide-mounting of lice: A detailed description of the Canada balsam technique. *The New Zealand Entomologist*, *6*(4), 432-436.

Paperna, I., Soh, M. C. K., & Yap, C. A. M. (2008). Haemosporozoan parasites found in birds in Peninsular Malaysia, Singapore, Sarawak and Java. *The Raffles Bulletin of Zoology*, *56*(2), 211-243.

Peirce, M. A. (2000). Order Haemospororida Danilewsky, 1885. In J. J. Lee, G. F. Leedale & P. Bradbury (Eds.), *An IIlustrated guide to the protozoa, vol.1* (2nd ed., pp. 339-347). Lawrence, KS: Society of Protozoologists.

Pence, D. B. (2008). Acariasis. In C. T. Atkinson, N. J. Thomas & D. B. Hunter (Eds.), *Parasitic diseases of wild birds.* (pp. 527-536). Iowa, USA: Wiley-Blackwell, John Wiley and Sons, Inc.

Peterson, P., Atyeo, W. T & Moss, W. W. (1980). *Feather mite Family Eustathiidae (Acarina: Sarcoptiformes)*. Academy of Natural Sciences. Philadelphia, Pennsylvania.

Pfeiffer, D. U. (2002). *Veterinary epidemiology- an introduction.* Royal Veterinary Collage. United Kingdom

Philips, J. R. (2007). Ectoparasites. In D. M. Bird, & K. L. Bildstein (Eds.), *Raptor research and management techniques* (pp. 311-317). US, Canada: Hancock House Pulishers.

Philips, J. R. (2000). A review and checklist of the parasitic mites (Acarina) of the Falconiformes and Strigiformes. *Journal Raptor Research, 34*(3), 210-231.

Pinsonneault, J., & Sadee, W. (2004). Pharmacogenomics of multigenic disease: Sex-specific differences in disease and treatment outcome. *AAPS Phamsci, 5*, E29.

Poiani, A. (1992). Ectoparasitism as a possible cost of social life: A comparative analysis using Australian passerines (Passeriformes). *Oecologia, 92*(3), 429-441. doi:10.1007/BF00317470

Price, R. D., & Clayton, D. H. (1997). Two new species of *Dennyus* (*Ctenodennyus*) lice (Phthiraptera: Menoponidae) from swiftlets (Apodiformes: Apodidae). *Journal of the Kansas Entomological Society, 70*(1), 4-10.

Price, R. D., Hellenthal, R. A., & Palma, R. L. (2003). World checklist of chewing lice with host associations and keys to families and genera. In R. D. Price, R. A. Hellenthal, R. L. Palma, K. P. Johnson & D. H. Clayton (Eds.), *The chewing lice. World checklist and biological overview.* (pp. 1-448). Champaign: Natural History Survey Special Publication.

Proctor, H., & Owens, I. I. (2000). Mites and birds: Diversity, parasitism and coevolution. *Trends in Ecology & Evolution, 15*(9), 358-364. doi:S0169534700019248 [pii]

Proctor, H. C. (2003). Feather mites (Acari: Astigmata): Ecology, behavior, and evolution. *Annual Review of Entomology, 48*, 185-209. doi:10.1146/annurev.ento.48.091801.112725 [doi]

Przybilla, B., Ryckmanns, F., Postner, M., & Klovekorn, W. (1983). Epizootic disease caused by the mite *Dermanyssus gallinae* (de geer 1778). [Epizootie durch die Milbe *Dermanyssus gallinae* (De Geer 1778)] *Der Hautarzt; Zeitschrift Fur Dermatologie, Venerologie, Und Verwandte Gebiete, 34*(7), 335-338.

Qadri, M. A. H. (1936). Studies on the mouth-parts of Mallophaga infesting North-indian birds. *Proceedings of the Indian Academy of Sciences - Section B, 3*(5), 411-423. doi:10.1007/BF03049361

Rahman, M. A. (2002). Using mist-nets on canopy walkways in Malaysia to study canopy avifauna. *The Raffles Bulletin of Zoology, 50(2)*, 499–506.

Rahman, M. A., Salleh, M. A. & Tuen, A. A. (2002). Bird diversity of the Crocker range national park, Sabah Malaysia. ASEAN Review of Biodiversity and Environmental Conservation (ARBEC). http://www. arbec.com.my/pdf/-art16julysep02.pdf Retrieved on 15th October, 2008.

Rajpar, M. N. & Hussien, M. Z. (2008). Assessment of avifauna composition at Paya Indah wetland peat swamp forest, Selangor Peninsular Malaysia. In *International Symposium and Workshop on Tropical Peatland.* 19–22nd August, 2008 Kuching, Sarawak Malaysia. Pp. 41–50.

Redpath, S. (1988). Vigilance levels in preening dunlin *Caladris alpina*. *Ibis, 130*, 555-557.

Reed, T. E., Daunt, F., Kiploks, A. J., Burthe, S. J., Granroth-Wilding, H. M. V., & Takahashi, E. A. (2012). Impacts of parasites in early life: Contrasting effects on juvenile growth for different family members. PLoS ONE 7(2): e32236. doi:10.1371/journal.pone.0032236

Reid, M. W. (1983). Cestodes. In M. S. Hofstad, H. J. Barnes, B. W. Calnek, W. M. Reid & H. W. Yoder (Eds.), *Diseases of poultry* (8th ed., pp. 649-667). Ames, IA: Iowa State University Press.

Robert E Ricklefs. (2005). Avian malaria parasites and other Haemosporidia by Gediminas Valkiūnas. *The Quarterly Review of Biology, 80*(3), 364-365.

Richner, H., Oppliger, A., & Christe, P. (1993). Effect of an ectoparasite on reproduction in great tits. *Journal of Animal Ecology, 62*, 703-710.

Roscoe, D. E., & Huffman, J. E. (1982). Case report-trematode (*Sphaeridiotrema globulus*)-induced ulcerative hemorrhagic enteritis in wild, mute swans (*Cygnus olor)*. *Avian Diseases, 26*, 214-224.

Roy, L., & Chauve, C. M. (2007). Historical review of the genus *Dermanyssus* DugÃ¨s, 1834 (Acari: Mesostigmata: Dermanyssidae). *Parasite, 14*(2), 87-100.

Sanz, J. J., Arriero, E., Moreno, J., & Merino, S. (2001). Female hematozoan infection reduces hatching success but not fledging success in pied flycathers *Ficedula hypoleuca*. *The Auk, 118*, 750-755.

Savage, A. F., Robert, V., Goodman, S. M., Raharimanga, V., Raherilalao, M. J., Andrianarimisa, A., Greiner, E. C. (2009). Blood parasites in birds from Madagascar. *Journal of Wildlife Diseases, 45*(4), 907-920. doi:45/4/907 [pii]

Schell, S. C. (1970). *The trematodes*. United States of America: W. C. Brown Company Publishers.

Scheuerlein, A., & Ricklefs, R. E. (2004). Prevalence of blood parasites in European passeriform birds. *Proceedings: Biological Sciences, 271*(1546), 1363-1370.

Schmidt, G. D. (1970). *How to know the tapeworms*. United States of America: W. C. Brown Company Publishers.

Schmidt, G. D. (1986). *Handbook of tapeworm identification*. Boca Raton, FL: CRC Press.

Schmidt, G. D. (1972). Cyclophyllidean cestodes of Australian birds, with three new species. *The Journal of Parasitology, 58*(6), 1085-1094.

Sealander, J. A., & Hoffman, C. E. (1956). A modified Berlese funnel for collecting mammalian and avian ectoparasites. *The Southwestern Naturalist, 1*(3), 134-136.

Seegar, W. S., Schiller, E. L., Sladen, W. J. L., & Trpis, M. (1976). A Mallaphaga, *Trinoton anserinum*, as a cyclo developmental vector for a heartworm parasite in waterfowl. *Science, 194*, 739-741.

Siikamaki, P., Ratti, O., Hovi, M., & Bennet, G. F. (1997). Association between haematozoan infections and reproduction in the pied flycatcher. *Functional Ecology, 11*, 176-183.

Sikes, R. K., & Chamberlain, R. W. (1954). Laboratory observations on three species of bird mites. *Journal of Parasitology, 40*, 691-697.

Smith, L. M., & Burgoyne, L. A. (2004). Collecting, archiving and processing DNA from wildlife samples using FTA databasing paper. *BMC Ecology, 4*, 4. doi:10.1186/1472-6785-4-4 [doi]

Sol, D., Jovani, R., & Torres, J. (2000). Geographical variation in blood parasites in feral pigeons: the role of vectors. *Ecography. 23*: 307-314.

Sol, D., Jovani, R., & Torres, J. (2003). Parasite mediated mortality and host immune response explain age-related differences in blood parasitism in birds. *Oecologia, 135*(4), 542-547. doi:10.1007/s00442-003-1223-6

Soulsby, E. J. L. (1976). *Helminths, arthropods & protozoa of domesticated animals* (6th ed.). London: Bailliere, Tindall and Cassell Ltd.

Soulsby, E. J. L. (1986). Genus *Haemoproteus* Kruse, 1890. In E. J. L. Soulsby (Ed.), *Helminths, arthropods and protozoa of domesticated animals.* (7th ed., pp. 700-706). Soulsby, London: Bailliere Tindall.

Stamp, R.K., Brunton, D.H., & Walter, B. (2002). Artificial nest box use by the North Island saddleback: effects of nest box design and mite infestations on nest site selection and reproductive success. *New Zealand Journal of Zoology*. 29: 285-292.

Stephan, S.A.R., Kaschula, V.R., & Canham, F.S. (1950). Respiratory acariasis of canaries. *Journal of the South African Veterinary Medical Association, 21*: 103-107.

Spassky, A. A. (2002). Neoliginae, subfam. N. (syn. tr. neoligini spassky, 1980), A new subfamily of cyclophyllidean cestodes. *Acta Zoologica Lituanica, 12*(1), 86-89. doi:10.1080/13921657.2002.10512492

Spassky, A. A. (1946). [Contribution to the knowledge of the avian cestode fauna of USSR]. In V. P. Pod'yapol'skaya (Ed.), *Gel'mintologicheskiy sbornik.* (pp. 252-261). Moscow, Leningrad: Izdatel'stvo Akademii Nauk SSSR.

Spassky, A. A., & Spasskaja, L. P. (1959). [Cestodes of swifts and swallows, phylogenetically distant but ecologically similar birds] (in Russian). *Helminthologia, 1*, 85-98.

Spencer, K. A., Buchanan, K. L., Leitner, S., Goldsmith, A. R., & Catchpole, C. K. (2005). Parasites affect song complexity and neural development in a songbird. *Proceedings of the Royal Society of London, 272* (Series B) 2037.

Springer, W. T. (1972). Other blood and tissue protozoa. In M. S. Hofstad (Ed.), *Diseases of poultry* (6th ed., pp. 727-740). Iowa State: Ames: Iowa State University Press.

Spurrier, M. F., Boyce, M. S., & Manly, B. F. J. (1991). Effects of parasites in mate choice by captive sage grouse. In J. E. Loye and M. Zuk (eds), *Birds-parasites interactions, ecology, evolution and behavior* (pp. 390-398). Oxford, Oxford University Press,

Stock, T. M., & Holmes, J. C. (1987). Host specificity and exchange of intestinal helminths among four species of grebes (Podicipedidae). *Canadian Journal of Zoology, 65*, 669-676.

Tan, T. M. C., Nelson, J. S., Ng, H. C., Ting, R. C. Y., & Kara, U. A. K. (1997). Direct PCR amplification and sequence analysis of extrachromosomal plasmodium DNA from dried blood spots. *Acta Tropica*, *68*(1), 105-114. doi:http://ezproxy.upm.edu.my:2099/10.1016/S0001-706X(97)00080-6

Tella, J.L., Gajon, A., Gortazar, C., & Osacar, J.J. (1998). High host specificity of *Crataerina melbae* (Diptera: Hippoboscidae) in a mixed colony of birds. *Journal of Parasitology*, *84*: 198-200

Threlfall, W. (1986). Parasites: An ignored factor in the study of the energetics and food of seabirds. *Pacific Seabird Group, 13*, 110-111.

Tolesano-Pascoli, G., Garcia, F. I., Gomes, C. R. G., Diniz, K. C., Onofrio, V. C., Venzal, J. M., & Szabo, M. P. J. (2014). Ticks (Acari: Ixodidae) on swifts (Apodiformes: Apodidae) in Minas Gerais, Southern Brazil. *Experimental and Applied Acarology, 64*, 259-263.

Tompkins, D. M. (1996). Evolutionary ecology of bird-parasite associations. (Doctoral thesis, Wolfson College, University of Oxford, United Kingdom). Thesis retrieved from file:///F:/literature/tompkins%201996.pdf

Tompkins, D. M. (1999). Impact of nest-harvesting on the reproductive success of black-nest swiftlets *Aerodramus maximus*. *5*(1), 33-36.

Tompkins, D. M., Jones, T., & Clayton, D. H. (1996). Effect of vertically transmitted ectoparasites on the reproductive success of swifts (*Apus apus*). *Functional Ecology, 10*(6), 733-740.

Tompkins, D. M., & Clayton, D. H. (1999). Host resources govern the specificity of swiftlet lice: Size matters. *Journal of Animal Ecology, 68*(3), 489-500.

Valim, M. P. (2013). Three new species of *Dennyus* Neumann, 1906 (Phthiraptera, Amblycera, Menoponidae) parasitic on swifts (Aves, Apodiformes, Apodidae) in Brazil. *Museu De Zoologia Da Universidade De Sao Paulo, 53*(30), 415-429.

Valkiunas, G. (2005). Life cycle and morphology. *Avian malaria parasites and other Haemosporidia* (pp. 17-19). Boca Raton: CRC Press.

Valkiūnas, G., Bensch, S., Iezhova, T. A., Križanauskienė, A., Olof Hellgren, & Bolshakov, C. V. (2006). Nested cytochrome B polymerase chain reaction diagnostics underestimate mixed infections of avian blood haemosporidian parasites: Microscopy is still essential. *The Journal of Parasitology, 92*(2), 418-422.

Valkiūnas, G., Lezhova, T. A., Križanauskienė, A., Palinauskas, V., Sehgal, R. N. M., & Bensch, S. (2008). A comparative analysis of microscopy and PCR-based detection methods for blood parasites. *The Journal of Parasitology, 94*(6), 1395-1401.

Valkounova, J. (1987). Comparative studies on the morphology, histology and histochemistry of metacestodes (Hymenolepididae, Dilepidiidae and Dipylidiidae). *Folia Parasitologica, 34*, 117-128.

Van Riper III, C., & Van Riper, S.G. (1980). A necropsy procedure for sampling disease in wild birds. *The Condor, 82*(1), 85-98.

Van Riper III, C., Van Riper, S.G., Goff, M. L., & Laird, M. (1986). The epizootiology and ecological significance of malaria in Hawaiian land birds. *Ecological Monographs, 56*(4), 327-344.

Varghese, T. (1987). Endoparasites of birds of paradise in Papua New Guinea. *Veterinary Parasitology, 26*(1–2), 131-144. doi:http://ezproxy.upm.edu.my:2099/10.1016/0304-4017(87)90083-5

Viljoen, G. J., Nel, L. H., & Crowther, J. R. (2005). *Molecular diagnostic PCR handbook*. Netherlands: Springer.

Wagner, R., & Stallmeister, N. (2000). *Cheyletiella* dermatitis in human, dogs and cats. *British Journal of Dermatology, 143*, 1110-1112.

Waldenström, J., Bensch, S., Hasselquist, D., & Östman, Ö. (2004). A new nested polymerase chain reaction method very efficient in detecting *Plasmodium* and *Haemoproteus* infections from avian blood. *The Journal of Parasitology, 90*(1), 191-194.

Walter, D. E., & Proctor, H. C. (1999). *Mites: Ecology, evolution and behaviour.* New York, USA: CABI.

Walther, B. A., & Clayton, D. H. (1997). Dust-ruffling: A simple method for quantifying ectoparasite loads of live birds (sacudidas de polvo: Un metodo sencillo para cuantificar las cargas de ectoparasitos en aves vivas). *Journal of Field Ornithology, 68*(4), 509-518.

Weddle, C. B. (2000). Effects of ectoparasites on nestling body mass in the house sparrow. *The Condor, 102*, 684-687.

Wobeser, G. (2008). Parasitism: Costs and effects. In C. T. Atkinson, N. J. Thomas & D. B. Hunter (Eds.), *Parasitic diseases of wild birds* (First ed., pp. 3-9). Iowa, USA: Wiley Blackwell.

Wobeser, G. (1981). *Diseases of wild waterfowl* (2nd ed.). New York: Plenum Press.

Wong, S., Chong, A., Mak, J., Tan, J., Ling, S., & Ho, T. (2011). Molecular identification of house dust mites and storage mites. *Experimental and Applied Acarology, 55*(2), 123-133. doi:10.1007/s10493-011-9460-6

Wright, E. J., Nayar, J. K & Forrester, D. J. (2005). Interactive effects of turkey pox virus and *Plasmodium hermani* on turkey poults. *Journal of Wildlife Diseases. 41*: 141-148

Yamaguti, S. (1959). *Systema helminthum Vol. II The cestodes of vertebrates*. London, New York: Interscience Publishers Ltd.

Yamaguti, S. (1971). *Synopsis of digenetic trematodes of vertebrates. Vol. I & II.* Tokyo, Japan: Keigaku Publishing Company.

Yorke, W & Maplestone. (1969). *Nematodes parasites of vertebrates*. New York: Hafner Publishing Company.

Zinkl, J. G. (1986). Avian haematology. In N. C. Jain (Ed.), *Schalm's veterinary haematology*. (4th ed., pp. 256-273). Philadelphia: Lea and Febiger.

Zuk, M., & McKean, K. A. (1996). Sex differences in parasite infections: Patterns and processes. *International Journal for Parasitology*, *26*(10), 1009-1024. doi:http://ezproxy.upm.edu.my:2099/10.1016/S0020-7519(96)80001-4