



**MOLECULAR EPIDEMIOLOGY OF *Giardia duodenalis* ISOLATES FROM
SIKA DEER AND JAVAN RUSA IN SUNGAI LEMBING, PAHANG**

By

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**Thesis Submitted in Partial Fulfilment of the Requirement for
Bachelor of Medical Laboratory Technology (Hons),
Faculty of Health Sciences, Universiti Teknologi MARA**

2016

ACKNOWLEDGEMENTS

In the name of Almighty God, Most Gracious and Most Merciful, all praises to Him for continuously giving me guidance, strength and opportunities to complete successfully my Final Year Project and also this thesis within the time limit given.

First of all, I would like to express my greatest gratitude to Kol. Dr. Amir Mukhriz Abdul Latif, the Dean of the Faculty of Health Sciences for allowing the research to be conducted. A special thanks to Dr. Wan Mazlina Md Saad, the head of MLT department, and Dr. Siti Nazrina Camalxaman as the Final Year Project coordinator for their countless support in providing information and guidelines for final year students' projects.

I would also like to show my deepest appreciation to Dr. Tengku Shahrul Anuar Tengku Ahmad Basri, my supervisor for the final year project for being there for me throughout the laboratory works and the writing process. Without his advices, motivation and enthusiasm, this project would not happen smoothly. His supportive ideas and guidelines help me to understand the complex stages of the research and writing. Therefore, grateful thanks to my supervisor for his time, efforts and trust in me to finish the planned project.

Other than that, I would like to thank my co-supervisor, Prof. Datin Dr. Norhayati Moktar, who does not fail to show me support during the entire process in the research. Sincere thanks to Ms. Fatmah Md Salleh and Ms. Nabilah Amelia Mohammad for lending me their expertise in laboratory techniques in order to help me completing this research. I would also like to express my gratitude to the laboratory staffs in Department of Medical Laboratory Technology for helping with the facilities during the laboratory processing of the samples.

I would also like to show my deepest gratitude to my beloved parents, Encik Zamri bin Jamil and _____ for their endless encouragement, patience and support. Special thanks for my research buddies under the same

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ABSTRACT

Giardia duodenalis is a binucleate intestinal parasite that has two forms of life cycle which are trophozoite and cyst. Cyst is the infective stage while trophozoite attaches itself to our intestinal villi. It can be divided into eight different genetic assemblages starting from A to H. Common assemblages infecting the human which is A and B, found in the animals, open a recent transmission mode called zoonotic. Giardiasis is a common disease associated with *G. duodenalis* and gives common clinical symptoms such as diarrhea, malabsorption and abdominal pain. Recently, prevalence studies for *G. duodenalis* in Malaysia are starting to focus on farm animals. However, there is a limited data on the characterization of *G. duodenalis* from deer farm in this country. Therefore, this research is conducted to determine the prevalence of *G. duodenalis* from Sika deer and Javan rusa deer in Sungai Lembing, Pahang. A cross-sectional study was conducted in D'Paradise deer farm, one of the largest deer farm in Malaysia, located in Sungai Lembing, Pahang. A total 50 stool samples were collected, 25 samples each from two species of deer involved in this research which are Sika deer (*Cervus nippon*) and Javan rusa (*Cervus timorensis*). The stool samples collected were analysed microscopically using Wheatley's trichrome staining technique and nested polymerase chain reaction by the amplification of triosephosphate isomerase gene. Both methods showed prevalence of 0% (0/50) for *G. duodenalis* in both species. Therefore, more studies with a broad range of deer farms and various species of deer could be performed to further understand the characterization of *G. duodenalis* from deer in Malaysia.

CHAPTER 1

INTRODUCTION

The first description of *Giardia* comes from van Leeuwenhoek when he examined his own stools in 1681 (Dobel, 1920). In 1859, Lambl classified *Giardia* into a genus called *Cercomonas* and gave a name to the organism as *Cercomonas intestinalis* (Lambl, 1859). The proposed name *Lambliia intestinalis* was suggested by Blanchard in 1888 (Bernal *et al.*, 1998). However, in 1902, Stiles substituted the name with *Giardia duodenalis* (Steimle *et al.*, 1997) while in 1915, Kofoid and Christensen named the organism *Giardia lamblia* (Kofoid & Christensen, 1920).

To differentiate between the species of *G. muris* and *G. lamblia*, Simon used morphological characteristics and determined *G. lamblia* is present in human (Simon, 1922). Based on the morphology of the median body of the organism, Filice differentiated the species of *Giardia* into three types which are *G. duodenalis*, *G. muris* and *G. agilis* (Fraser *et al.*, 2000). *G. lamblia* was described as pear-shaped with claw-shaped transverse bodies while *G. muris* was small with round bodies. *G. agilis* was long and slender with body of a teardrop shape when observed by using light microscopy (Feely & Erlandsen, 1985). Further classification of *Giardia* species are done using electron microscopy such as *G. psittaci* from parakeets (Erlandsen & Bemrick, 1987), *G. ardeae* from herons (Erlandsen *et al.*, 1990;), and *G. microti* from voles and muskrats (Ey *et al.*, 1997; Adam, 2001). There is also a species of *Giardia* that infect the reptiles which is called *G. varani* (Iowa, 2012).

G. duodenalis is a parasite with the characteristics of anaerobic, binucleate and intestinal flagellate. It has two main forms in life cycle which are trophozoite and cysts. Trophozoite attaches itself to the intestinal villi of the host while cysts, the infective stage of *G. duodenalis* contaminate the environment (Mcpherson, 2005). The cysts are considered infective once it is passed out in stools and survive even in