# CHAPTER I
# INTRODUCTION

## 1.1 Background and rationale of the study

Opisthorchiasis is cause by *Opisthorchis viverrini* infection. The endemic areas are Lao People's Democratic Republic, Cambodia and Thailand especially in the northeastern part (International Agency for Research on Cancer [IARC], 1994; Sithithaworn, Haswell-Elkins, 2003). An estimated about 5-6 million people infected with *O.viverrini* (World Health Organization [WHO], 1995; Jongsuksuntigul, Imsomboon, 2003). Humans are infected with *O.viverrini* by ingestion of raw or uncooked cyprinoid fishes contained metacercariae, the infective stage. After metacercariae excystation in the duodenum, the juvenile flukes migrate to the hepatic bile duct and gallbladder where they can settle and develop to adult stage. Opisthorchiasis leads to many pathological changes of the intra- and extrahepatic bile ducts and gallbladder through mechanical damage, parasite excretion/secretion and immunopathogenesis. Mechanical damage lead to epithelium desquamation that induce cell proliferation response including epithelial hyperplasia, goblet cell metaplasia, adenomatous hyperplasia and periductal fibrosis (Kaewkes, 2003; Sripa, 2003; Sripa et al, 2007). The virulence of disease may associate with density of parasites and durations of infection (Bhamarapravati et al., 1978; Harinasuta et al., 1984). Moreover, the *O.viverrini* infection associated with many hepatobiliary diseases such as cholangitis, obstructive jaundice, cholecystitis, cholelithiasis and hepatomegaly including cholangiocarcinoma (CCA). Up to date, researchers in Khon Kaen University and their colleagues are interested in opisthorchiasis and CCA in many aspects such as *O. viverrini* pathology, CCA model, host-parasite interaction, diagnosis, prevention and treatment (Pinlaor et al., 2009; Boonjaraspinyo et al., 2010; Loilome et al., 2010). Hence, the studies in humans are ethically limited thus animal models have been needed. Hamster is the most common animal model which is used for studies of *O.viverrini* infection and CCA (Boonmars et al., 2009; Songserm et al., 2009; Sripa et al., 2009; Boonjaraspinyo et al., 2010; Prakobwong et al., 2010).

However, other animal models (dog, cat, hamster, monkey, guinea pig) have been used to studies for long time and addressed in many review papers including parasitology books (Noble, Elmer, 1989) but lack of the details of the difference among animal models which is focused in biology, worm recovery, parasite size, host interaction such as macropathology and micropathology. Recently, our previous study (Boonmars et al., 2009) reported some differences of liver gross appearance and parasite size among infected hamster and gerbil models for *O.viverrini* infection. The result showed the *O. viverrini* adults from infected gerbils were larger than those collected from infected hamsters. These results may cause by different the biology such as host physiology, components in bile acids of each host. Although, there was a contrast report that the intestinal fluke, *Echinostoma caproni* developed to adult in hamsters and gerbils without the difference in size at the same time point of observation (Mahler et al., 1995). Nowadays, the study of animal models for opisthorchiasis is rare. Thus, I sought to develop another animal model for *O.viverrini* infection to reveal other pathologies which may be possible occurred in human opisthorchiasis and moreover, reveal parasite host interaction in difference host condition.

Referred to our previous report that gerbil is one of the hosts that *O. viverrini* infections can be developed to adult. Thus, the present study is designed to determine the effect of *O.viverrini* in hamster and gerbil for comparison of morphology, biology, susceptibility of parasite and pathology as follow:

i) host susceptibility through worm recovery, adult size, reproductive development such as area of ovary and testes through carmine staining and eggs per worm using simple smears and egg per gram of feces using modified formalin concentration technique during 30-90 days post-infection.

ii) bile component through thin-layer chromatography (TLC)

iii) gross appearances using photography

iv) pathohistological changes using hematoxylin and eosin staining, and Gomori's trichome staining

v) blood chemistry through liver function tests (alanine transaminase (ALT) and alkaline phosphatase (ALP)

## 1.2 Objectives of the study

1.2.1 To compare the susceptibility of *O.viverrini* infection in hamsters and gerbils.

1.2.2 To study the pathological changes of hepatobiliary system in hamsters and gerbils infected with *O.viverrini.*

1.2.3 To compare bile fluid components of hamsters and gerbils.

## 1.3 Conceptual framework