# Letters

## Human Cysticercosis and Larval Tropism of *Taenia asiatica*

*Taenia solium*, *T. saginata* and the recently discovered *T. asiatica*[1–3], are species of taeniid cestodes whose adult stages are known to infect humans. Less clear is whether the eggs of *T. asiatica* also infect humans (as those of *T. solium* do, causing cysticercosis and the fatal neurocysticercosis) or whether the species is similar to *T. saginata* whose eggs do not cause infections in humans.

Although evidence does exist in support of infective egg stages[4,5], it is also disputed for two main reasons[6–8]. First, *T. asiatica* is more closely related to *T. saginata* at the molecular level than to any other taeniid; if *T. saginata* does not cause human cysticercosis, then the same could be said of *T. asiatica*. Second, observations of human populations where *T. asiatica* adults are highly prevalent show no evidence of human cysticercosis or neurocysticercosis (eg. Taiwan, and Samosir Island, Indonesia). We would like to discuss further reasons why such observations might be incorrect.

First, although molecular affinities between *T. asiatica* and *T. saginata* are very close, the egg infectivity of the two species is quite different; the natural hosts of *T. saginata* are cattle, while those of *T. asiatica* are pigs (the same intermediate host for human cysticercosis-producing *T. solium*). Second, the absence of cysticercosis or neurocysticercosis in these human populations may merely suggest a low prevalence of *T. solium*. We, however, believe that it is an erroneous indicator of whether the eggs of *T. asiatica* can infect humans.

So, are there similarities between *T. solium* and *T. asiatica* that could be used to indicate whether eggs of *T. asiatica* infect humans? Again, subtle differences between the two species suggest that this is not the case. First, tropism and size of the larval forms differ between the two species. The larva of *T. solium* (*Cysticercus cellulosae*) in pigs exhibits no defined tropism[9] and larval size ranges from 5 to 15 mm (Ref. 10). In contrast, the larva of *T. asiatica* (*C. viscerotropica*) in the pig (and other experimental intermediate hosts such as calves, goats and monkeys)[1,11], exhibits marked liver tropism, while reaching a larval size of approximately 2 mm[1,2]. This suggests that if *C. viscerotropica* follows the same developmental course in humans as in other intermediate hosts, then it would preferentially parasitize the liver, causing hepatic cysticercosis, with smaller larvae being present than if *C. cellulosae* were the infective agent. Such cases of hepatic cysticercosis could be symptomatic or not, depending on larval number and location within the liver (although hepatic/gastrointestinal manifestations may occur). It could be assumed that such clinical symptoms would be more related to the initial stages of cystic hydatidosis than to the classical cysticercosis or neurocysticercosis caused by *T. solium*. Therefore, where *T. asiatica* is prevalent in human populations, the absence of classical evidence of cysticercosis should not be taken as indication of the lack of human cysticercosis caused by this parasite.

The clinical risk of this possible larval parasitization by *T. asiatica* could be similar to that of classical cysticercosis, but only if the larvae also reach other locations within humans (as in the case of *T. solium* and the larvae of *Echinococcus granulosus* or *E. multilocularis*) or develop aberrant forms as in the case of *T. solium* (the racemose cysticercus). At the experimental level, larvae of *T. asiatica* have been successfully developed in nonhepatic regions[12] and can develop larger body sizes in hosts other than pigs[13].

Evidence for the infection of humans by eggs of *T. asiatica* therefore remains contradictory. However, we are of the opinion that *C. viscerotropica* should be included in the evaluation of liver lesions compatible with the larval development of cestodes, particularly in those Asian countries where the parasite is already known to occur.


**References**

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# Book Reviews

## The Biology of Mosquitoes (Vol. 2) Sensory Reception and Behavior

*by A.N. Clements, CABI Publishing, 1999. £95.00*
*(xv + 740 pages) ISBN 0 85199 313 3*

This hefty volume is the second in an anticipated series of three that comprehensively addresses major aspects of the biology of mosquitoes. The structure and function of larval and adult sensory organs and the diverse and complicated behavior of both larval and adult mosquitoes are described. Information drawn from a wealth of available published literature on all the major subfamilies of mosquitoes is presented. While efforts are made to identify general properties that all mosquitoes share, attention is paid to the source of particular findings and conclusions that respects and acknowledges the considerable evolutionary distance among the mosquitoes. Furthermore, efforts are made to focus on studies of mosquito behavior in the wild so as not to bias the general conclusions with the potentially aberrant behavior of mosquitoes in the laboratory.

The first five of the 17 chapters describe the anatomy of the sensory organs of the larva and adult in great detail. Line drawings and transmission and scanning electron micrographs are combined with clear descriptions to provide a remarkable source text for the structural components of the mosquito peripheral nervous system. In addition, eletrophysiological data are presented where available, providing