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THE POSSIBLE SNAIL INTERMEDIATE HOSTS OF DICROCOELIUM HOSPES IN NIGERIA

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Abstract

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Limicolaria flammea, L. striatula and *Lamellaxis gracilis* were experimentally infected with larval stages of *Dicrocoelium hospes* after exposure to embryonated eggs. *Limicolaria* proved to be more suitable, showing higher infection rates, more mature cercariae and retaining infections longer. The potential for *Lamellaxis* as a natural host seems higher because it is known to occur in both rain forest and drier savanna grassland where most cattle are pastured. *Limicolaria* is essentially a rain forest snail.

Laboratory infection, cercariae, larvae, sporocysts, trematodes.

There are records of *Dicrocoelium hospes* infections in cattle in Nigeria and several other countries. Such reports include those of Graber and Oumatie (1964), Odei (1966), Williams (1969), Mahlau (1970), Kajubiri et al. (1977) and Obiamiwe (1977). Studies of its life cycle including the molluscan hosts are very sketchy and speculative in most cases. This situation contrasts sharply with *Dicrocoelium dendriticum,* a closely related species where almost thirty snail species and several arthropods were listed by Soulsby (1965) as intermediate hosts in Europe, America, Asia and North Africa.

Limicolaria and *Achatina* were suggested as possible snail hosts of *D. hospes* in Ghana (Odei 1966) while Bourgat et al. (1975) found larval stages of the trematode from *Limicolaria flammea, L. striatula* and *L. aurora* collected from grazing fields in Togo. In Sierra Leone, however, Asanji (1976) failed to infect experimentally any of these snails, although the country shares similar geographical and ecological features with Ghana and Togo. It is therefore important to establish the hosts of the fluke in Nigeria for a good understanding of its epizootiology.

Materials and Methods

Eggs of *D. hospes* were recovered from the gall bladders of infected cattle or teased out of the uterus of adult worms. They were incubated to full embryonation using the method of Fashuyi (1984). Samples of *Limicolaria flammea, L. striatula,* an unidentified *Limicolaria* sp. and young *Achatina* sp. were collected from the Biological Garden of the University of Lagos while colonies of *Lamellaxis gracilis* were raised in the laboratory. Adult *Achatina* sp. was purchased from open markets in Lagos. Several snails from each sample collected from the Biological Garden were dissected and examined for trematode infection.

Exposure of snails to infection was carried out by isolating them in groups of five in plastic cans containing food mixed with over one hundred fully embryonated eggs for 48 hours on each occasion. Seven days after exposure, 1–2 snails of each type were dissected daily and examined

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for any possible trematode infections. Mature cercariae were studied live but measurements were taken from twenty specimens fixed in hot 10 % formalin.

Snails were maintained in the laboratory on fresh or decaying paw paw leaves, lettuce and occasionally moist humus in the case of *L. gracilis*.

Results

Examination of Snails Collected from Natural Conditions

A total of 50 *Limicolaria flammea*, 42 *L. striatula* and 30 unidentified *Limicolaria* sp. collected from the Biological Garden were examined without finding trematode infections. Similarly, none of the 25 adult and 10 young *Achatina* sp. examined without exposure to embryonated eggs of *D. hospes* was infected by trematodes.

Table 1

Results of Snail Infections After Exposure to Embryonated eggs of D. hospes

Ser.	Snail types	Total number exposed	Total with infection	Percentage	Period (Days) mature cercariae were recovered
1.	Limicolaria flammea	100	30	30	16—54
2.	Limicolaria striatula	40	9	20	30—72
3.	Limicolaria sp.	30	—	—	—
4.	Lamellaxis gracilis	100	8	8	30—46
5.	Young/Adult Achatina sp. Achatina sp.	 18/30 18/30	 —	 —	 —

Infection of Snails Exposed to *D. hospes* Eggs

The results obtained after exposure of snails to embryonated eggs are presented in Table 1. Larval stages of *D. hospes* developed to maturity in *Limicolaria flammea*, *L. striatula* and *Lamellaxis gracilis*. Both young and adult *Achatina* sp. and *Limicolaria* sp. were uninfected. The highest rate of infection of 30 % was recorded in *L. flammea*, followed by 20 % infection in *L. striatula*. Only 8 % of *Lamellaxis gracilis* exposed to embryonated eggs had *D. hospes* infections.

Larval Stages of *D. hospes*

Both the mother and daughter sporocysts were recovered from the digestive glands of infected snails. The minimum period for occurrence of mature cercariae in *L. flammea* was 16 days after exposure. The highest number of mature cercariae recovered from the snail was 40. Other snails contained between 15 and 20 mature cercariae each when dissected. However, over 80 developing cercariae have been counted from few mother sporocysts of all species of infected snails. Mature cercariae were still recovered from *L. striatula* 72 days after exposure. Most of *Lamellaxis gracilis* population exposed to infection died out after 46 days or were never infected. Few had empty sporocysts.

The Cercaria of *D. hospes*

The mature cercaria has a semi-transparent body, 1.7—2.0 mm × 0.5—0.7 mm; and a short tail. The oral sucker measuring 0.3—0.4 mm in diameter bears a stylet,

while the ventral sucker is 0.16—0.24 mm. across. The pharynx measures 0.11 to 0.15 mm × 0.16—0.20 mm The flame cell formula and pattern of integumentary papillae are similar to the description of Bourgat et al. (1975).

Discussion

The cercariae recovered from laboratory infected snails are similar in size and morphology to those described from naturally infected *Limicolaria* from Togo by Bourgat et al. (Loc. cit.). Although *Achatina* sp. has been recorded as a host in Ghana by Odei (1966), the results in Table 1 show that this may not be the case in Nigeria because all mature and young snails exposed to embryonated eggs never showed signs of infection. A similar experience was encountered by Asanji (1976) in Sierra Leone. The most attractive of all the snails used for this experiment is *Limicolaria flammea* in which infections reached maturity within 16 days and which also produced largest number of mature cercariae. However, the fact that the unidentified species of *Limicolaria* was refractive to infections shows that *D. hospes* is host specific to some extent.

The development of *D. hospes* larvae in *Lamellaxis gracilis* has not been mentioned in any literature. The snail is much smaller in size than either *Limicolaria* or *Achatina*. It is known to be the first intermediate host of *Mesocoelium monodi*, a common parasite of amphibians and reptiles in West Africa (Thomas 1965). The trematode is a member of the Dicrocoeliidae (Bayssade - Dufour and Bourgat 1975). Although a very low rate of 8 % infection was recorded from the snail, its potential as a natural vector seems higher than *Limicolaria*. *Lamellaxis* has been observed to occur in both rain forests and savannah zones throughout W. Africa (Asanji loc. cit), unlike *Limicolaria* which is essentially a rain forest snail. The cattle rearing areas of Nigeria are mostly in the savannah regions with long dry seasons. This does not however rule out the possibility of occurrence of *Limicolaria* throughout the year around the river valleys and water holes which form areas of concentration of cattle during the dry season.

Mezihostitelští plži motolice Dicrocoelium hospes v podmínkách Nigérie

Plži *Limicolaria flammea, L. striatula* a *Lamellaxis gracilis* byli experimentálně invadováni embryonovanými vajíčky *Dicrocoelium hospes*. Pro experimentální invazi se nejlépe osvědčili plži rodu *Limicolaria*, u nichž byla zjištěna vyšší invadovanost, bylo nalezeno více zralých cerkárií a zůstávali po delší dobu invazeschopní. Jako mezihostitel v přírodních podmínkách však přichází v úvahu spíše rod *Lamellaxis*, který se vyskytuje jak ve vlhkých lesnatých lokalitách, tak i v biotopech sušších travnatých savan spásaných skotem. Rod *Limicolaria* je typický pro vlhké lesnaté oblasti.

Промежуточные хозяева — гастроподы двуустки Dicrocoelium hospes в условиях Нигерии

Двуустки *Limicolaria flammea, L. striatula* и *Lamellaxis gracilis* были экспериментально инвадированы оплодотворенными яичками *Dicrocoelium hospes*. Пригоднее всех для экспериментальной инвазии стали гастроподы рода *Limicolaria*, отличавшегося большей инвадированностью, более высоким числом созревших церкарий, у которых более длительное время сохранялась способность к проникновению. Однако в природ-

ных условиях в качестве промежуточного хозяина приходится рассчитывать скорее на род *Lamellaxis*, встречающийся не только в влажной лесистой местности, но и в более сухих биотопах травянистых саванн, стравливаемых крупным рогатым скотом. Род *Limicolaria* характерен для влажных лесистых областей.

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