

An Ultrastructural Study of Ova of *Paragonimus* Species from Human and Cat Faeces

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SUMMARY

Ova of *Paragonimus* species were observed in faecal specimens from a paediatric patient at King Edward VIII Hospital and from a cat from the Durban area. The material was embedded in low-viscosity epoxy resin and examined under the electron microscope. Although *P. kellecotti* has been found in the cat in South Africa, human paragonimiasis, as far as we know, has not been recorded in Southern Africa.

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Human paragonimiasis is common in many parts of the Far East and has been recorded in parts of Central and North Africa¹⁻⁴ and particularly in Eastern Nigeria,⁵ where it seems to be endemic, but as far as we know it has not been seen in Southern Africa. Animal infections are widespread and, according to Lapage,⁶ *Paragonimus kellecotti* has been found in the cat in South Africa.

Over the years there has been considerable disagreement on the differentiation of the species in the genus *Paragonimus*. However, in a review of the literature, Yokogawa *et al.*⁷ accept the opinion of most workers that *P. ringeri*, the form from the Orient, should be considered as a synonym of the tiger form *P. westermanni*, and that *P. kellecotti*, the American lung fluke, is a separate species.

The adults live in fibrous cysts in the lungs, while the eggs escape through the bronchioles and are coughed up, either being voided in the sputum or swallowed and discharged in the faeces. Embryonation occurs in water, and after hatching the miracidium penetrates an appropriate species of snail where further development takes place, including sporocyst, redia and cercaria. The latter, after escaping from the snail, penetrates fresh water crabs or crayfish forming a metacercaria and the definitive host acquires the infection by eating the raw meat.

In the course of a survey of cats in the Durban area to determine the incidence of *Isospora*, ova having the same form as eggs of *Paragonimus* species were observed. The ova were golden brown in colour, oval with a flattened operculum, and measured 68 - 76 × 44 - 48 μm.

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By a rare coincidence, a faecal specimen received from a paediatric patient at King Edward VIII Hospital was found to contain ova similar to those from the cat. They were also golden brown with a flattened operculum and measured 68 - 84 × 40 - 44 μm.

Ova from the cat and the human were fixed and embedded in low-viscosity epoxy resin⁸ and thin sections, about 50 - 80 nm, cut on a Cambridge Huxley ultramicrotome, were examined under the electron microscope.

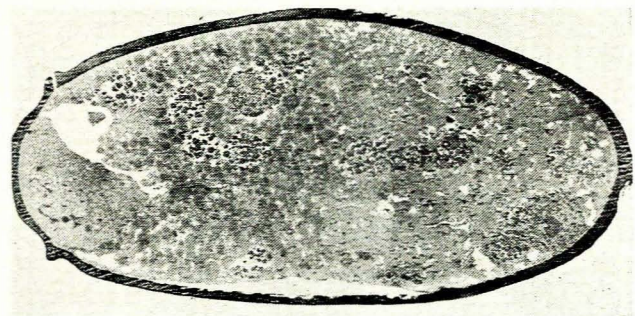


Fig. 1. Section through an ovum of *Paragonimus* species, showing the operculum narrowing to form a shoulder and the thick shell (× 3 240).

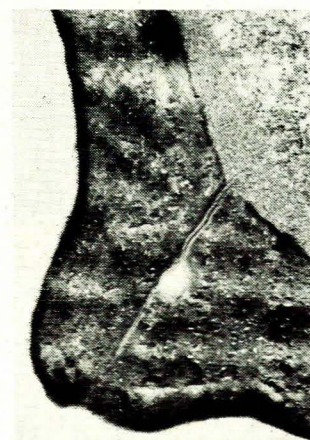


Fig. 2. The gap between the operculum and the shell, which gradually closes to form a tight junction (× 44 800).

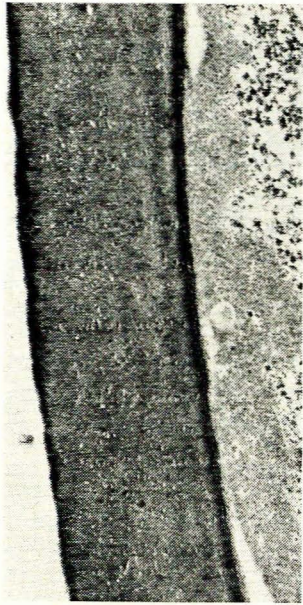


Fig. 3. A section through the shell ($\times 25\ 272$).

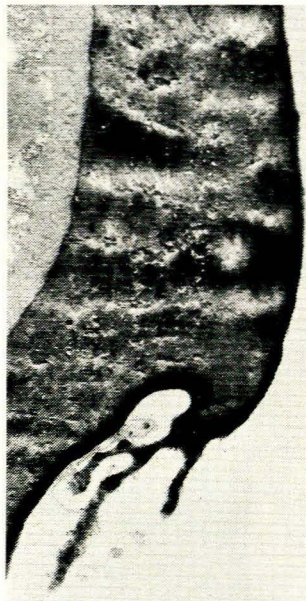


Fig. 4. The thickened abopercular region ($\times 27\ 550$).

The average thickness of the shell was 1.1-1.5 μm narrowing down to 0.54 μm at the base of the shoulder (Figs 1 and 3). Between the operculum and the shell (Fig. 2) was a gap approximately 35 nm wide which gradually closed to form a tight junction at the outer edge. The abopercular or tail region was thickened and measured approximately 1.8 μm (Figs 1 and 4). Owing to the thickness of the shell, fixation of the germinal cells was poor.

According to Chen's description of the ova⁹ the shell of *P. kellicotti* is of uniform thickness except at the pole opposite the operculum, and almost all shells are symmetrical. On the other hand, he emphasises that in practically all the eggs of the 'ringeri' type the shell is not of equal thickness throughout, and about half of them are asymmetrical.

In their review, Yokogawa *et al.*⁷ question whether any of the species besides *P. westermanni* will develop in man; however, they point out that the range of hosts for *P. kellicotti* suggests that man may also serve as a suitable host if he has the opportunity of infection.

Nwokolo,⁸ in a clinical review of 100 cases of paragonimiasis detected in Eastern Nigeria after the 1967-1970 civil war, showed that 25% of the patients were children under the age of 10 years. He was not able to determine the exact species of the parasite responsible nor the biological characteristics of the vectors.

Our ultrastructural studies have not shown any differences between the ova from these 2 cases, nor, in the absence of reference material, do we know with which species we are dealing.

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