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Besnoitia in a Palaearctic Lizard (*Lacerta dugesii*) from Madeira*

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Abstract. *Besnoitia* cysts in the heart of a lizard (*Lacerta dugesii*) from the islands of Madeira are the first record of besnoitiosis in a poikilothermic animal in the Old World. The size of the cysts corresponds to those found in lizard genera (*Basiliscus* and *Ameiva*) from Panama which belong to *B. darlingi*. Up to now nothing is known concerning the life cycle of this species from Madeira but it seems possible that cats function as definitive hosts as well as in the other species.

Key words: *Besnoitia* – Lizard – Madeira.

Introduction

Although the genus *Besnoitia* was originally described from tissue cysts of a Pyrenean cow with cutaneous and visceral lesions (Besnoit and Robin 1912), and *B. besnoiti* has since been reported from Israel, South Africa, and Kazakhstan (Neuman 1972; McCully et al. 1966; Basson et al. 1970; Peteshev et al. 1974), other members of the genus have been found mainly in the Americas.

B. tarandi was reported from the Alaskan reindeer and caribou (Hadwen 1922; Choquette et al. 1967). *B. jellisoni* was described from rodents from the genus *Peromyscus* (Frenkel 1953) and from three species of *Dipodomys* (Ernst et al. 1968). A *Besnoitia* species was found in the rodent *Microxus torques* from Peru (Jellison et al. 1960). *Besnoitia darlingi* was observed in Panamanian opossums (*Didelphis marsupialis*) and the lizards, *Basiliscus basiliscus* and three species of *Ameiva* (Schneider 1965, 1967a, b). *Besnoitia sauriana*, possibly a synonym of *B. darlingi*, was described from *Basiliscus vittatus* in British Honduras by Garnham (1966). Similar isolates have been obtained from opossums in the United States (Conti-Diaz et al. 1970; Flatt et al. 1971; Smith and Frenkel 1977). *B. besnoiti* observed in cattle from Kazakhstan was transmitted via isosporoid oocysts shed by cats (Peteshev et al. 1974). *B. wallacei* was isolated from oocysts of a cat in Hawaii and was transmitted to mice and rats (Wallace and Frenkel 1975; Frenkel 1977). In addition, *B. darlingi* from opossums in Kansas was transmitted to mice by means of isosporoid oocysts shed by cats (Smith and Frenkel 1977).

* Dedicated to Prof. Dr. G. Piekarski on his 70th birthday

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Material and Methods

The investigated lizard (*Lacerta dugesii*) was one out of a collection of specimens bought for other studies. All were kept for a long period in the laboratory. The histologic examination revealed tissue cysts of *Besnoitia* in the heart of only one lizard. Other organs were free of cysts but unfortunately muscles were not examined.

The organs were fixed in Susa (Romeis 1968), embedded in paraffin, sectioned in 7 μm slices, and stained with a fast-red-combination stain (Sterba 1953; Krauter 1978; Schönfeld 1980).

Results

Besnoitia cysts were observed in the heart of *Lacerta dugesii* from Madeira (Eastern Atlantic Ocean) (Fig. 1). Although the lizard was kept in the laboratory for about three years (1969–1972) and was killed for some other investigations, it is probable that it was naturally infected because no other infections were found in any other lizards observed under similar circumstances in the laboratory.

According to the definition of the genus, cysts were found in fibroblasts with numerous bradyzoites in a parasitophorous vacuole and hypertrophic host cell nuclei undergoing hyperplasia underneath the cyst wall, which surrounded the entire cell. The cysts measured 255×210 μm and the individual bradyzoites about $7.5–8.5 \times 1.2$ μm. The cyst wall measured from 3.5 to 6.5 μm in thickness with an average of about 4 μm. All the cysts seen were intact. Larger cysts with thicker walls may exist, but they could not be seen in the sections in toto. It is presumed that cysts can reach about 500 μm in the long axis.

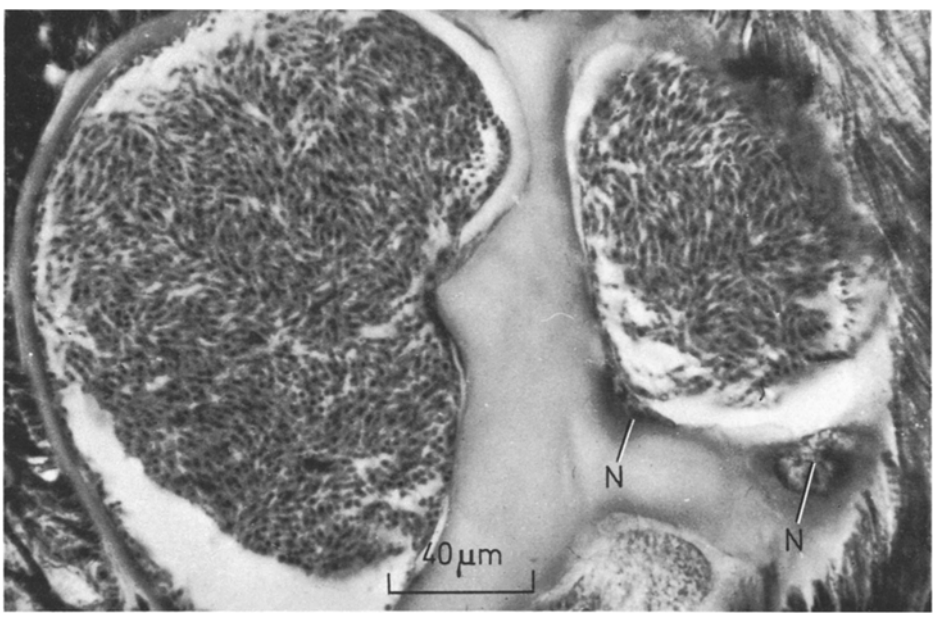

Fig. 1. *Besnoitia* cysts in the heart-muscle of a lizard (*Lacerta dugesii*) from Madeira Islands. *N* Nucleus

Discussion

The finding of this *Besnoitia* in lizards is of interest because it extends the host range for this genus in Europe and Africa where so far it has only been reported in mammals. It is not known whether the species in cattle extends also into reptiles. The occurrence of *B. darlingi* cysts in both reptiles and opossums could be explained by feral or wild cats serving as final host, and lizards as well as opossums ingesting oocysts from the feces of cats, either directly or through some transport host (Smith and Frenkel 1977; c.f. Häfner 1980). The finding of the final host for this *Besnoitia* as well as for *B. besnoiti* from cattle in southern France and Spain and in Africa would be of interest. Attempts to transmit *B. besnoiti* in Uganda were apparently unrewarding (Rommel 1975). However it is interesting to note that on the islands of Madeira a close contact between lizards and cats is established. Many of the wall lizards live in the surroundings of screes particularly of the many modern tourist hotels, and they feed there on garbage and also on insects. Cats and dogs also play a part in the "sanitation service" in these places and cats also catch the lizards and feed on them. Thus it is possible that a life cycle of the above mentioned Madeira *Besnoitia* and cats may exists.

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