

Isospora abdallahi sp. n. (Apicomplexa: Eimeriidae), a new coccidium from the lacertid lizard *Acanthodactylus boskianus* (Sauria: Lacertidae) from Northern Egypt

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Abstract. Seven of 12 lacertid lizards *Acanthodactylus boskianus* (Daudin, 1802), passed oocysts of an *Isospora* species. Comparison with other species of the genus *Isospora* Schneider, 1881 indicated that found coccidium represented a new species, for which the name *I. abdallahi* is proposed. Sporulated oocysts of *I. abdallahi* are spherical or subspherical, 25.8 (24.5-29.0) × 23.9 (23.0-25.5) μm, shape index (length/width) being 1.07 (1.00-1.16), with a smooth, bilayered oocyst wall that is slightly yellowish, about 2 μm thick. Micropyle, oocyst residuum and polar granule are absent. Sporocysts are ovoidal, 15.4 (14.0-16.0) × 9.4 (9.0-10.0) μm, with smooth and colorless sporocyst wall, shape index 1.6 (1.5-1.8). Stieda body is dome-like, substieda body spherical to subspherical. Sporocyst residuum is composed of numerous granules of different size, scattered among sporozoites. Most oocysts are passed unsporulated; sporulation was completed within 12 h at 25°C. Endogenous development occurs inside nuclei of enterocytes in the small intestine.

Lacertid lizards of the genus *Acanthodactylus* Fitzinger are widely distributed from West Africa to the Middle East (Salvador 1982). From these common and abundant lizards only one species of coccidia from the genus *Isospora* Schneider, 1881 has been described to date. Herein we present a description of a new *Isospora* species from *Acanthodactylus boskianus* (Daudin, 1802) from Northern Egypt.

MATERIALS AND METHODS

Twelve adult specimens of *Acanthodactylus boskianus* were collected in the Alexandria district, Northern Egypt in April 1995. Lizards were kept individually in small plastic boxes and transported to the University of Veterinary and Pharmaceutical Sciences in Brno, Czech Republic.

In the laboratory, lizards were housed individually in small glass or plastic terraria with 15-25 W heating lamps. The terraria reached ground temperatures of 27-29°C during the daytime, and night temperatures varied between 19 and 21°C. Lizards were fed daily on laboratory reared crickets with vitamin and mineral supplementation. Individual faecal samples were collected repeatedly from the ground of the terraria or after careful manipulation of lizards. All samples were examined microscopically after flotation, using a modified Sheather's sugar solution (s.g. 1.30).

Two infected lizards have been euthanized with an overdose of barbiturate (Thiopental® Spofa, Czech Republic) and necropsied. Tissue samples of the stomach, duodenum, small and large intestine, heart, lung, liver, gall bladder and kidney

were fixed in 10% buffered formalin. Fixed tissues were processed for light microscopy using standard methods. Paraffin sections were stained with hematoxylin and eosin (H&E), or Giemsa.

In order to determine sporulation, oocysts from the intestinal content of euthanized lizards were suspended in 2.5% potassium dichromate solution and incubated at 25°C. Oocysts were examined at various intervals using Nomarski interference contrast (NIC) microscopy. Unsporulated and freshly sporulated oocysts were measured and photographed with NIC. Measurements are reported in micrometres (μm), given as the mean followed by the range in parentheses.

RESULTS

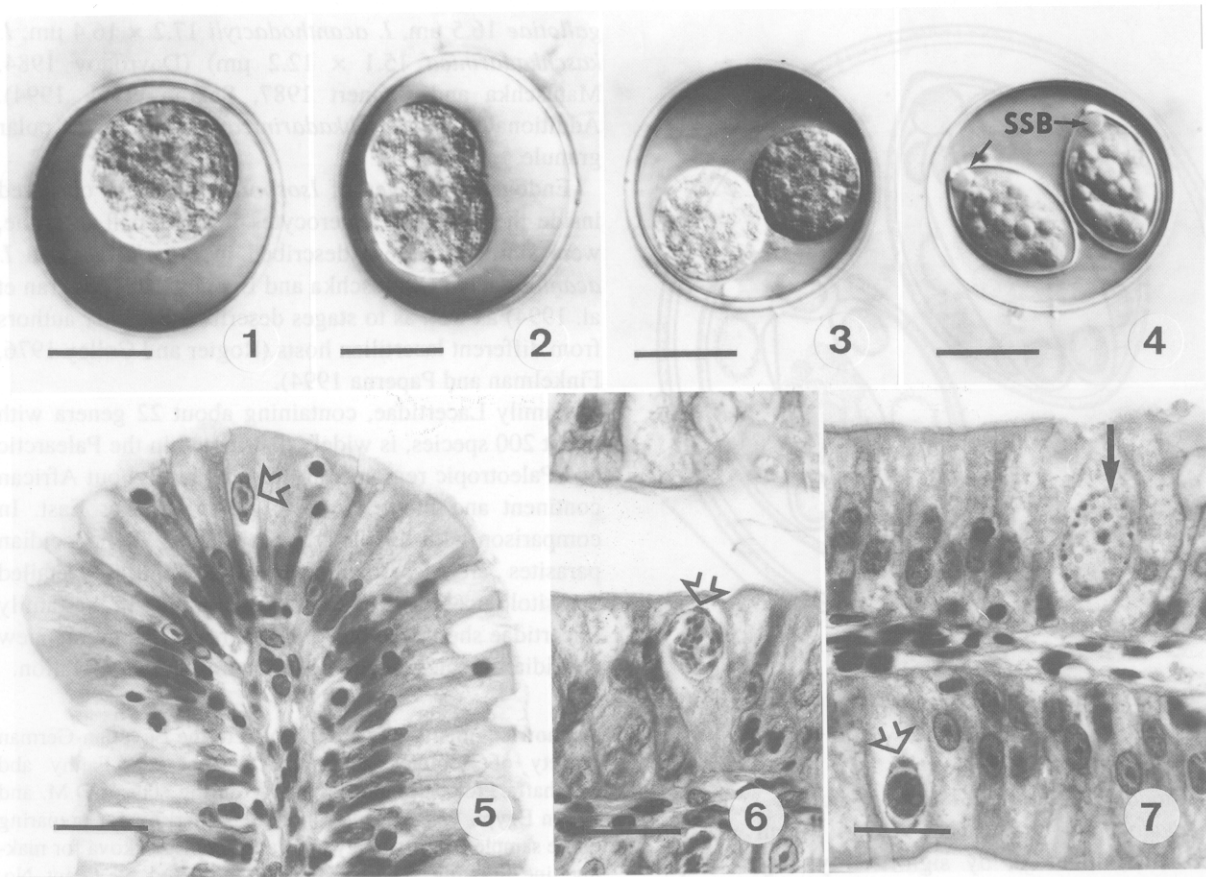
Of 12 adult *Acanthodactylus boskianus* examined, seven (58%) passed coccidian oocysts. A morphological comparison with previously reported species revealed that coccidia found represented an undescribed *Isospora* species, and it is described as a new below.

Isospora abdallahi sp. n.

Figs. 1-8

Description: Oocysts spherical or subspherical, 25.8 (24.5-29.0) × 23.9 (23.0-25.5); shape index (length/width) 1.07 (1.0-1.16). Wall smooth, slightly yellowish and bilayered, 2.0 thick, composed of outer layer 1.5 thick and inner layer 0.5 thick. Micropyle, oocyst residuum and polar granule absent. Sporocysts ovoidal, 15.4 (14.0-16.0) × 9.4 (9.0-10.0); shape index

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Figs. 1-4. Nomarski interference contrast (NIC) photomicrographs of sporulated oocysts of *Isospora abdallahi* during different stages of sporogony. Scale bars = 10 μ m. **Fig. 1.** Unsporulated oocyst; **Fig. 2.** Oocyst containing a binucleate sporont in the process of dividing to form sporoblasts; **Fig. 3.** Oocysts containing two sporoblasts; **Fig. 4.** Sporulated oocyst with prominent substieda bodies (SSB). **Figs. 5-7.** The intranuclear endogenous stages of *I. abdallahi*. HE. Scale bars = 20 μ m. **Fig. 5.** Intranuclear trophozoite (arrowhead); **Fig. 6.** Intranuclear meront with merozoites; **Fig. 7.** Intranuclear multinucleate meront (arrowhead) and mature macrogamont (arrow).

1.6 (1.5-1.8). Wall smooth, colorless, about 0.5 thick. Stieda body dome-like, 1.0 high and 1.5 wide; substieda body spherical to subspherical, homogenous, 2.0 high (1.0-2.5) and 1.5 wide (1.0-2.0). Sporocyst residuum composed of numerous granules of irregular sizes, scattered among sporozoites. Sporozoites elongate, with distinct anterior and posterior refractile bodies.

Sporulation: Exogenous. Intestinal contents of euthanized lizards contained unsporulated oocysts (Fig. 1), oocysts in early stages of sporulation (Figs. 2, 3) and a few sporulated oocysts (Fig. 4). The majority of fully sporulated oocysts were first observed within 12 hours at 25°C.

Site of infection: Endogenous stages developed within nuclei of enterocytes in the small intestine. During endogenous development, nuclei were gradually consumed and transformed to thin envelope around the parasite (Figs. 5-7).

Type host: *Acanthodactylus boskianus* (Daudin, 1802) (Sauria: Lacertidae)

Type locality: Alexandria district, Northern Egypt.

Prevalence: 7/12 (58%) examined lizards were infected.

Type material: Phototypes and histological slides are deposited at the Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice (No. R115/95). Symbiotype is deposited in the herpetological collection of National Museum Prague (Coll. No. NMP 6V 35551).

Etymology: The specific epithet is given in honour of Dr. Abdallah El Bahnassawy, in expression of our thanks for his help and hospitality during our field work in Egypt.

DISCUSSION

The new species, *Isospora abdallahi*, differs from all three hitherto described species of the genus *Isospora* from lacertid lizards, *I. gallotiae* Matuschka et Bannert, 1987 from *Gallotia galloti* Oudart, *I. acanthodactyli* Sakran, Fayed, El-Toukhy et Abdel-Gawad, 1994 from

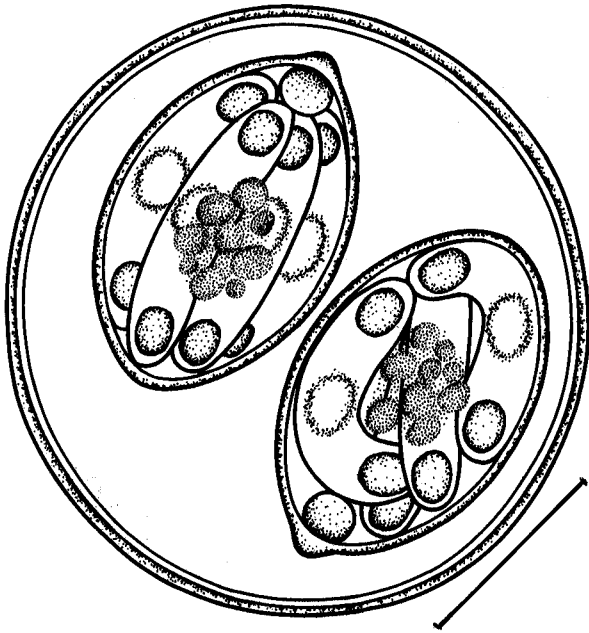


Fig. 8. Composite line drawings of sporulated oocyst of *Isospora abdallahi*. Scale bar = 10 μ m.

Acanthodactylus boskianus (Daudin) and *I. kaschkadarinica* Davronov, 1984 from *Eremias lineolata* (Nikolskij), by significantly larger oocysts. The differences in oocyst size are evident (*Isospora*

gallotiae 16.5 μ m, *I. acanthodactyli* 17.2 \times 16.4 μ m, *I. kaschkadarinica* 15.1 \times 12.2 μ m) (Davronov 1984, Matuschka and Bannert 1987, Sakran et al. 1994). Additionally, *I. kaschkadarinica* possesses a polar granule.

Endogenous stages of *Isospora abdallahi*, observed inside the nuclei of enterocytes in the small intestine, were similar to those described in *I. gallotiae* and *I. acanthodactyli* (Matuschka and Bannert 1987, Sakran et al. 1994) as well as to stages described by other authors from different lacertilian hosts (Rogier and Colley 1976, Finkelman and Paperna 1994).

Family Lacertidae, containing about 22 genera with about 200 species, is widely distributed in the Palearctic and Paletropic region from Europe throughout African continent and most part of Asia to the Far East. In comparison with this heterogeneity, only few coccidian parasites are described from this family. Detailed parasitological studies of lizards belonging to the family Lacertidae should, in our opinion, reveal numerous new coccidian species, adequate to the hosts diversification.

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