Caryospora simplex (Apicomplexa: Eimeriidae) from a captive Kaznakov's viper (Vipers kaznakovi)

Authors: Wilber, Patricia G., Hnida, John A., Richard, Michael J., and Duszynski, Donald W.

Source: Journal of Wildlife Diseases, 31(3) : 397-399

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-31.3.397

Journal of Wildlife Diseases, 31(3), 1995, pp. 397–399

Caryospora simplex (Apicomplexa: Eimeriidae) from a captive Kaznakov's viper (*Vipera kaznakovi*)

Patricia G. Wilber,[1] John A. Hnida,[1] Michael J. Richard,[1,2] and Donald W. Duszynski[1] [1] The University of New Mexico, The Department of Biology, Albuquerque, New Mexico 87131, USA; [2] The Rio Grande Zoological Park, 903 10th St. SW, Albuquerque, New Mexico 87102, USA

ABSTRACT: *Caryospora simplex* is reported for the first time from the feces of a captive female Kaznakov's viper (*Vipera kaznakovi*) in Albuquerque, New Mexico (USA). Coccidian meronts and gamonts were observed in the intestinal epithelial cells of another female Kaznakov's viper that died in October 1993.

Key words: Caryospora simplex, Vipera kaznakovi.

Caryospora simplex Leger 1904 has been described from three species of viperid (Upton et al., 1986), but never from Kaznakov's vipers (*Vipera kaznakovi*). In July 1993, five Kaznakov's vipers were obtained by the Rio Grande Zoological Park in Albuquerque, New Mexico (USA). One female snake (F1) died in October and one male (M1) died in November 1993; coccidial stages were observed in the intestinal epithelial tissue of F1. Thus, feces were obtained when a third Kaznakov's viper, a female (F2), became anorexic.

Fecal samples were collected from F2 on 2 December 1993, 3 January 1994, and 11 and 12 March 1994. The January sample contained mucosal tissue in addition to feces. Material from all but the first sample was placed in 2.5% (w/v) aqueous potassium dichromate ($K_2Cr_2O_7$) for 5 days. Samples then were examined by direct smear and after sucrose flotation (Stout and Duszynski, 1983) at 1,250×. Measurements were taken of 25 oocysts from the 3 January 1994 sample when they were 10 to 15 days old (Table 1). Photomicrographs of the 3 January sample were taken with a Universal photomicroscope (Carl Zeiss, Jena, Germany) using both Nomarksi interference contrast and bright field (Neofluar) oil objectives.

The feces from F2 contained unsporulated oocysts on all four collection days as did the mucosal tissue collected in the feces on 3 January 1994. Most oocysts from the January and March 1994 samples sporulated (Fig. 1) within five days in $K_2Cr_2O_7$. Measurements of these sporulated oocysts were slightly smaller than published ranges for *C. simplex* (Table 1), but internal morphology was otherwise identical (Figs. 1A, B; Table 1). Matuschka (1986) found a caryosporan in *Vipera kaznakovi* similar in size to the specimens we describe, but declined to name it because he had no information on the life history of the spec-

TABLE 1. Comparison of measurements (μm) of 25 oocysts of *Caryospora simplex* from the Kaznakov's viper (*Vipera kaznakovi*) and previously published measurements from the Ottoman viper (*Vipera xanthina xanthina*) (Upton et al., 1983).

	V. kaznakovi		*V. xanthina xanthina*
	Mean (range)	SD	Mean (range)
Oocyst diameter	11.9 (12–13)	0.44	14.9 (14–16)
Oocyst wall	1.1 (0.9–1.5)	0.20	1.4 (NR*)
Sporocyst width (W)	6.9 (6.3–7.8)	0.32	8.9 (8.1–9.5)
Sporocyst length (L)	8.9 (8.7–9.7)	0.34	11.6 (10.4–12.6)
Sporocyst L/W ratio	1.3 (1.2–1.4)	0.05	1.3 (NR)
Polar granule length	1.25 (1.0–1.5)	0.26	2.4 (1.8–2.7)
Polar granule width	0.8 (0.5–1.0)	0.20	2.0 (1.4–2.3)

* Not reported.

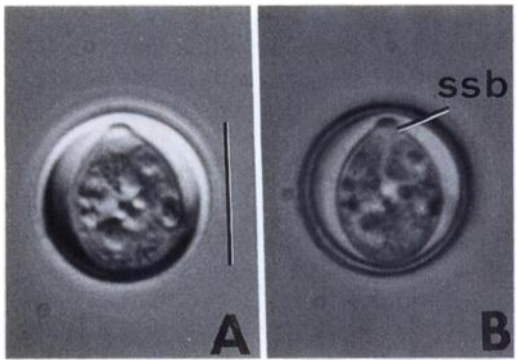

FIGURE 1. Photomicrographs of *Caryospora simplex* from a captive Kaznakov's viper (*Vipera kaznakovi*) from the Rio Grande Zoological Park, Albuquerque, New Mexico. A. Oocyst as seen with Nomarski optics; the Stieda body and sporozoite refractile bodies stand out. B. Same oocyst as seen with bright-field optics (Neofluar lens); the substieda body (ssb) is just barely visible. Scale bar = 10 μm.

imen, and no infections between snake species had been accomplished with *C. simplex*. Matuschka (1986) proposed that oocysts of similar morphology, but found in different hosts, might be different species. However, Upton and Barnard (1986) transmitted *C. simplex* from *Vipera xanthina xanthina* to *Vipera xanthina palestinae*; also, based on a review of the genus *Caryospora* by Upton et al. (1986), we believe that the recognized species of *Caryospora* are morphologically distinct. Thus, we believe our specimens and those of Matuschka (1986) represent *C. simplex*. *Caryospora simplex* has been reported from three other species of *Vipera* (Upton et al., 1986).

Fecal samples from F2 contained oocysts from December 1993 to March 1994, despite treatment with sulfadimethoxine (Sanofi Animal Health, Inc., Overland Park, Kansas, USA) via stomach tube (90 mg/kg on day 1, followed by 45 mg/kg for days 2 to 6) beginning on 2 December 1993. Because *C. simplex* oocysts were identified in the January and the March samples, the patent period appeared to be at least 67 days. The patent period in an experimental infection of one *V. xanthina palestinae* was at least 308 days (Upton and Barnard, 1986).

The samples of intestinal epithelial tissue from F1 and lung tissue from M1 were fixed in formalin, embedded in paraffin, sectioned at 3 to 4 μm, and stained in Harris's hematoxylin and eosin. They were examined at 1,250×. We found two types of meronts and both macro- and microgametes of a coccidian in the stained intestinal tissue, but no coccidial stages were observed in the lung tissue from M1. Because no fecal material was obtained, specific identification of the tissue stages was not possible. However, as all snakes were acquired in the same shipment, it is likely that the tissue stages were of *C. simplex*. Unfortunately, tissue stages of *C. simplex* have not been described adequately.

Origin of the coccidial infections is unknown. The captive history of the snakes was incomplete, but their lack of habituation to captive conditions is evidence that they may have been wild caught. Thus, infection with *C. simplex* may have occurred naturally.

We thank Mark Jordan for assistance with nomenclature, Dale Belcher for information about the captive snakes, the New Mexico Department of Agriculture Veterinary Diagnostic Services for tissue preparation and S. Bret Snyder, DVM, for helpful comments on an earlier draft of this paper.

LITERATURE CITED

MATUSCHKA, F. 1986. *Caryospora telescopis* sp. n. (Apicomplexa: Eimeriidae) from the cat snake, *Telescopus fallax* (Serpentes: Colubridae), and *Caryospora* spec. from the West Caucasian viper, *Vipera kasnakovi* (Serpentes: Viperiidae). Archiv für Protistenkunde 132: 93–99.

STOUT, C. A., AND D. DUSZYNSKI. 1983. Coccidia from kangaroo rats (*Dipodomys* spp.) in the western United States, Baja California and northern Mexico with descriptions of *Eimeria merriami* sp. n. and *Isospora* sp. The Journal of Parasitology 78: 406–413.

UPTON, S. J. AND S. M. BARNARD. 1986. Experimental transmission of *Caryospora simplex* (Apicomplexa: Eimeriidae) to Palestine vipers *Vi-*

pera xanthina palestinae (Serpentes: Viperidae). The Journal of Protozoology 33: 129–130.

———, J. V. ERNST, S. M. BARNARD, AND W. L. CURRENT. 1983. Redescription of the oocysts of *Caryospora simplex* (Apicomplexa: Eimeriidae) from an Ottoman viper, *Vipera xanthina xanthina*. Transactions of the American Microscopical Society 102: 258–263.

———, W. L. CURRENT, AND S. M. BARNARD. 1986. A review of the genus *Caryospora* Leger, 1904 (Apicomplexa: Eimeriidae). Systematic Parasitology 8: 3–21.

Received for publication 2 December 1994.