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SHORT COMMUNICATIONS

COCCIDIAN PARASITES (COCCIDIA, EIMERIIDAE) OF THE SQUIRREL SCIURUS VULGARIS L. FROM CZECHOSLOVAKIA

B. RYŠAVÝ and Ž. ČERNÁ

Department of Parasitology and Hydrobiology, Faculty of Sciences, Charles University, Prague

Abstract. Three coccidian species of the genus *Eimeria* were found in two squirrels, *Sciurus vulgaris* L., in southern Bohemia (Czechoslovakia): 1. *Eimeria andrewsi* Yakimoff et Gousseff, 1935 — a first record in Czechoslovakia; 2. *Eimeria mira* Pellérdy, 1954 — a first record in Czechoslovakia; 3. *Eimeria serbica* Pop Cenitch et Bordjochki, 1957 — this species has been recorded in Czechoslovakia by Jírovec (1942) and Ryšavý (1954) and redescribed under the name *Eimeria sciurorum* Galli-Valerio, 1922. Its specific determination is discussed in the present paper.

Seven coccidian species of the genus *Eimeria* (Pellérdy 1974) have hitherto been described from the squirrel (*Sciurus vulgaris* L.), but only one species has been recorded in Czechoslovakia. Two squirrels from the vicinity of Jindřichův Hradec (southern Bohemia) were examined for parasites. In addition to two helminth species, three species of coccidians belonging to the genus *Eimeria* were recovered. Two of them are reported for the first time in Czechoslovakia. Their redescriptions and comments to their occurrence are given below.

Eimeria andrewsi Yakimoff et Gousseff, 1935 Figs. 1A, 2C

Oocysts oval, measuring 22–26 × 14–17 μm, colourless and with a very thin double-layered wall without micropyle. Sporulated oocysts contain oval sporocysts (11–12 × 5–6 μm) somewhat narrowed at one pole and with feebly visible Stieda body. Residuum in form of fine, dispersed granules, sometimes feebly visible. Oocyst residuum not formed. A small polar granule usually appears in oocysts after sporulation. Sporulation time in 2 % solution of potassium dichromate 96 hours at 16–17 °C.

This species was originally described from *Sciurus* sp. (most probably *Sciurus vulgaris* L.) from the territory of the U.S.S.R. (European part). Pellérdy (1954) recorded *E. andrewsi* in Hungary. Sheather (1923) recovered *Eimeria* species with oval cysts measuring 21–25 × 12–16 μm from *Sciurus vulgaris* in England. The shape and structure of oocysts suggest that *E. andrewsi* is involved; Levine and Ivens (1965) also share this opinion.

Eimeria mira Pellérdy, 1954 Figs. 1C, D, 2A

Oocysts pyriform, very variable in size and shape, measuring 32–45 × 22–30 μm. Oocyst wall 3–4 μm thick, dark brown and consisting of three layers. Outer surface of oocyst wall covered with fine, spherical, prominating protuberances. A 4–7 μm wide micropyle present at narrowed pole. Sporulated oocysts contain oval sporocysts with feebly visible Stieda bodies at the slightly narrowed pole. Sporocysts measure 18–20 × 9–11 μm. Sporocyst residuum consists of relatively large granules usually distributed in form of a band along the whole length of sporocysts in their central line. No residuum is formed in the oocysts. Sporulation time 216 hours at 16–18 °C.

This species was originally described by Lyubimov (1935) from the Novgorod (now Gorky) region in the U.S.S.R. from *Sciurus vulgaris* under the name *Eimeria piriformis*. Kotlán and Pospesch (1934) described under the same name a new *Eimeria* species from rabbit. Pellérdy (1954) regarded the species described by Lyubimov as a homonym and named it *Eimeria mira* Pellérdy, 1954. Outside the territory of the U.S.S.R., this species has so far been reported from Hungary (Pellérdy 1954) and Bulgaria (Golemansky and Duhlinska 1973).

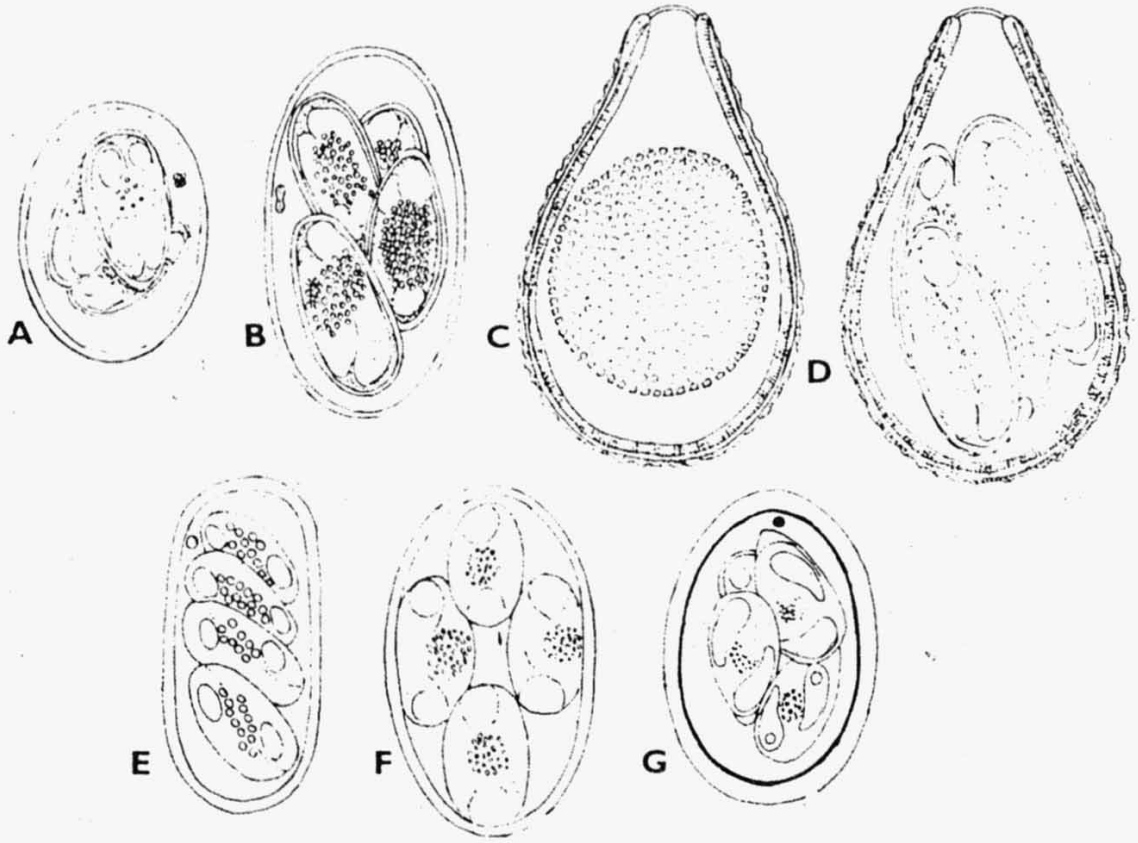

Fig. 1. Schematic illustration of coccidian oocysts from squirrels. A — *Eimeria andrewsi*. Orig. B — *E. serbica*. Orig. C — *E. mira* — unsporulated oocyst. Orig. D — *E. mira* — sporulated oocyst. Orig. E — *E. sciurorum* (after Galli Valerio 1922). F — *E. serbica* (after Pop Cenitch and Bordjochki 1957). G — *E. neosciuri* (after Prasad 1960). (× 1 180).

Eimeria serbica Pop Cenitch et Bordjochki, 1957 Figs. 1B, 2B

Oocysts oval, thin-walled, colorless, without micropyle, measuring 27—37 × 15—19 μm. Sporocysts oval, measuring 12—13 × 7—8 μm, slightly narrowed at one end and with feebly visible Stieda body. Sporocysts contain large, conspicuous residua consisting of dense, dark and small granules, oocyst residuum lacking, only a small rod-shaped polar granule present. Sporulation time 96 hours at 16—18 °C.

This species was first reported from Czechoslovakia by Jírovec (1942). He recovered from the small intestine of *Sciurus vulgaris* oocysts of oval or elipsoidal shape, measuring 30—50×13—18 μm, with a distinct sporocyst residuum and named the coccidian *Eimeria sciurorum* Galli Valerio, 1922. The author described also the endogenous phase of development of this species in the host intestine. The maximum length of oocysts (50 μm) should be considered an error, with regard to the given width of oocysts. Ryšavý (1954) described evidently the same species from the same host (the size 23.8—32.3×13.6—18.7 μm and morphology of oocysts conform to the description by Jírovec).

He identified this coccidian as *E. sciurorum* Galli Valerio, 1922. Levine and Ivens (1965) analyzed the records of *E. sciurorum* and arrived at the conclusion that the coccidian described by Ryšavý resembles most the species *Eimeria neosciuri* Prasad, 1960 from *Sciurus* (*Neosciurus*) *carolinensis*.

The coccidian described in this paper is identical with that previously reported by Ryšavý (1954). It resembles in the shape and size of oocysts the coccidian mentioned by Pellérdy (1954) as *E. sciurorum* Galli Valerio, 1922. However, it distinctly differs from the original description in the oval shape of oocysts. Those figured in the original description by Galli Valerio have a cylindrical shape which has never been reported since that time in any coccidian of the genus *Eimeria* from squirrels (Fig. 1E). Also the oocysts described in the paper by Bulgarian authors (Golemansky and Duhlinska 1973) under the name *E. sciurorum* are more elipsoidal than cylindrical. Consequently, our finding is not identical with *E. sciurorum* Galli Valerio, 1922, but from the zoogeo-graphical viewpoint, this cannot even be ascribed to *E. neosciuri* Prasad, 1960, because the original host, *Sciurus carolinensis* is distributed only in the eastern half of the U.S.A., from their northern border up to the Gulf of Mexico and it is a distinctly nearctic element. Moreover, the oocysts of *E. neosciuri* (Fig. 1G) differ also in their morphology: the inner layer of their wall is thick and dark in colour, whereas in our species, both layers of the oocyst wall are very thin and colorless. The size of *E. neosciuri* oocysts is $22-28\times14$ to 18 μm, in our species the oocysts measure $27-37$ μm in length and $15-19$ μm in width.

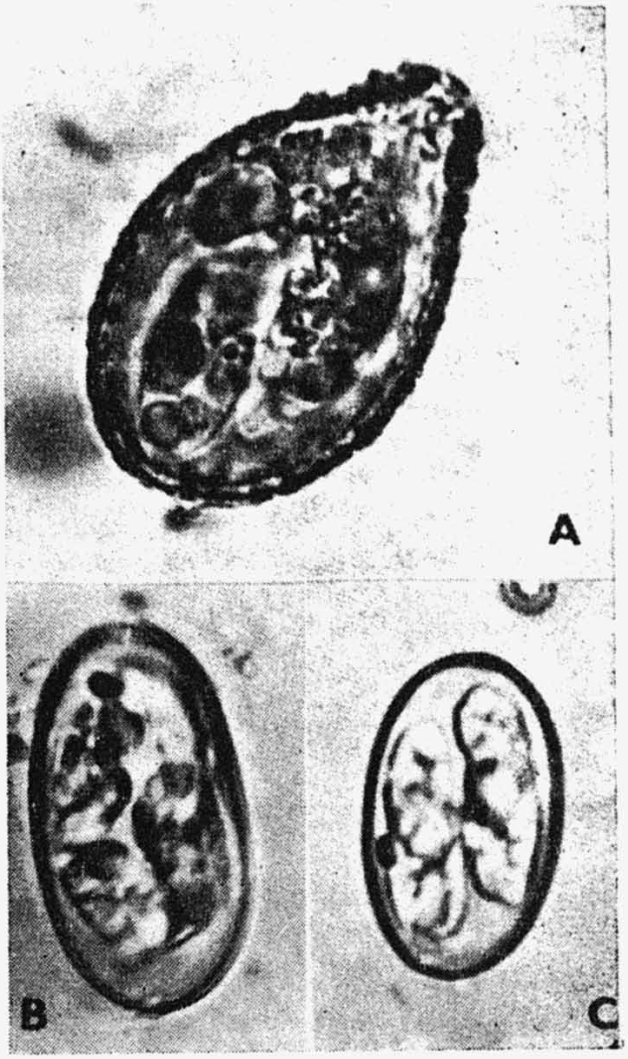

Fig. 2. Sporulated oocysts. A — *E. mira*, B — *E. serbica*, C — *E. andrewsi*. (× 1 330).

A comparison of our material with all species found in *Sciurus vulgaris* shows that our species is most closely related to *Eimeria serbica* Pop Cenitch et Bordjochki, 1957 described from *S. vulgaris* from Yugoslavia. The shape and size of oocysts (Fig. 1F) are identical in both species. Except some minor differences, the size and morphology of sporocysts seem to be also identical. We place therefore our specimens to *E. serbica* and correct thus the name of coccidians hitherto reported from squirrels from Czechoslovakia.

КОКЦИДИИ (EIMERIIDAE) ОТ БЕЛКИ *SCIURUS VULGARIS* L. В ЧЕХОСЛОВАКИИ

Б. Рышавы и Ж. Черна

Резюме. Три вида кокцидий рода *Eimeria* были обнаружены у 2 белок *Sciurus vulgaris* L. в южной Чехии (Чехословакия): 1. *Eimeria andrewsi* Yakimoff et Gusseff, 1935 — первая находка в Чехословакии; 2. *Eimeria mira* Pellérdy, 1954 — первая находка в Чехословакии;

3. *Eimeria serbica* Pop Cenitch et Bordjochki, 1957 — этот вид в ЧССР уже переописали Ировец (1942) и Рышавы (1954) под названием *Eimeria sciurorum* Galli-Valerio, 1922. Его видовая принадлежность обсуждается в настоящей работе.

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B. R., Přírodovědecká fakulta KU,
Viničná 7, 128 44 Praha 2,
ČSSR