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The study of the protozoan fauna of rodents is not only of theoretical but also of practical interest. Rodents dwell not far from the villages and can spread some parasites of domestic animals; from this point of view, full knowledge of their coccidia is quite necessary. Nevertheless, the rodent coccidia of Kazakhstan have so far been poorly studied.

For this reason the present article is of interest because it gives information on the coccidia of the Mongolian pika and Strelzov's vole which have never been studied before.

The only paper on the coccidia of the pika is that of Machul'skiĭ (1949), who found 4 species of coccidia in the daurian pika (Ochotona daurica Pallas): Eimeria daurica, E. ochotona, E. metelkini and E. erschovi.

We found a few reports on the coccidia of the vole. Galli-Valerio (1905) described E. arvicolae from the snow vole (Arvicola nivalis Martins). This same species was found in the common vole (Microtus arvalis Pallas) by P. S. Ivanova-Gobzem (1935). S. N. Machul'skiĭ (1949) mentioned infection with E. falciformis in the narrow-skulled vole (Microtus gregalis Pallas); finally, S. K. Svanbaev (1956) discovered E. arvicolae and E. musculi in the common vole.

Thus, according to these papers there are four species of coccidia in the pika and three species in the vole.

Our own data on the coccidia of the Mongolian pika (Ochotona pallasi Gray) and Strelzov's vole (Alticola strelzovi Kastschenko) are based on a study of intestinal contents from young and adult rodents. The contents were gathered by a post graduate student, I. G. Shubin, of the Institute of Zoology, Academy of Science, Kazakh SSR while doing zoological work in Central Kazakhstan, and were passed on to us to examine for coccidia.

The rodents were obtained near Kiik and Bassaga stations of the Karagandinsk railway (Chetsk district of Karaganda Region) from June through October, 1953 and April through June, 1954. The intestinal contents of 66 Mongolian pikas and 43 Strelzov's voles were examined for coccidia by the method of Darling. Infections with coccidia were found in 26 (39.4%) of the pikas and 4 (9.3%) of the voles.

Four species of coccidia were found in the Mongolian pika and one species in Strelzov's vole.

Following are descriptions of the coccidia we found.

Eimeria kriygsmanni Jakimoff et Gousseff, 1938

This species was found in 6 (9.1%) of 66 Mongolian pikas examined. The oocysts were oval and egg-shaped, 19.4 to 34.4 by 17.2 to 25.8 microns with a mean of 26.3 by 21.3 microns. The form-index was 1:0.75 to 0.89, with a mean of 1:0.81. The oocysts were colorless, greenish, and yellow-brown. The oocyst wall was smooth, double-contoured, 1.4 to 2.0 microns thick. Micropyle absent. The protoplasmic mass was frequently spherical in the fresh oocyst. Usually a polar granule was present.

The sporulated oocyst contained four oval or round spores, 8.8 to 13.4 by 7.0 to 8.8 microns, with a mean of 11.0 by 7.8 microns. The sporozoites were comma-shaped, 7.0 to 9.6 by 3.5 to 4.2 microns, with a mean of 7.9 by 3.8 microns. Oocyst and sporocyst residual bodies were absent.

Eimeria erschovi Matschoulsky, 1949

This species was found in four Mongolian pikas (6.1%). The oocysts were egg-shaped, oval, and round, green and yellow-brown in color. A micropyle was present. The oocyst wall was smooth, double-contoured, 1.0 to 1.8 microns thick, thinner at the micropylar end. The protoplasmic mass was spherical. A polar granule was absent. The oocysts measured 21.8 to 31.2 by 16.4 to 23.4 microns, with a mean of 25.6 by 20.2 microns. The form-index was 1:0.79. The sporulated oocysts contained four oval or short-oval sporocysts, 8.4 to 11.3 by 4.4 to 6.8 microns, with a mean of 9.7 by 5.3 microns. The sporozoites were comma-shaped, 5.3 to 7.5 by 2.4 to 4.1 microns, with a mean of 6.4 by 3.3 microns. The sporocyst residuum consisted of fine granules.

Eimeria musculi Jakimoff et Gousseff, 1938

This species was found in only one Mongolian pika. The oocysts were round, 22.3 by 22.1 microns. The form-index was 1:0.95. The oocyst wall was smooth, double-contoured, yellow-green, 1.3 to 1.6 microns thick. The protoplasmic mass was spherical in the fresh oocysts. A polar granule was absent. The sporulated oocysts contained four oval sporocysts, 8.0 to 9.3 by 7.1 to 8.4 microns, with a mean of 8.6 by 7.7 microns. The sporozoites were comma-shaped, 5.8 to 6.9 by 3.5 to 4.5 microns, with a mean of 6.2 by 3.8 microns. Oocyst and sporocyst residual bodies were absent.

Eimeria sp.

This species was found in 16 Mongolian pikas (24.2%). The oocysts were egg-shaped and elongate oval, yellow-green and yellow-brown in color. The wall was 3.0 to 5.8 microns thick, smooth, double-contoured, the outer radially striated. Micropyle absent. The protoplasmic mass was irregular in shape. Occasionally a polar granule was present. The oocysts measured 93.6 to 111.2 by 35.9 to 51.5 microns, with a mean of 103.2 by 46.1 microns. The form-index was 1:0.38 to 0.46, with a mean of 1:0.45. Four oval sporoblasts were formed, 30.7 to 35.2 by 18.1 to 20.9 microns, with a mean of 32.9 by 19.9 microns. An oocyst residual body was

absent. This coccidium differs morphologically from other Eimeria. Since, however, it did not sporulate completely, we could not assign it a specific name. Table 1 compares the oocysts of the four species we found in the Mongolian pika.

Eimeria arvicolae Galli-Valerio, 1905

Svanbaev (1956) described this species from the common vole of Western Kazakhstan. We found this same species in Strelzov's vole, Alticola strelzovi, in Central Kazakhstan. Four of 43 (9.3%) animals examined were infected.

In conclusion, I want to thank I. G. Shubin for providing us with the material to examine.

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Table 1

Comparative Table of Coccidia of the Mongolian Pika (measurements in microns)

Morphological Characteristics	Eimeria kriygsmanni	Eimeria erschovi	Eimeria musculi	Eimeria sp.
Oocyst shape	oval or egg-shaped	egg-shaped, oval or round	round	egg-shaped or elongate oval
Structure of the wall	double-contoured, smooth, 1.4 - 2.0 thick	double-contoured, smooth, 1.0 - 1.8 thick	double-contoured smooth, 1.3 - 1.6 thick	double-contoured, smooth, outer with radial striations, 3.0 - 5.8 thick
Color of the wall	colorless, greenish or yellow-brown	greenish or yellow-brown	yellow-green	yellow-green or yellow-brown
Micropyle	absent	present	absent	absent
Oocyst size	19.4-34.4 x 17.2-25.8 M 26.3 x 21.3	21.8-31.2 x 16.4-23.4 M 25.6 x 20.2	22.3 x 22.1	93.6-111.2 x 35.9-51.5 M103.2 x 46.1
Form-index	1:0.75-0.89 M 1:0.81	1:0.79	1:0.95	1:0.38-0.46 M 1:0.45
Shape of protoplasmic mass	spherical, constricted from wall in fresh oocyst	spherical	spherical, constricted from wall in fresh oocyst	irregular
Polar granule	present	absent	absent	present
Number and shape of sporocysts	4, oval or round	4, oval or short oval	4, oval	4, oval
Sporocyst size	8.8-13.4 x 7.0-8.8 M 11.0 x 7.8	8.4-11.3 x 4.4-6.8 M 9.7 x 5.3	8.0-9.3 x 7.1-8.4 M 8.6 x 7.7	30.7-35.2 x 18.1-20.9 M 32.9 x 19.9
Number and shape of sporozoites	2, comma-shaped	2, comma-shaped	2, comma-shaped	-
Sporozoite size	7.0-9.6 x 3.5-4.2 M 7.9 x 3.8	5.3-7.5 x 2.4-4.1 M 6.4 x 3.3	5.8-6.9 x 3.5-4.5 M 6.2 x 3.8	-
Residual bodies	absent in oocyst and sporocyst	fine granules present in sporocyst, absent in oocyst	absent in oocyst and sporocyst	absent in oocyst