TWO MORPHOLOGICAL TYPES OF OOCYST OF RABBIT COCCIDIA EIMERIA MEDIA KESSEL, 1929

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Abstract. The morphology of oocysts of *E. media* Kessel, 1929, has been studied and two types have been found. Significant differences were observed in length of the oocysts (average value 29.05 μm with type I and 32.88 μm with type II), in width of the micropyte (5.21 and 3.72 μm, respectively) and in width of the sporocysts (6.67 and 5.00 μm). Marked differences were found even in the shape of the residual bodies of the sporocysts and in the structure of the oocyst wall in the region of the micropyte.

*E. media* Kessel, 1929 ranks among the most common rabbit coccidia and is regarded as a moderately pathogenic species. The oocysts were described as oval, ovoid, or ellipsoidal, with a considerable range in size. The colour of an oocyst wall was reported as pinkish, orange, light yellow to light brown, the micropyte being distinct. The interior of an oocyst contained a residual body. The sporocysts were oval or elongate ovoid with inconspicuous or absent Steied bodies.

Investigating materials from natural infections we observed oocysts of two morphologically distinct types. This observation led us to study the two types in experimentally inoculated rabbits. The results are described in the present paper.

MATERIALS AND METHODS

The oocysts were observed at a magnification of 1250X and measured in an ocular microscope. The measured oocysts originated from experimental infections, with inocula transferred from natural infections. These inocula constituted 90% of one of the two types, the other type being absent. The rest were oocysts of other species. The rabbits were six weeks old and pretreated with Sulfaflorkombin. The inocula were about five thousand oocysts of either type. In all we measured two hundred oocysts of each type. The results were evaluated statistically by the Student's t-test.

RESULTS

The morphological characteristics of the two types were preserved even after two passages in rabbits. The main dimensions are given in Table 1.

Type I. The oocysts are oval or barrel-shaped, the wall is smooth, pinkish or light yellow, lighter than in type II. The micropyte is broad; in the region of the micropyte the outer oocyst wall is uninterrupted and has a pyramid-shaped protrusion with sharp edges and obtuse angles. The residual body of the oocyst is about spherical, made up of coarse grains of the same appearance as in type II. The sporocysts are spindle-shaped, with an end tapering toward the Steied body, which is small and pointed. The residual oocyst body is not compact, but built of grains, minute as well as sporadic large ones (Fig. 1). The sporulation time is two days at 20—25°C, but some oocysts were sporulated as early as after 30 h.
Table 1. Comparison of oocyst dimensions of two types of *E. media*

<table>
<thead>
<tr>
<th>Dimension (μm)</th>
<th>Type I min.</th>
<th>Type I max.</th>
<th>Type I average</th>
<th>Type II min.</th>
<th>Type II max.</th>
<th>Type II average</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of oocyst</td>
<td>24</td>
<td>33</td>
<td>29.65</td>
<td>30</td>
<td>37</td>
<td>32.88</td>
<td>+</td>
</tr>
<tr>
<td>Width of oocyst</td>
<td>15</td>
<td>29</td>
<td>18.18</td>
<td>17</td>
<td>21</td>
<td>19.19</td>
<td></td>
</tr>
<tr>
<td>Width of microple</td>
<td>3.5</td>
<td>6.5</td>
<td>5.21</td>
<td>3</td>
<td>4</td>
<td>3.72</td>
<td>+</td>
</tr>
<tr>
<td>Diameter of residual body</td>
<td>4.5</td>
<td>7</td>
<td>5.48</td>
<td>4</td>
<td>7</td>
<td>5.72</td>
<td></td>
</tr>
<tr>
<td>Length of sporocyst</td>
<td>14</td>
<td>17</td>
<td>15.79</td>
<td>14</td>
<td>16.5</td>
<td>15.71</td>
<td></td>
</tr>
<tr>
<td>Width of sporocyst</td>
<td>6</td>
<td>8</td>
<td>6.67</td>
<td>7</td>
<td>9</td>
<td>8.09</td>
<td>+</td>
</tr>
</tbody>
</table>

*This column shows whether a given dimension ranges significantly (+) or not (−) in evaluating the data by the Student’s t test at P ≤ 0.01; Min. and max. denote the minimum and the maximum values.*

Fig. 1. Oocysts of type I (a) and type II (b).

Type II. The oocysts are ellipsoidal, often moderately elongated toward the microple. The maximum width of an oocyst generally occurs some distance from the centre of its axis, in the direction from the microple. The wall of an oocyst is smooth, bilayered, yellowish to light brown. In the region of the microple the outer layer is interrupted, the inner layer is flat or slightly cambered, without any edge. The oocyst contains a residual body. The sporocysts are spindle-shaped, having approximately the same length but greater width than those in type I. The Spidra body is small and flat. The residual body of a sporocyst is compact, composed of coarse grains, and is usually nearer to the wall of the sporocyst (Fig. 2). The sporulation time is 2 to 3 days at room temperature.

**DISCUSSION**

There are some distinct morphological differences between the two types of oocyst, but these seem to have been overlooked or disregarded by all authors and either type has been classified as *E. media*. The dimensions of the oocysts and sporocysts of the species *E. media*, as reported by different authors, are given in Table 2.

Table 2. Dimensions of oocysts and sporocysts of *E. media*

<table>
<thead>
<tr>
<th>Author</th>
<th>Size of oocysts (μm)</th>
<th>Size of sporocysts (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khayssain 1967</td>
<td>18.6–33.3 × 13.3–21.3</td>
<td>6.6–14.6 × 5–7</td>
</tr>
<tr>
<td>Levine and Ivens 1972</td>
<td>19–37 × 13–22</td>
<td>17.5 × 7</td>
</tr>
<tr>
<td>Pelléry 1974</td>
<td>27–36 × 15–22</td>
<td></td>
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</tbody>
</table>

The oocysts of type I somewhat resemble those of the species *E. matsubayashii* Taunoda, 1952. Since the latter type is known to us merely from the literature, we can make comparisons on the basis of reported data only. The dimensions of the oocysts of *E. matsubayashii* were given as 29.8 × 18.2 μm (Khayssain 1967), 22–30 × 14–22 μm (Levine and Ivens 1972), 22–29 × 16–22 μm (Pelléry 1974). The dimensions of the sporocysts were reported by Levine and Ivens (1972) as 7 × 6 μm. However, the shape of sporocysts corresponding to such dimensions seems rather unlikely and the possibility of an error cannot be ruled out. In the other above-cited papers the sporocyst dimensions of *E. matsubayashii* are lacking. According to these authors the incidence of *E. matsubayashii* is restricted to Japan and India only. Nevertheless, one find in Europe has since been reported by Roméro et al. (1975). These authors give the average dimensions of oocysts as 36 × 21.6 μm and sporocysts as 14.4 × 7.2 μm, and enclose a photograph where the residual bodies are in the centre of the sporocysts, are spherical, and cover almost the whole width of the sporocysts. It can be concluded that the reported dimensions of the oocysts *E. matsubayashii*, though somewhat discrepant, are not far from those of the type I oocysts. Also the broadly ovoid shape of the oocysts of *E. matsubayashii*, their light wall and the residual body of (a diameter of 6.2 μm) resemble the type I described in the present paper. Some facts point out, however, that this type can hardly pertain to the species *E. matsubayashii*. They are size and shape of the residual body of the sporocysts, and the geographical occurrence of *E. matsubayashii*. This species has been found in Europe only once as yet, whereas the type I characterised herein appears to have a common and widespread incidence.

A pyramid-like protrusion of the oocyst wall in the region of the microple of the species *E. media* was reported by Catchpole and Norton (1979). The issue of taxonomical classification of the two types can evidently be settled by further study, focussed on their endogenic cycles. Preliminary experience has revealed that the two types differ by their prepatent periods, 6 days with type I and 9 to 11 days with type II.
ДВА МОРФОЛОГИЧЕСКИ ОТЧЕТЛИВЫХ ТИПА ОООЙСТ КРОЛИЧЕЙ
КОКЦИДИИ EIMERIA MEDIA KESSEL, 1929

М. Пакапид

Резюме. Изучением морфологии ооцист E. media Kessel, 1929 было обнаружено, что в рамках этого вида существуют два морфологически отличительных типа ооцист. Значительные различия были обнаружены в длине ооцист (средняя величина 39,65 μm у типа 1 и 32.88 μm у типа 11), в ширине микропили (5,21 μm и 3,72 μm) и в ширине спироциста (6,67 μm и 8,00 μm). Отчетливые различия имеются также в форме остаточного тельца спироциста и в образовании стены ооциста в области микропили.

REFERENCES


T. A. Vershinina: Kartografirovaniie razmeshcheniya i sezonnuy aktivnosti ikosodykh kleshechey. (Mapping of distribution and seasonal activity of ixodid ticks.)


In the publication are discussed principles and methods of mapping of distribution and seasonal activity of ixodid ticks on the basis of author’s own experiences and analysis of literary data. The first chapter deals with theoretical foundations of mapping, the following three chapters are devoted to large scale, average scale and small scale mapping. Many concrete data on the process of map constructions are given based mainly on examples of Ixodes persulcatus and Dermacentor nattilis. Such maps are very useful for medical geographic purposes. It was shown that character of natural conditions and economic exploitation of the territory influence on the spatial population structure of individual tick species. The publication is destined for those interested in biology, parasitology, medical geography and zoological mapping.

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