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EIMERIA VITELLINI N. SP. (APICOMPLEXA: EIMERIIDAE) FROM THE BRAZILIAN TOUCAN, *RHAMPHASTOS VITELLINUS VITELLINUS* LICHTENSTEIN (AVES: PICIFORMES: RHAMPHASTIDAE)

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Eimeria vitellini *n. sp., is described from the faeces of the toucan,* Rhamphastos v. vitellinus. *Oocysts broadly ellipsoidal to oval (egg-shaped), 22.6 x 18.3 (20.0-25.0 x 16.3-22.5) μm, shape-index (length/width) 1.2 (1.1-1.4). Oocyst wall a single colourless layer about 0.5 μm thick, becoming thinner at one extremity, at which point the oocyst usually ruptures. No oocyst residuum, but 1 or 2 small polar bodies of about 1.0-1.5 x 0.5-1.0 μm. Sporocysts ellongated ellipsoid (pear-shaped), 14.3 x 7.5 (13.8-15.0 x 6.9-7.5) μm, shape-index 1.9 (1.8-2.0), with a thin colourless wall bearing a very delicate Stieda body: a conspicuous sub-Stieda body is present. Sporozoites with anterior and posterior refractile bodies and strongly recurved around a bulky, compact sporocyst residuum composed of relatively fine granules and spherules.*

Key words: Apicomplexa – Eimeriidae – *Eimeria vitellini* n. sp. – coccidia – oocysts – toucan – *Rhamphastos v. vitellinus* – Aves – Brazil

Faeces from 2 of 6 specimens of the "sulphur and white-breasted toucan", *Rhamphastos v. vitellinus*, housed in the Museu Paraense Emílio Goeldi, Belém, Pará, Brazil, were found to contain coccidial oocysts. They are considered to be those of a hitherto unrecorded species of *Eimeria*, described below.

MATERIALS AND METHODS

Freshly passed faeces were lightly triturated in 2.0% (w/v) aqueous $K_2Cr_2O_7$ solution and the suspension maintained as a thin layer in covered Petri-dishes kept at 24-26 °C. Oocysts were sufficiently abundant to permit examination without concentrating them by the usual zinc sulphate or sucrose flotation methods. Fifty were measured, using an ocular micrometer, x 8 eyepieces and a x 100 neofluar objective: photomicrographs were prepared using a Zeiss Microflash II and Ilford Pan F film. The line drawing of the oocyst is based on these, together with direct observations made on the oocysts being measured. All measurements are in micrometers (μm): they are given as means, with the range in parentheses, and are followed by the shape-index (ratio of length/width).

RESULTS

Eimeria vitellini n. sp.
(Figs 1-4)

Diagnosis: Oocysts are broadly ellipsoidal to oval (egg-shaped), 22.6 x 18.3 (20.0-25.0 x 16.3-22.5), with a shape-index of 1.2 (1.1-1.4). Oocyst wall very delicate, smooth, colourless, and of a single layer about 0.5 thick: no obvious micropyle, but the wall is thinner at one extremity (the narrow one in the case of oval oocysts). No oocyst residuum, but there are 1 or 2 small polar bodies of about 1.0-1.5 x 0.5-1.0. Sporocysts are of an elongated ellipsoidal shape (pear-shaped), with a very delicate, colourless wall bearing an inconspiuous Stieda body: there is a sub-Stieda body of about 3.0 x 2.0. Sporozoites are strongly recurved around a bulky, compact residuum composed of relatively fine granules. Anterior and posterior refractile bodies are present, but they are seen with difficulty due to the recurved nature of the sporozoites and the bulky residuum.

Type Host: Rhamphastos v. vitellinus Lichtenstein: the "sulphur and white-breasted toucan" (Aves: Piciformes: Rhamphastidae).

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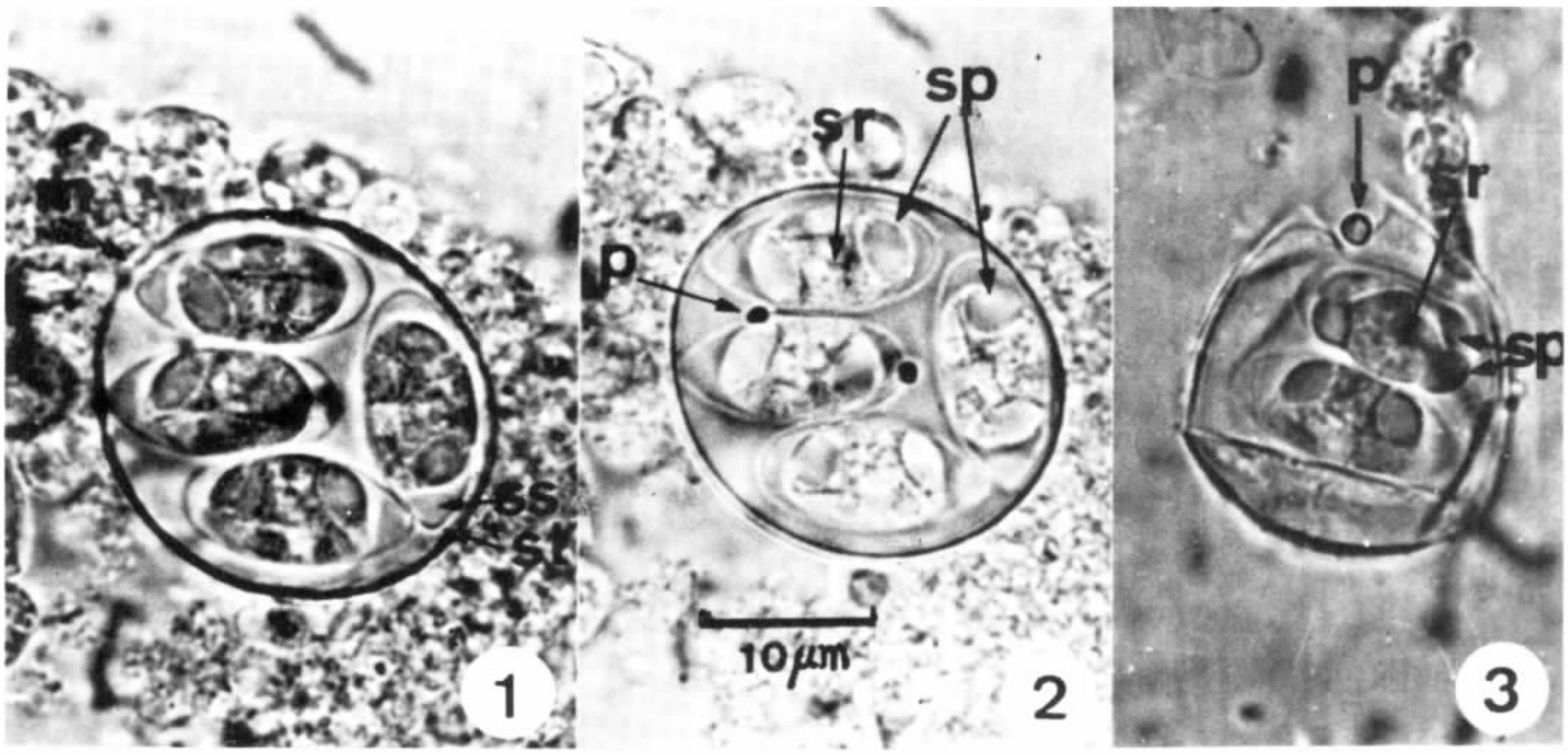

Photomicrographs of oocysts of *Eimeria vitellini* n. sp. in faeces of the toucan *Rhamphastos v. vitellinus:* bright field microscopy. Fig. 1: intact, mature oocyst showing thin single-layered wall with a thinner area at one pole (m), and sporocysts with a delicate Stieda body (st) and conspicuous sub-Stieda body (ss). Fig. 2: same oocyst in different focal plane, showing 2 polar bodies (p), the bulky sporocyst residuum (sr) and the ends of the recurved sporozoites (sp). Fig. 3: broken oocyst showing dehiscence of the single-layered wall at the thinner pole, single polar body and sporozoites recurved around the sporocyst residuum.

Location in Host: No information: probably the intestinal tract. Oocysts described from the faeces.

Sporulation: Exogenous: within 48 hours.

Type Material: Oocysts preserved in 10.0% formol-saline and held by the Department of Parasitology, Instituto Evandro Chagas, Belém, Pará. It should be noted, however, that in our hands such material has not proved very satisfactory for subsequent morphologic study, especially for very fragile oocysts such as those of *E. vitellini.*

Type Locality: Belém, Pará, north Brazil: captive birds in the Museu Paraense Emílio Goeldi.

Prevalence: No significant information: 2 out of 6 birds examined were infected.

Etymology: The specific name is derived from that of the host, *Rhamphastos v. vitellinus.*

DISCUSSION

We agree with Levine (1953) that the same coccidian species are unlikely to infect birds in different avian orders, and have accordingly limited our differential diagnosis for *E. vitellini* to parasites recorded within the order Piciformes. As far as we can determine from the available literature, only 4 species of *Eimeria* have been described from these birds.

Kar (1944) gave the name of *E. barbeta* to a coccidian of the "blue-throated barbet", *Cyanops asiatica.* The oocysts differ from those of *E. vitellini* in their more elongate, oval shape (22.0-24.0 x 10.0: shape-index 2.4), larger sporocysts (19.8 long) and the absence of polar bodies.

Levine (1953) named two parasites from the "greater spotted woodpecker", *Dendrocopus major,* as *E. dendrocopi* and *E. nonbrumpti.* The former differs from *E. vitellini* in its larger, predominantly cylindrical oocysts (28.6 x 16.7: shape-index 1.7) which have a yellow-orange coloured wall, about 1.2 thick. The latter parasite has spherical (22.2) or subspherical (21.0-26.0 x 19.0-22.0) oocysts which possess no polar bodies. The sporocysts are smaller than those of *E. vitellini,* being only 9.7-13.4 x 6.1-7.3: shape-index 1.8.

Finally, Upton et al., (1984) described *E. forresteri* in the faeces of the "toco toucan", *Rhamphastos toco,* of undetermined locality in South America. The oocysts of this coccidian are larger and more elongated than those of *E.*

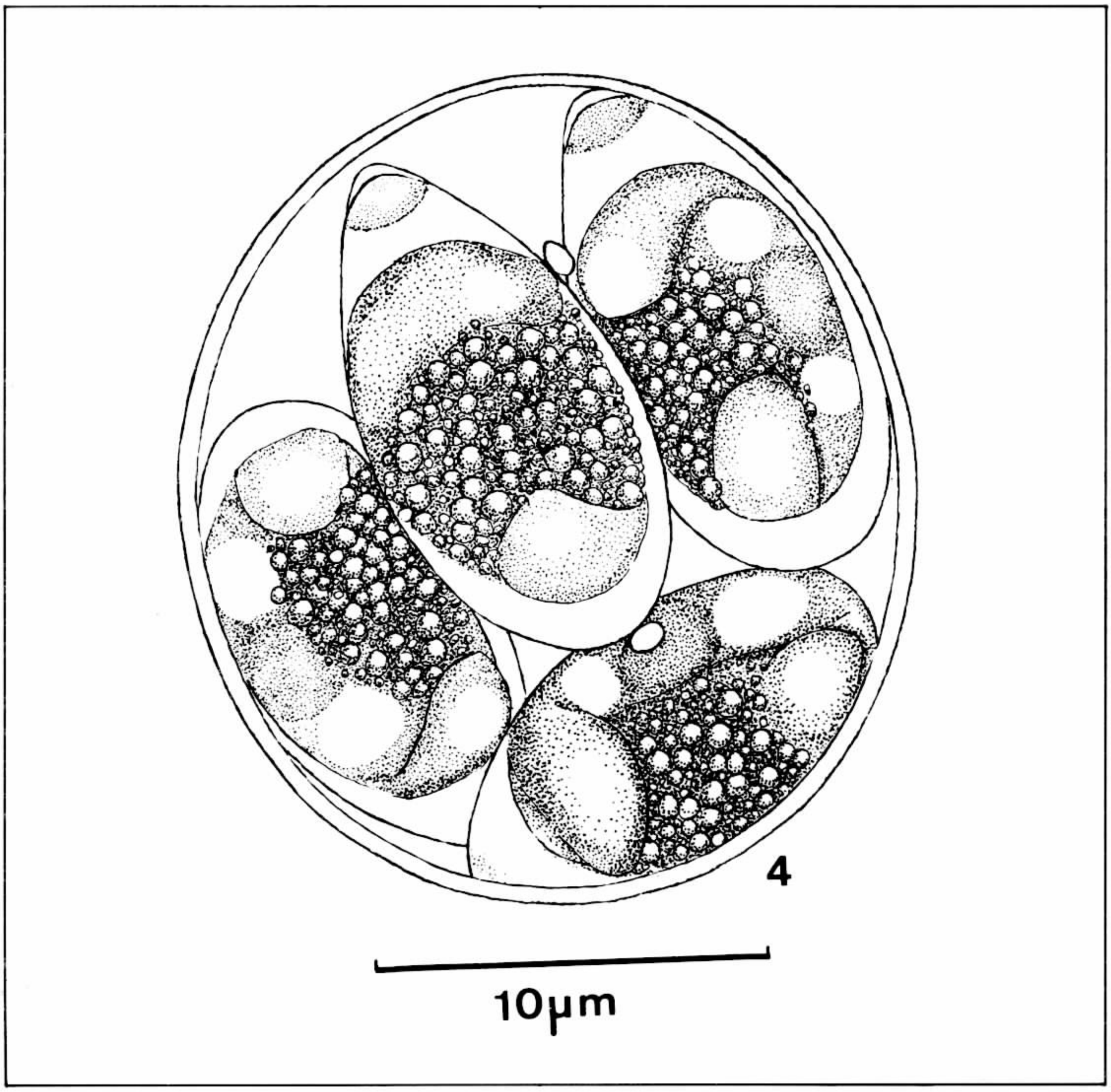

Fig. 4: line drawing of a mature oocyst of *Eimeria vitellini* n. sp.

vitellini (24.5 x 17.8: shape-index 1.4), but they do resemble the latter parasite in the morphology of the sporocysts (14.8 x 7.3: shape-index 2.0) and the possession of 1 to 3 small polar bodies. The major distinguishing feature is, however, the oocyst wall of *E. forresteri* which is 1.5 thick and composed of 3 layers: an outer pitted layer, about 0.25 thick, and smooth middle and inner layers of 0.5 and 0.75 respectively. The wall structure was confirmed by crushing the oocysts.

Upton et al., stated that in material ". . . examined periodically for up to 2 years" the outer oocyst wall layer was frequently partially detached or completely lost. This would reduce the thickness to 1.25, which is still, however, over double the thickness of the oocyst wall of *E. vitellini*. Furthermore, our material was examined within a few hours after the faeces were shed and *without* the use of concentration by Sheather's sugar solution: under such conditions it is most unlikely that additional oocyst wall layers were lost in all of the specimens of *E. vitellini* examined. Observations on crushed oocysts made it quite clear that the wall is, in fact, composed of a single delicate layer (Fig. 3). Finally, no mention is made by Upton et al., of a thinner area on the oocyst wall of *E. forresteri:* whether or not this feature

in *E. vitellini* represents a true micropyle is debatable, but crushed oocysts seemed always to break at the thinner extremity.

As far as we are aware, *E. vitellini* has little or no pathogenicity in *R. v. vitellinus.*

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