

Eimeria uekii sp. n. from *Lagopus mutus japonicus* (Clark)
in Mts. Tateyama, the Japan Alps

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Key words: *Eimeria uekii*, *Lagopus mutus*

Brinkmann (1926), Galli-Valerio (1929), and Levine (1953) reported that four species of coccidia (*Eimeria avium* i.e., *E. lagopodi*, *E. brinkmanni*, and *E. fanthami*) were present in ptarmigans, *Lagopus mutus* subspp. However, none was reported for the Japanese ptarmigan, *L. mutus japonicus*.

A new species of *Eimeria* was found in fresh fecal samples in a microbiological survey of the Japanese ptarmigan from Mts. Tateyama, The Japan Alps. Details are described in this paper.

Materials and Methods

Fresh fecal samples were collected from 281 ptarmigans immediately after defecation, in the area from Meadow Murodo (2,480 m) to Mt. Jôdo (2,820) in Mts. Tateyama, The Japan Alps, during 1971 and 1974 seasons except winter. Samples positive for coccidian oocysts were crushed and spread in a thin layer of 3% potassium dichromate solution in a petri dish for 2 days at room temperature. One hundred oocysts from different fecal samples were measured by an ocular micrometer.

Description

Eimeria uekii sp. n. (Figs. 1-3)

The oocyst was ellipsoidal, measuring 24 (19-29) by 16 (13-21) μm with L/W ratio of 1.5 (1.2-1.7), surface smooth, wall single-layered and yellowish with the thickness of 0.6 μm , residuum absent, indistinct micropyle present (not in the unsporulated oocyst), 1 or 2 ovoid polar granules present (2 by 1 μm).

Sporocysts were elongated ovoid, measuring 12 (11-15) by 6 (5-7) μm , irregularly oriented with a stieda body at the small end, substieda body absent, approximately thirty large granules of the sporocyst residuum effectively obscured sporozoite detail. There were two distinct refractile globules, one anterior small, the other posterior large (2.2-3.0 μm).

Type host: *Lagopus mutus japonicus* (Clark), Japanese ptarmigan.

Type locality: Meadow Murodo (2,480 m) of Mts. Tateyama, The Japan Alps, Toyama Prefecture, Japan.

Location in the host: Epithelium of the cecum. Oocyst in feces.

Sporulation time: 24 hours at about 24 C.

Etymology: The specific name is dedicated to Dr. Tadao Ueki in recognition of his contribution to this field.

Prevalence: Two hundred nine out of 281 ptarmigans (74%) were infected with

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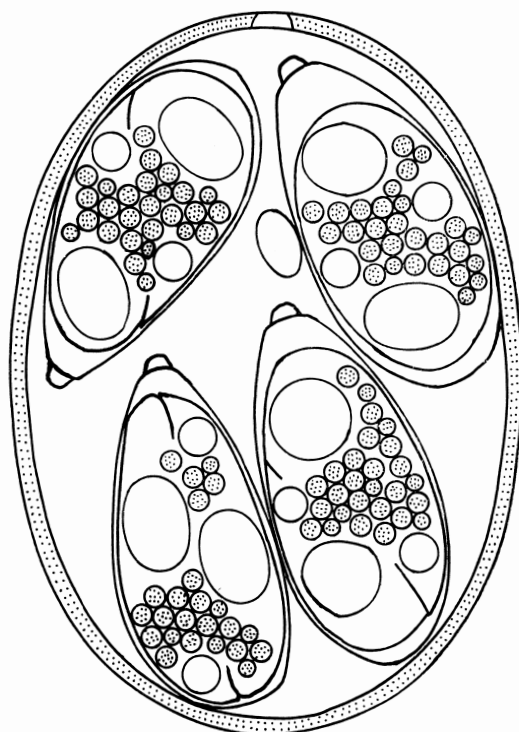


Fig. 1 *Eimeria uekii* sp. n. A schematic diagram of sporulated oocyst. Scale: 1 μ m.

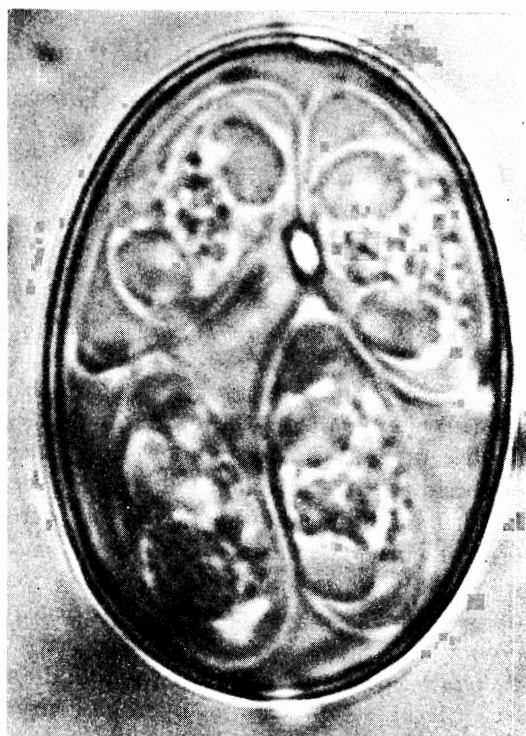


Fig. 2 Photomicrograph of sporulated oocyst of *Eimeria uekii*.

Table 1 Positive ratio of *Eimeria uekii* in *Lagopus mutus japonicus* at Mts. Tateyama

Date	1971	1972	1973	1974	Chicks	Total
June	—	18/ 25 (72)	—	11/14 (79)	—	29/ 39 (74)
July	—	15/ 20 (75)	20/21(95)	8/10(80)	4/ 4(100)	43/ 51(84)
Aug.	4/ 5 (80)	9/ 10(90)	13/19(68)	23/26(88)	18/19(95)	49/ 60(82)
Sept.	23/23(100)	16/ 16(100)	—	4/ 4(100)	7/ 7(100)	43/ 43(100)
Oct.	12/18(67)	14/ 22(64)	—	12/16(75)	9/15(60)	38/ 56(68)
Nov.	—	2/ 10(20)	5/22(23)	—	—	7/ 32(22)
Total	39/46(85)	74/103(72)	38/62(61)	58/70(83)	38/45(84)	209/281(74)

Table 2 The state of feces, *Escherichia coli* detection and the age of hosts in relation to the isolation of *Eimeria uekii*

	Feces		<i>E. coli</i>		Age of hosts		
	Cecal feces	Normal	+	—	Chick	Adult	Total
<i>Eimeria uekii</i> +	14	61	20	55	13	62	75
—	2	31	4	29	1	32	33
Total	16	92	24	84	14	94	108
ϕ	0.1634		0.1719		0.1989		



Fig. 3 *Eimeria uekii* of infected sites of the cecum (H.E.).

this species, and the rate being lower in both spring and autumn than in summer (Table 1). The detection rate of the *Eimeria uekii* was higher in chicks than in adults (Tables 1, 2). The same was true in cecal feces in which *Escherichia coli* was detected (Table 2).

Discussion

The oocyst of *E. uekii* is different from any of the species previously described. Brinkmann (1926) reported "*Eimeria avium*" from *L. mutus* in Norway, but this specific name is no longer considered valid. Galli-Valerio (1929) described *E. lagopodi* from *L. mutus* in Switzerland, but his description was so brief that so many morphological characteristics remained unknown. *E. lagopodi*, its sporocyst in particular, seems to be smaller than others.

Levine (1953) described *E. brinkmanni* and *E. fanthami* from *L. mutus repestis* in Canada. Both species look larger than *E. uekii*, having double-layered oocyst wall and thickened sporocyst without residuum.

Higher prevalences in the chicks, as well as in the cecal feces in which *E. coli* was detected, suggest that *E. uekii* may cause lesions in the host. In fact, an injured epithelium of the cecum was observed in a dead adult ptarmigan (Fig. 3). Parasitism was not observed in the small intestine nor in the rectum.

Summary

Eimeria uekii sp. n. was isolated from Japanese ptarmigan (*Lagopus mutus japonicus*) from Mts. Tateyama, The Japan Alps. The oocyst of *E. uekii* was ellipsoidal, 24 by 16 μm , surface smooth, wall yellowish, 0.6 μm thick and single-layered. An indistinct micropyle was present, but not in unsporulated oocyst. The oocyst residuum was absent but 1 to 2 polar granules were present. The sporocyst was elongated ovoid, 12 by 6 μm , having both stieda bodies and the sporocyst residuum. No substieda body was present. Freshly-passed oocyst became completely sporulated after 24 hours at 24 C. Higher prevalences in the chicks as well as in the cecal feces in which *Escherichia coli* was detected suggest that *E. uekii* may cause lesions in the host. *E. uekii* was mainly located in the cecum.

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立山棲息のライチョウに寄生するコクシジウムの1新種 *Eimeria uekii*

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日本アルプス立山連峰の室堂(標高 2,480 m) から浄土山(2,820 m)にかけて棲息の特別天然記念物ライチョウ延 281 羽の新鮮便を調べ、*Eimeria uekii* を高率(74%)に検出した。夏に寄生率が高く、9月100%に達すが、春秋には低下する。宿主の盲腸の絨毛上皮細胞内にて増殖し、ヒナおよび大腸菌検出の盲腸便に有意に多く検出されたことから、病原性がある

と思われる。

同種はオオシストが平均 $24 \times 16 \mu\text{m}$ で、壁が1層からなり、成熟オオシストに不明瞭な卵門を有し、スポロシストは平均 $12 \times 6 \mu\text{m}$ の長卵形で、スポロシスト残留体を有すなどの特徴で、既知種と区別できる。なお本種にはライチョウコクシジウムという和名を与えたい。