

Ctenidium molluscum (Musci) in Japan

Naoki Nishimura

Hiruzen Branch, Research Institute of Natural Sciences, Okayama University of Science,
Kawakami-son, Maniwa-gun, Okayama 717–0602, Japan

Abstract *Ctenidium molluscum* (Hedw.) Mitt. is confirmed to exist in the cool temperate, calcareous areas in Japan. A morphological description with figures is given, based on Japanese plants. Notes on the habitat and the distribution are also provided.

Key words : *Ctenidium molluscum*, Musci, Japan, distribution

Introduction

Ctenidium molluscum (Hedw.) Mitt. is the type species of the genus *Ctenidium*. Although it has a wide distribution in the Northern Hemisphere, its habitat is not well known except in Europe (Nishimura, 1985).

Sakurai (1954) first added *C. molluscum* to the Japanese moss flora in his “Mus-cologia Japonica”. Nagano & Kiguchi (1978) reported the species in a local floristic list without any comment. When Nishimura (1985) revised *Ctenidium*, he could not find any Japanese specimens of *C. molluscum* and he excluded it from the Japanese moss flora.

Recently, among the I. Nagano-collection (TNS), the author found some specimens from the Central Honshu, Japan, that are identical with *C. molluscum*, and he also encountered the species growing in a calcareous area of Shikoku, Japan.

The following description is based on the Japanese plants.

Ctenidium molluscum (Hedw.) Mitt., J. Linn. Soc. Bot. 12: 509 (1869). [Figs. 1–3]

Plants small- to medium-sized for the genus, in light- to yellowish-green, shiny mats. Stems creeping, yellowish, forming a rhomboid frond with regularly pinnate branches, (1.0–)1.5–2.0 cm long, ca. 1.0 cm wide, sometimes forming a long (ca. 6 cm long) frond by continuous growth of stem apex; new stem innovations developing irregularly from stem; central strand slightly developed, 2–3 layers of cortical cells in cross section. Branches horizontally spreading, flexuous, often hooked at apices, 5–8 mm long. Stem-leaves widely ovate- to triangular-lanceolate, more or less falcate-se-cund, slightly concave, weakly channeled at base of acumen, rather gradually nar-rowed into a long, often reflexed acumen, cordate at base with long, narrow or wide

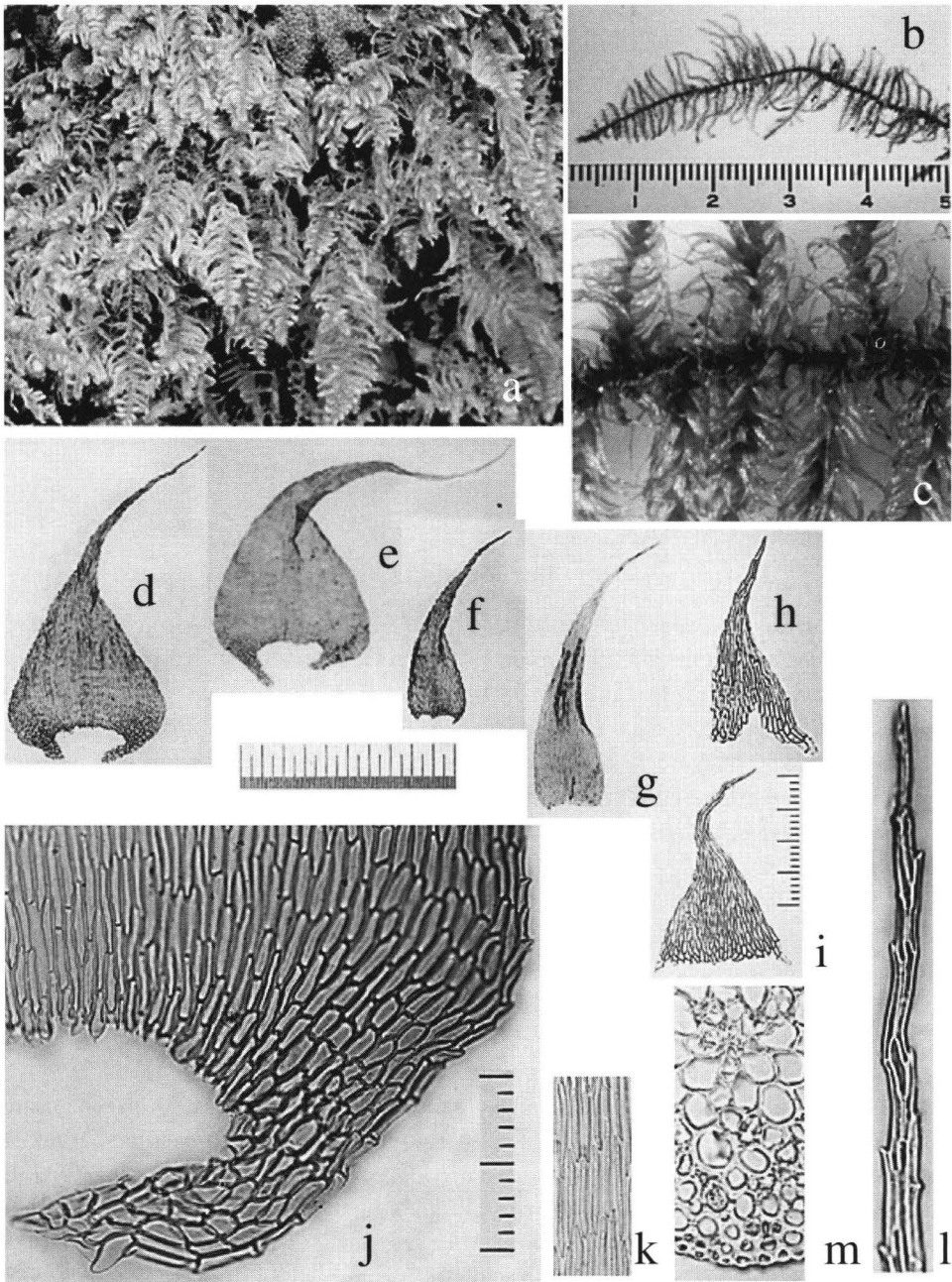


Fig. 1. *Ctenidium molluscum* (Hedw.) Mitt. a. Habit. b. Stem. c. Portion of stem and branches. d, e. Stem leaves. f, g. Branch leaves. h, i. Pseudoparaphyllia. j. Basal angle and decurrency of stem leaf. k. Median laminal cells of stem leaf. l. Apical part of stem leaf. m. Portion of cross-section of stem. (Scale bars: 1 mm for d–g, 0.2 mm for h–i, 0.1 mm for j–m. All photographed from N. Nishimura-10662).

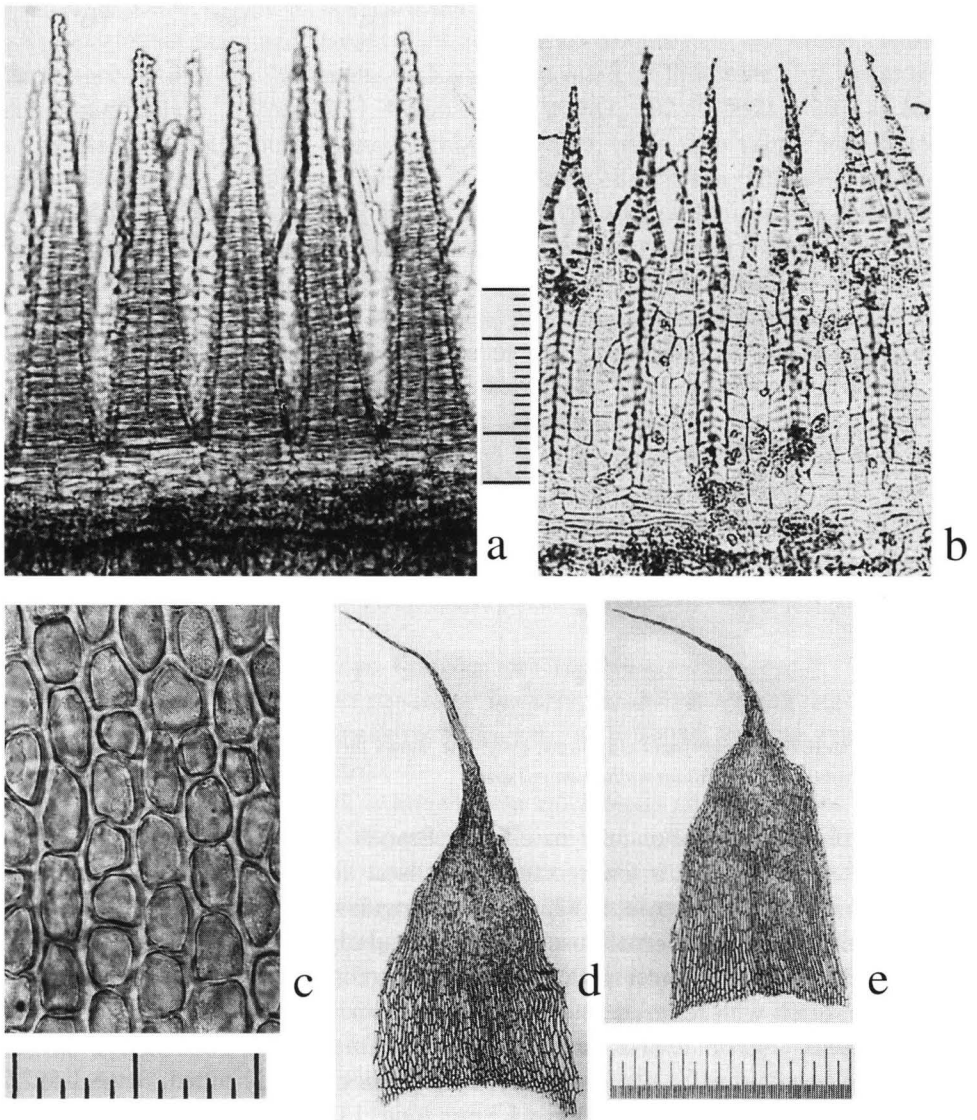


Fig. 2. *Ctenidium molluscum* (Hedw.) Mitt. a. Portion of peristome. b. Portion of endostome. c. Exothecial cells. d, e. Inner perichaetial leaves. (Scale bars: 0.2 mm for a-b, 0.1 mm for c, 1 mm for d-e. All photographed from N. Nishimura-10662)

decurrencies, 1.60–1.75 mm long, 0.65–0.75 mm wide; margins plane, often slightly undulate and weakly recurved at bases, serrulate throughout; costae double, rarely none, to 1/4 the leaf-length; median laminal cells linear, (30–)40–60(–80) μm long, 3.0–5.0 μm wide in lumen, walls mostly 2.0–2.5 μm thick, weakly prorate; alar cells

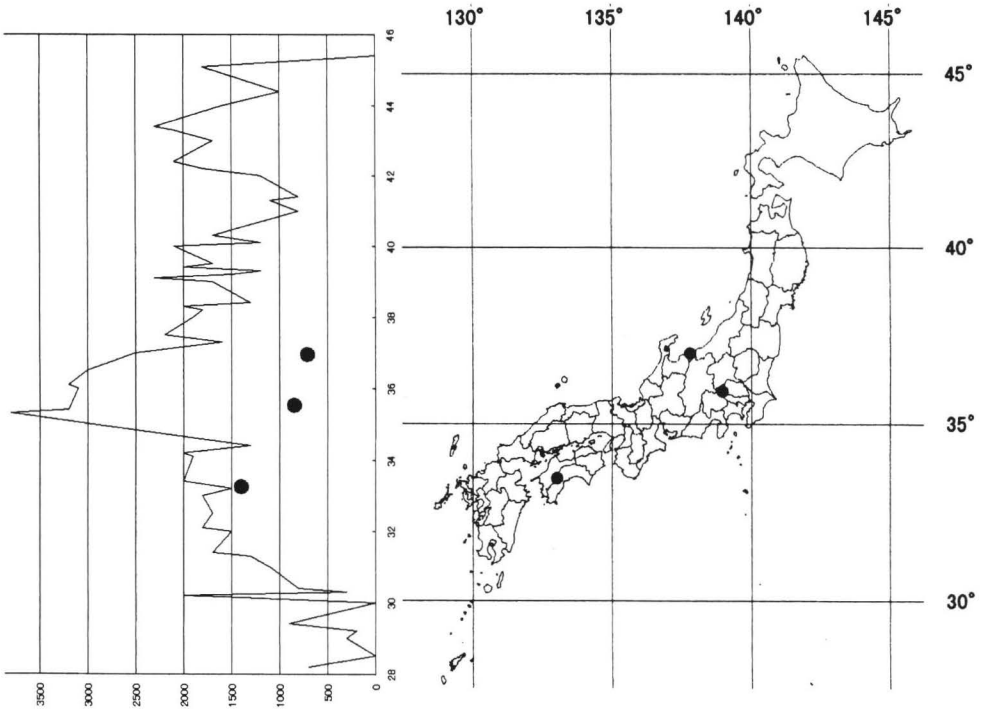


Fig. 3. Horizontal (right) and elevational (left; line shows the highest altitude in each latitude) distribution of *Ctenidium molluscum* in Japan.

weakly differentiated, rectangular to elliptic. Branch leaves narrowly ovate-lanceolate, falcate-secund, with a few rectangular cells at alar corners, 1.2–1.4 mm long, 0.2–0.3 mm wide. Pseudoparaphyllia foliose, triangular-lanceolate. Rhizoids reddish-brown, bundled, weakly verruculose, arising irregularly from ventral sides of stems and branches. Dioicous. Inner perichaetial leaves erect, widely ovate- to triangular-lanceolate, often with reflexed acumen; margins plane, with small spines at base of acumen, weakly serrulate at acumen; costae single or double to obscure, to 1/3 the leaf length; median cell walls mostly 2.0–2.5 μm thick, weakly pitted. Setae 1.5–2.0 cm long, reddish-brown, smooth. Urns 1.5 mm long, 1.0 mm broad when wet; exothecial cells broadly elliptic to rectangular. Peristome hypnoid, double and perfect. Exostome teeth subulate-acuminate, not shouldered, narrowly bordered at lower 2/3 of the length, yellowish, dorsally with zigzag central line and lamellae, dense-striolate below, finely papillose and hyaline above, ventrally trabeculate, finely papillose above. Endostome of high basal membrane, hyaline, finely papillose throughout on both surfaces; segments as high as the exostome teeth, keeled, widely or narrowly split along median line; cilia as long as or shorter than the segments, (1 or) 2 in number, slightly nodulose.

Male plants, calyptrae, opercula and spores not seen.

Specimens examined: Japan. Central Honshu. Niigata-ken, Oumi-cho, Senri-do (limestone doline), ca. 700 m alt., on humus deposited on limestone cliff, or on limestone cliff, July 6, 1976, coll. I. Nagano, nos. 20187, 20212, 20213, 20214, 20218 (TNS); Saitama-ken, Ohtaki-mura, Ohchi-gawa River, Nishi-dani valley, June 1, 1972, coll. T. Iwata, no. I. Nagano-23494 (TNS). Shikoku. Kochi-ken, Higashitsuno-mura, Tengu-Kohgen, Setomi-no-mori forest, ca. 1400 m alt., on soil covering limestone boulder, May 23, 1999, coll. N. Nishimura nos. 10662 (HIRU, NY), 10663 (HIRU, TNS).

Ctenidium molluscum has a beautiful appearance like the subalpine species, *Ptilium crista-castrensis*. The habit of the branches (regularly pinnate, closely and horizontally spreading) and the shape of branch leaves (narrowly ovate-lanceolate with long, falcate-secund acumen) of *C. molluscum* is very characteristic among the genus. Nishimura (1985) pointed out the following distinctive features of *C. molluscum*: (1) strongly falcate-secund stem- and branch-leaves, (2) narrowly ovate basal part of stem-leaves, (3) comparatively strong prorations of laminal cells, and (4) short-rectangular (sometimes transversely rectangular), thick-walled, and regularly arranged alar cells. Although the Japanese plants show stem-leaves rather weakly falcate and with less proration in laminal cells, this variation seems to be within the range of *C. molluscum*.

The specimens from Tengu-Kohgen have the old sporophytes (N. Nishimura-10662). Although the urn and peristome features, described above, are based on a single sporophyte of which urn is partly broken, no different features were detected with those of the European plants.

In Europe, *C. molluscum* is known as a calcicolous moss (Watson, 1963; Nyholm, 1954–69). In Japan, all the specimens were also collected at calcareous areas. The specimens from Senri-do were collected on a limestone cliff or on humus deposited on a limestone cliff. One specimen from Ohchi-gawa, Nishi-dani has no detail data on substrata, but its locality is a famous collecting site in the Chichibu calcareous area. In the Tengu-Kohgen of Shikoku, *C. molluscum* was growing on soil covering a limestone boulder on a steep north facing slope in the deciduous broad-leaved forest, mixed with some coniferous trees, where *Cirriphyllum cirrosum* (Schwaegr.) Grout and *Campyliadelphus stellatus* (Hedw.) Kanda were also growing on the limestone cliff.

The known localities in Japan (Fig. 3) seems to be in the cool temperate zone. The altitude of the Senri-do (700 m) is rather low for the cool temperate, but it has a cooler microclimate because of the special topography of the limestone doline (Nagano & Kiguchi, 1978).

Ctenidium molluscum is known in Europe, Western Asia (Turkey), Siberia, and Alaska, but not in East Asia (Nishimura, 1985). However, in East Asia many reports of the species have accumulated from China in recent years (Redfearn *et al.*, 1996). Thus, a wider distribution of the species might be expected in East Asia.

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References

- Nagano, I. and H. Kiguchi, 1978. On the bryophytes in the Senrido limestone sink of Niigata Prefecture. *Misc. Bryol. Lichenol.*, **8**: 42–43. (In Japanese).
- Nishimura, N., 1985. A revision of the genus *Ctenidium* (Musci). *J. Hattori Bot. Lab.*, **58**: 1–82.
- Nyholm, E., 1954–69. Illustrated Moss Flora of Fennoscandia, II. Musci, Fasc. 1–6. 799 pp. Swedish Natural Science Research Council.
- Redfearn, P. L., B. C. Tan, and S. He, 1996. A newly updated and annotated checklist of Chinese mosses. *J. Hattori Bot. Lab.*, **79**: 163–357.
- Sakurai, K., 1954. *Nihon-no-senrui* (Muscologia Japonica). 247 pp., 70 pls. Iwanami Shoten, Tokyo. (In Japanese.)
- Watson, E. V., 1968. *British Mosses and Liverworts*, 2nd ed. XVI+495 pp., 18 pls. Cambridge University Press.