Brachydontium polycarpum (Seligeriaceae, Musci),
a New Species from Japan

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Abstract. A new species, Brachydontium polycarpum H. Akiyama, is reported on the basis of specimens collected at the alpine rocky place Murodo, Mts. Tateyama, Central Japan. Brachydontium polycarpum is most closely related to B. olympicum (Britt.) McInt. & Spence reported from North America, in larger plant size, cygneous setae, and spherical to subspherical, eperistomate capsules. It differs from B. olympicum in the longer and more crispatem stem leaves with more or less sheathing bases.

Key words: Brachydontium, Brachydontium polycarpum, mosses, Seligeriaceae

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The genus Brachydontium is one of the members of the Seligeriaceae. It is clearly differentiated from the related genus Seligeria in the plicate capsule, the well differentiated, bi-to triseriate annulus, and mitrate calyptra. Beside these features, Brachydontium species can be characterized by their tiny stems size (usually less than 1.0 mm long).

Total seven species have been known for this genus; they are B. curvisetum Crum, B. flexisetum (Hampe) Par., B. intermedium Stone, B. notorogenes Buck & Schaefer-Verw., B.olsonii Bowers & Allen, B. olympicum (Britt.) McInt. & Spence, and B. trichodes (Web.) Mild. (Stone 1973, McIntosh & Spence 1986, Crum 1987, Bowers & Allen 1990, Buck & Schaefer-Verwimp 1992). Up to now only two species have been reported from Japan; they are B. trichodes and B. olympicum.

In the course of field surveys for the Red Data Book Project on the endangered bryophytes of Japan, the author botanized in Murodo, Mts. Tateyama in September 1994 to visit the locality where a rare species Brachydontium trichodes had been collected once before. I failed to find the species there, but I collected a curious species of the Seligeriaceae growing on granite rock surface. The plant is small and it has mitrate calyptrae, short setae, and weakly plicate capsules with triseriate annulus. Amongst all, its compound annulus and mitrate calyptra indicate that it belongs to the genus Brachydontium. This species differs from B. trichodes, however, in the longer stem, absence of peristome, and its distinctly cygneous setae in moist conditions. In addition, it bears three or more sporophytes laterally on a single stem; B. trichodes has a single sporophyte at terminal position (sometimes subterminal) of a stem. The author compares the species with all other ever known congeners and found that it represents a new species of the genus Brachydontium.
Brachydontium polycarpum H.Akiyama, sp. nov. (Figs. 1–3)

Diagnosis. Affinis Brachydontio olympico, sed foliis longioribus, crispatis, laminis basi vaginatis diversus.

Description. Plants gregarious, minute, light-green. Stems to 5 mm long including leaves, erect, often branched, showing distinct innovation in both male and female stems, with a single, well-differentiated central strand; rhizoids reddish brown, smooth. Leaves crisped and twisted more than three times in dry conditions, widely spreading in moist conditions, but tightly appressed to stem at lower sheathing portion; (1.0–)1.5 to 2.3 mm long, subulate from oblong-lanceolate or triangular sheathing bases; subula ca. 1/3 to 1/2 of leaf length, obtuse at apex, reniformis in transverse section and slightly papillose on both sides above; margins plane or

Fig. 1. Natural habit of Brachydontium polycarpum H. Akiyama. Scale bar=5 mm.
Fig. 2. *Brachydontium polycarpum* H. Akiyama. a: Dry plants. b: Wet plant. Arrows indicate archegonia. c: Close-up of a sporophyte. Arrow indicates cymeneous seta. d: Close-up of ribbed urn and operculum. Arrow indicates annulus. Scale bars equal 1 mm, 1 mm, and 0.5 mm, respectively. All photographs were taken from the holotype.
slightly incurved, entire to minutely crenulate; costa occupying subula, stereids weakly differentiated; lamina unistratose throughout; laminar cells totally smooth, long-rectangular, thin-walled and laxly arranged at basal sheathing portion, becoming short-rectangular to subquadrate and more or less thick-walled above.

Autoicous; perichaetia and perigonia on the top of very short lateral branches, usually on different shoots in the same cushion, but sometimes on separate branches of the same stem; usually three or more perichaetia or perigonia on single stem; paraphyses few, linear, transparent, five- to six-cell long. Inner perigonal leaves reddish brown at base, subulate from widely ovate to triangular sheathing base. Inner perichaetial leaves subulate from triangular sheathing base, longer than ordinary stem leaves. More than two sporophytes usually occurring from different perigonia on a
single stem.

Setae straight and twisted about three times in dry conditions, cygneous when in wet conditions, pale yellow, smooth, 0.8 to 1.0 mm long; vaginulae reddish brown. Capsules erect, spherical to subspherical, 0.3–0.4 mm long, with a few stomata at indistinct neck, ribbed with six-to eight-plication; exothecial cells short-rectangular, thin-walled, becoming subquadrate and reddish brown at just below mouth; columella attached to urn when deoperculated; annulus large, three to four rows, each cell large and very thick-walled; operculum long straight-rostrate from low-convex base, ca. 0.3 mm long; peristome absent. Spores spherical, smooth, 8–12 μm in diameter. Calyptrae pale yellow, ca. 0.4 mm long, mitrate, deeply three-lobed at base, smooth and naked, only covering operculum and upper part of urn.

*Specimens examined.* JAPAN, Honshu, Toyama Pref., Tateyama-cho, Murodo, around Raicho-zawa, 2300 m alt., on surface or in a shallow crack of boulder at exposed, alpine rocky place beside a temporarily flowing stream, September 10, 1994. Hiroyuki Akiyama 12880 (HYO, holotype; BM, FH, L, NICH, NY, isotypes); ibid., Hiroyuki Akiyama 12863 (HYO).

The distinguishing characters of *Brachydontium polycarpum* are: (1) tall and branched aerial shoots with several sporophytes, (2) spherical and plicate capsules, (3) absence of peristome, and (4) cygneous setae in wet conditions.

*Brachydontium polycarpum* mostly resembles *B. olympicum* (Britt.) McIntosh & Spence in larger plant size, cygneous setae clearly expressed particularly in wet conditions, absence of peristome, and spherical to subspherical, distinctly ribbed urns. *Brachydontium olympicum* differs from *B. polycarpum*, however, in lanceolate and shorter stem leaves (usually less than 2.0 mm long) with weakly differentiated sheathing bases. In addition, stem leaves of *B. olympicum* are (1) straight and more or less appressed to stem in dry conditions and (2) erect-patent or obliquely spreading in wet conditions. Their growing habit also differs judging from observations on the specimens borrowed from NY; *B. olympicum* grows on boulder but it is always half-buried in soil, while *B. polycarpum* grows directly on boulder or in minute crack of rock surface (Fig. 1).

*Brachydontium olympicum* has been reported from two geographically separate localities, that is, North America (Frye, 1919; McIntosh and Spence, 1986) and Japan (Noguchi and Saito, 1970; Deguchi, 1978). Plants of these two localities differ from each other in their seta length (0.8–2 mm long for North American plants, 0.1–0.2 (~0.4) mm long for Japanese ones). No author, however, has recognized them as representing different taxa, because they regarded the difference in seta length as taxonomically meaningless and there was no other feature detected by which effectively the plants from two localities could be separated (Noguchi and Saito, 1970; Deguchi, 1978; McIntosh and Spence, 1986).

It is interesting that here we have a new species in Japan which is closely related to *B. olympicum*, and that it has long setae as seen in North American *B. olympicum*. The author considers that the Japanese
plants referred above are not real B. olympicum. Brachydontium polycarpum can be distinguished from B. trichodes and the Japanese plants so far identified as "B. olympicum", as follows;

1. Plants growing half-buried in soil on rocks; setae 0.1–0.2 (–0.4) mm long; capsules immersed ........................................... "B. olympicum"
2. Single stem bearing more than two sporophytes at lateral position; setae cygneous in moist conditions; peristome absent ... B. polycarpum

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References


摘　要

秋山弘之：日本産キヌシッポゴケモドキ属（コシッポゴケ科：鞠類）の新種、ポンチゴケ（新称）Brachydontium polycarpum

富山県立山連峰の堂堂にある雷鳥沢から、キヌシッポゴケモドキ属の新種、ポンチゴケ Brachydontium polycarpum を報告した。堂堂周辺は、ハイマツ以外には主だった植物のない、標高 2300 m 周辺に広がるやや平坦な場所である。冬から春にかけての長期間にわたり深い雪に覆われているが、雪解けを待つ夏には強い日差しに曝される。ここに報告した新種ポンチゴケは、堂堂乗越からの沢と雷鳥沢本流との出会い河原にある、ひと抱え以上もある岩上に生育している。ポンチゴケはこの岩の表面に固着するようにして生育しているが、つよい日差しに曝される表側ではなく、岩の側面、あるいは陰になった部分に限られるようである。形態上の特徴は、キヌシッポゴケモドキ属としては植物体が大きくよく分枝するこ
と、2-3個、時にはそれ以上の数の胞子体を一本の茎に側生すること、著は球形に近く、乾くと蒴壁にはっきりとしたしぶきができることは、萌芽がへび状に曲がること（湿った状態で顕著である）、そして蒴齿を欠くことである。

ポンチゴケは北米から知られているBrachydontium olympicumに形態が非常に似ている。B. olympicumは茎葉の長さが通常2mm以下であり、乾燥状態では葉の中央よりも先がまっすぐ、濡れた状態では斜め上方にまっすぐに関出する。一方のポンチゴケでは、茎葉は乾燥時にはっきりと巻きし、湿ると広く開出する。またB. olympicumの葉は、はっきりとした披針形で、蒴部の発達が弱く、ポンチゴケのように蒴部でしっかりと茎を抱くことはありえない。標本から判断する限り、両種の生育状態も異なっている。B. olympicumは、岩上の土に著が半ば埋まって状態で生育しているが、ポンチゴケは図1に示されるように岩表面の浅い溝や表面に直接生育しており、茎の下部が土に埋まっていることは全くない。

Brachydontium olympicumは、実はこれまではスガダイラゴケという和名で、北海道、長野県などの数カ所から報告されている。日本で見つかっているスガダイラゴケと北米のB. olympicumとは蒴柄の長さが著しく異なっている。しかしながらこれら両者は、これまで同種として扱われてきている。今回日本から、B. olympicumに近縁で、しかも長い蒴柄を持つ植物が見つかったことは、スガダイラゴケの種としての位置づけについて再検討を迫るものであり、非常に興味深い。

これまでに日本から報告されたキヌシッポゴケモドキ属植物は、以下のように区別することができる。

1 植物体は、なかば基部の土に埋まって生育する。蒴柄は非常に短く、著は包葉間に沈没する

1 基物である岩石表面に生育する。著は包葉から超える

2 胞子体は側生し、一本の茎に数個がつくる。蒴柄は潰れると強くねじれる。蒴齒を欠く。

立山室堂に特産

ポンチゴケ

2 一本の茎には胞子体は一つで、ほぼ頂生する。蒴柄はまっすぐ。蒴齒は非常に短いが存在する。中部日本各地に普通に産する

キヌシッポゴケモドキ

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