

## Notes on rhizoidal tubers in *Tortula truncata* (Pottiaceae, Bryophyta) from Japan

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Rhizoidal tubers in *Tortula truncata* (Hedw.) Mitt. were newly confirmed in Japanese populations. A brief description of the rhizoidal tubers is provided, with illustrations. Ecological and distributional information on Japanese *T. truncata* are also given.

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### Introduction

*Tortula truncata* (Hedw.) Mitt. [= *Pottia truncata* (Hedw.) Bruch & Schimp.] is an acrocarpous moss of *Tortula* sect. *Pottia* (Rchb.) Kindb., which is widely distributed in the temperate zones (Zander & Eckel 2007; Cano & Gallego 2008). In Japan, this species has been reported from Honshu, Shikoku and Kyushu with a limited number of localities (Bescherelle 1893; Horikawa 1951; Sakurai 1954; Saito 1973; Fukuoka-ken Koutougakkou Seibutsu Kenkyukai 1975; Iwatsuki & Noguchi 1983; Kimura & Sakuma 2008; Inoue *et al.* 2011), and all specimens reported from Japan have been collected until the 1980s. In recent years *T. truncata* has not, however, been collected in Japan. During our field research, conducted in 2012 and 2013, we confirmed *T. truncata* from several new localities in Hiroshima Pref., SW Japan, and found rhizoidal tubers in Japanese populations. We summarize here the habitat and distribution of *T. truncata* in Japan, and provide a brief description and illustrations of rhizoidal tubers.

### Findings and Discussion

#### *Habitat and distribution*

*Tortula truncata* is usually found growing on fertilized clay soil in open sites (Fig. 1), associated with *Bryum argenteum* Müll.Hal., *Hedwigia*

*ciliata* (Hedw.) P.Beauv., *Hypnum plumaeforme* Wilson, *Leptophascum leptophyllum* (Müll.Hal.)



Fig. 1. Habitat of *Tortula truncata*. A. Habitat in Akit-su-cho, Higashi-hiroshima-shi, Hiroshima-ken, SW Japan. B. Close-up of plants (Scale bar = 1 mm).

J.Guerra & M.J.Cano, *Marchantia polymorpha* L., *Physcomitrium eurystomum* Sedtn., *Tortula caucasica* S.O.Lindberg, and *Weissia controversa* Hedw. The known localities of *T. truncata* in Japan are shown in Fig. 2. They are particularly concentrated in the littoral region around the Seto Inland Sea. Two of the three localities where *T. truncata* was newly found were citrus orchards in

that region. The habitat and distribution of this species in Japan may be associated with fertilized clay soil in periodically disturbed fields, such as in citrus orchards. A similar habitat and distribution pattern has been reported for *T. caucasica* [= *Pottia intermedia* (Turner) Fűrnr.] in Japan (Saito 1973; Deguchi 1998; Inoue *et al.* 2011; Seki 2012).

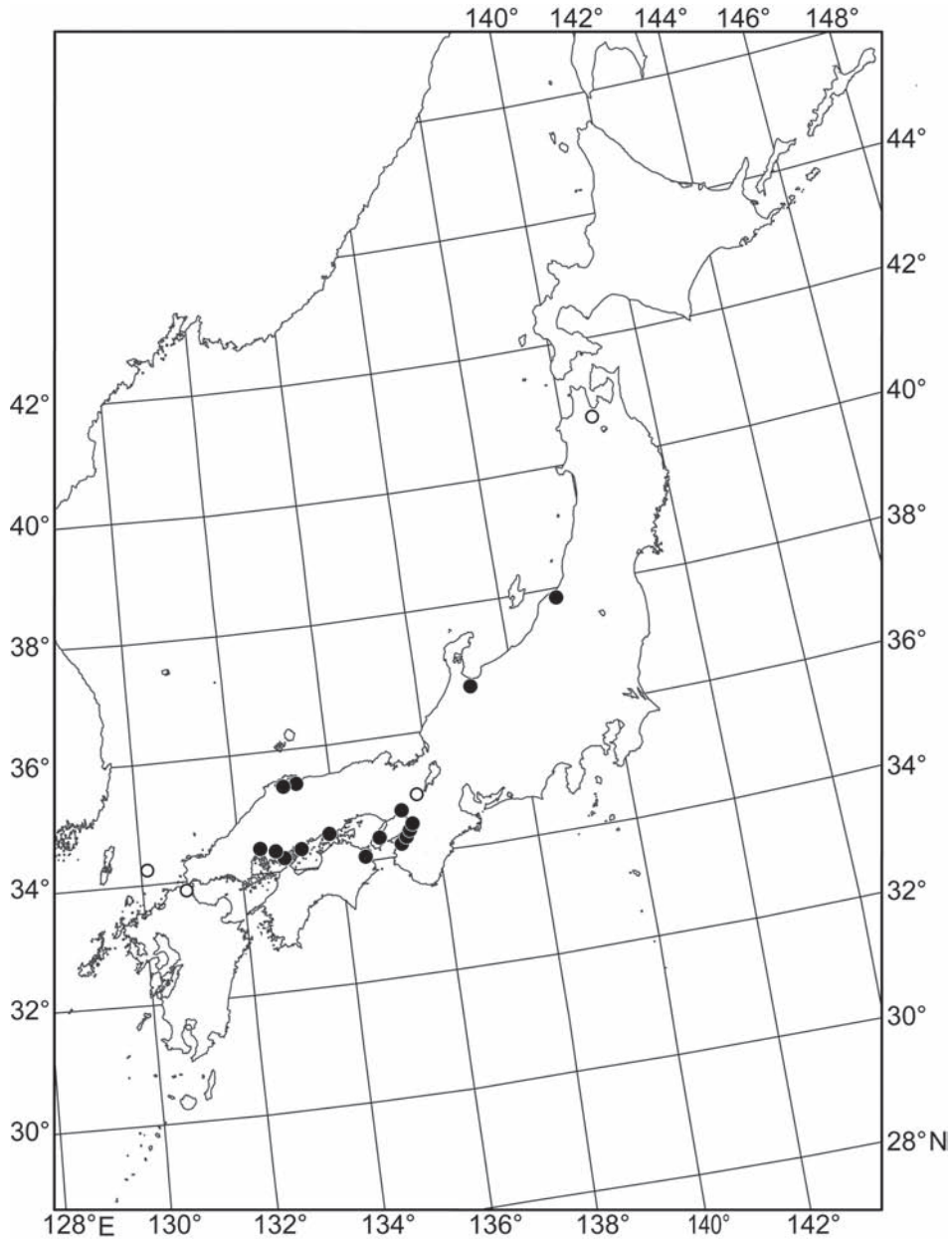


Fig. 2. Distribution of *Tortula truncata* in Japan. Closed circles are based on specimens examined. Open circles are based on literature reports.

### Rhizoidal tubers

Rhizoidal tubers on *T. truncata*, which have been reported several times on European specimens (Bruch *et al.* 1843; Gümbe1 1854; Roth 1904; Arts 1987; Pedrotti 2001), are recorded here for the first time in Japanese populations. In Japanese material the tubers are borne terminally on primary or secondary rhizoids, are reddish brown, and are irregularly globose to ellipsoidal, 60–130×70–200 µm (Fig. 3, A–F). They occur both on plants with sporophytes and on those without. No morphological differences were found between rhizoidal tubers of *T. truncata* and those of *T. caucasica*, which were described and illustrated by Inoue *et al.* (2011). As Arts (1987) has noted, tubers of *Pottia* ssp. (= *Tortula* sect. *Pottia*) cannot be used for identification of the different species, nor to clarify their taxonomic rank. In the course of this study we also confirmed that fallen or detached leaves can produce rhizoids

and regenerative bud on the costa in the field (Fig. 3, G). Arts (1987) pointed out that rhizoidal tubers of *Pottia* (= *Tortula* sect. *Pottia*) may play an important role as a dormant phase in periodically disturbed habitats, such as arable fields, and that it is possible that local survival and spreading is partially, or even mainly, relying on vegetative propagation. Japanese plants of *Tortula* sect. *Pottia* are usually found in arable fields, such as citrus orchards. Our findings of rhizoidal tubers and regenerative bud produced on fallen or detached leaves suggest Japanese populations of *T. truncata* propagate asexually as well as sexually.

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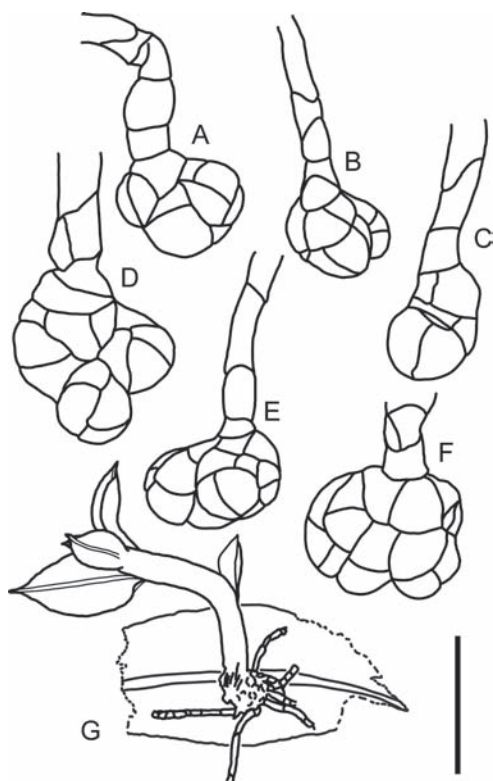


Fig. 3. Rhizoidal tubers (A–F) and leaf with regenerative bud (G) of *Tortula truncata*. A–E from *Y. Inoue 1704* in HIRO; F and G from *Y. Inoue 1646* in HIRO. Scale bar = 100 µm for A–F, and 500 µm for G.

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- 井上侑哉・内田慎治・坪田博美：日本産ハナシセンボンゴケで新たに確認された塊状体
- ハナシセンボンゴケ *Tortula truncata* (Hedw.) Mitt. は温帯を中心に世界的に広く分布するセンボンゴケ科の頂蘚類である。国内では本州および四国、九州で報告されているが比較的稀な種であり、近年その生育は確認されていなかった。今回広島県内の3か所で本種の生育を確認した。本種は日当たりの良い畑の土上に生育しており、これまで日本産の植物体では確認されていなかった塊状体ははじめて確認された。

#### Appendix 1. Representative specimens examined of *Tortula truncata*.

Japan. HONSHU, Niigata-ken, Naka-kanbara-gun, Sakaya, *Ikegami* 7985 (NICH); Toyama-ken, Nei-gun, Yatsuo-mura, *Sinno* (TNS 8367); Wakayama-ken, Naga-gun, Momoyama-cho, Tsukatsuki, *ca.* 90 m alt., *Nakajima* 41859 (OSA); Osaka-fu, Kishiwada-shi, Tsugawa-cho, *ca.* 140 m alt., *Nakajima* 40937 (OSA); Daiku-machi, *Nakajima* 508 (NICH); Sennan-gun, Higashi-tottori-mura, *Nakajima* 441 (OSA); Sakai-shi, Mikitakami, *ca.* 60 m alt., *Nakajima* 20718 (OSA); Toyonaka-shi, Nishikidori, *Nakajima* 39037 (OSA); Hyogo-ken, Awaji-shima Isl., Toshi-mura, *Takada* 451 (TNS); Shimane-ken, Matsue-shi, Sotonakabara-cho, *Nishida* 40 (NICH); Okayama-ken, Tsukubo-gun, Seno-cho, *Uno* (TNS 42351); Hiroshima-ken, Hiroshima-shi, Eibo-hospital, *Noguchi* 2757 (NICH); Fukuo-ji, *Matsumoto* (NICH 179843); Higashi-hiroshima-shi, Akitsu-cho, Mitsu, *ca.* 200 m alt., *Y. Inoue* 1675 (HIRO); Onomichi-shi, Momoshima-cho, Momoshima Isl., *ca.* 60 m alt., *Y. Inoue* 1704 (HIRO); Kure-shi, Oosakikamijima-cho, Nakano, Oosakikamijima Isl., *ca.* 50 m alt., *Y. Inoue* 1646 (HIRO); SHIKOKU, Tokushima-ken, Tokushima-shi, *Muroi* 55A (NICH).

Note: We determined the specimen TNS 40551 was *T. caucasica*, which had been reported as *Pottia truncata* in Saito (1973).

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