A Collection of Hepatics from the Tottori Prefecture, Japan

Vadim A. Bakalin¹,*, Tomotsugu Arikawa² and Masanobu Higuchi³

¹Botanical Garden-Institute, Far Eastern Branch of the Russian Academy of Sciences, Makovskogo Street 142, Vladivostok 690024, Russia
²Keio University, Hiyoshi 4–1–1, Kohoku-ku, Yokohama, Kanagawa 223–8521, Japan
³Department of Botany, National Museum of Nature and Science, Amakubo 4–1–1, Tsukuba, Ibaraki 305–0005, Japan
*E-mail: v_bak@list.ru

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Abstract Basing on the collection of hepatics gathered in the middle of March, 2013, in Tottori Prefecture, Japan, 56 species of liverwort and one hornwort species are recorded. Compiled check-list provides the information on generative structures and vegetative propagules presence, altitudinal diapason of collected specimens, habitat description and accompanying taxa list for each recorded species. Nine species (Annea maxima, Conocephalum salebrosum, Lejeunea aquatica, Megaceros flagellaris, Plectocolea horikowana, Plectocolea ovalifolia, Riccardia kodamae, Riccardia latifrons and Riccardia tamariscina) are new for Tottori Prefecture.

Key words: bryophytes, hornworts, Japan, liverworts, Tottori Prefecture.

Tottori Prefecture is located in South–West part of Honshu, Japan, and covers over than 3500 km². It stretches out long and thin from east to west (approximately 120 km east–west and maximum 50 km north–south). It faces the Sea of Japan in the north, and it is bordered southward with a ridgeline of Chugoku Mountains including Mt. Daisen (1,729 m alt.), the highest peak in a Western part of Honshu. The vegetation of the lower part under 300 m alt. was originally represented by warm-temperate, evergreen broad-leaved forests (e.g. laurel forest), and that of the higher part over 600 m alt. was by deciduous broad-leaved forest (e.g. beech forest). The part between 300 and 600 m alt. is an ecotone. Most of these forests, however, are now replaced by secondary forests dominated by Pinus densiflora and the plantation of Cryptomeria japonica. Tottori Prefecture is the least populous prefecture in Japan (ca. 590,000), because of the mountainous topography. In spite of the low latitude, heavy snowfalls are sometimes occurred in winter owing to the Sea of Japan.

The prefecture has a long history of bryological exploration that was summarized by Arikawa et al. (2011) provided checklist of bryophytes of the prefecture. The list counts 312 species of mosses, 124 species of liverworts and 3 species of hornworts recorded in literature. Later Arikawa et al. (2012) published floristic results of field survey for Tottori red list species recognizing. That list is based on field researches curried in 2010. Arikawa et al. (2012) provide data on distribution of 183 species of mosses and 93 species of hepatics, respectively with 30 and 14 species of bryophytes new for Tottori Prefecture. Recently Kobayashi (2012a, 2012b) also reported 2 species of hepatics as new record for Tottori Prefecture.

Our researches were conducted in three days at March of 2013 as the part of collaboration project for studies of biota diversity and development around Sea of Japan, concluded between National Museum of Nature and Science, Tokyo,
and three institutes of the Far East Division of the Russian Academy of Sciences (Botanical Garden-Institute, Institute of Biology and Soil Sciences and Institute of Geology). Due to springtime we conducted field researches in low altitudes in Tottori Prefecture (see Fig. 1 and Table 1), when over than 200 specimens of hepatics were collected. All specimens were studied for oil-bodies features within one week after the collection, when the plants were in living condition. Despite the time for collecting was very limited we have found 57 species of hepatics (56 liverworts and 1 hornwort), 9 of them are new for the prefecture. Due to the latter fact, as well as we found in additional localities some rare in Tottori Prefecture taxa we provide the list of our collection below.

**Enumeration of Species**

The conspectus lists taxa in alphabetical order. Taxa new for the prefecture are marked with...
Table 1. Collecting localities in Tottori Prefecture

<table>
<thead>
<tr>
<th>Locality number</th>
<th>Coordinates</th>
<th>Geographic description</th>
<th>Altitude, m alt.</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35°30′04.7″N 134°14′59.7″E</td>
<td>Tottori-shi, Ue-machi, Ouchi-dani Park</td>
<td>60</td>
<td>10 March 2013</td>
</tr>
<tr>
<td>2</td>
<td>35°28′55.1″N 133°56′09.3″E</td>
<td>Tohaku-gun, Yurihama-cho, Urushibara, Fudo Waterfall</td>
<td>40</td>
<td>11 March 2013</td>
</tr>
<tr>
<td>3</td>
<td>35°28′54.0″N 133°56′07.3″E</td>
<td>Tohaku-gun, Yurihama-cho, Urushibara</td>
<td>40</td>
<td>11 March 2013</td>
</tr>
<tr>
<td>4</td>
<td>35°27′13.8″N 133°56′50.8″E</td>
<td>Tohaku-gun, Yurihama-cho, Kawakami, around the summit of Mt. Hachibuse</td>
<td>500</td>
<td>11 March 2013</td>
</tr>
<tr>
<td>5</td>
<td>35°28′41.3″N 133°58′20.7″E</td>
<td>Tottori-shi, Aoya-cho, Tawaradani, Fudo Waterfall</td>
<td>115</td>
<td>11 March 2013</td>
</tr>
<tr>
<td>6</td>
<td>35°25′17.3″N 134°05′28.0″E</td>
<td>Tottori-shi, Kouchi, Kouchi Shrine</td>
<td>170</td>
<td>12 March 2013</td>
</tr>
<tr>
<td>7</td>
<td>35°24′09.6″N 134°06′09.4″E</td>
<td>Tottori-shi, Iwatsubo, Iwatsubo Shrine</td>
<td>240</td>
<td>12 March 2013</td>
</tr>
<tr>
<td>8</td>
<td>35°24′48.3″N 134°09′42.6″E</td>
<td>Tottori-shi, Naka-sunami</td>
<td>210</td>
<td>12 March 2013</td>
</tr>
<tr>
<td>9</td>
<td>35°27′40.8″N 134°22′18.2″E</td>
<td>Tottori-shi, Kokufu-cho, Sugano, Sugano Marsh</td>
<td>400</td>
<td>12 March 2013</td>
</tr>
<tr>
<td>10</td>
<td>35°28′42.5″N 134°24′04.0″E</td>
<td>Tottori-shi, Kokufu-cho, Amedaki, Amedaki Waterfall</td>
<td>390</td>
<td>12 March 2013</td>
</tr>
</tbody>
</table>

Asterisk. The nomenclature mostly followed to the accepted in the “Catalog of the hepatics of Japan” (Yamada and Iwatsuki, 2006) with the exception in recognizing of Plectocolea and Solenostoma as the genera different from, Jungermannia s. str. (cf. Bakalin and Vilnet, 2012). Each species is annotated by the followings.

1. Locality number.
2. Presence of generative structures and vegetative propagules (if present) in the following abbreviations: per. (perianths including fleshy calyptrae and pseudoperianth of metzgerioid hepatics), ant. (antheridia), arch. (archegonia), spor. (sporangia), gemm. (gemmae).
3. Altitudinal diapason where the species was collected.
4. Habitat description.
5. Accompanying species (if present).
6. Selected specimens examined herbarium number (one per each locality, according to the Fig. 1 and Table 1).
7. In some cases some taxonomical or other notes are added.

The specimens cited here were mainly collected by Bakalin, and they are deposited in the herbarium of the Botanical Garden-Institute, Far Eastern Branch of the Russian Academy of Sciences (VBGI) and some duplicates in the herbarium of the Department of Botany, National Museum of Nature and Science (TNS).


**Blepharostoma minus** Horik. L1, 60 m. Wet clay road cuts and stone walls in the valley in part shade in the secondary forests. In pure mats or with Bazzania tridens, Diplophyllum taxifolium, Kurzia makinoana and Scapania parvistexta. J-1-44-13.

**Calypogea japonica** Steph. L1, 60 m. Wet stone walls in the valley in the seconary forests. In pure mats or with Conocephalum salebrosum, Pallavicinia subciliata and Riccardia tamariscina. J-1-15-13.

**Calypogea tosana** (Steph.) Steph. L1, 2, 7, 40–240 m. Wet sandy and clayish road cuts in part shade, clay on slope to stream, moist cliffs along stream in the secondary forests. In pure mats or with Lejeunea japonica, Pallavicinia subciliata, Plagiochila ovalifolia and Plectocolea truncata. J-1-26-13, J-2-9-13, J-7-18-13.
**Cavicularia densa** Steph. L7, 240 m. Very wet cliff along stream in the secondary forest. Only one collection. With *Conocephalum salebrosum* and *Plectocolea unispiris*. J-7-13-13.

**Cephalozia otaruensis** Steph. L1,5, per. 60–110 m. Moist rotten log in part shade in the secondary forests. In pure mats or with *Heteroscyphus coailitus, Odontoschisma demudatum* and *Riccardia latifrons* var. miyakeana. J-1-4-13, J-5-30-13.

**Chiloscyphus polyanthos** (L.) Corda L2, 5, 7, ant., per., spor. 40–240 m. Very wet cliffs in spray zone of waterfall in part shade, wet boulders and cliffs in the stream valley in open place or in part shade in the secondary forests. In pure mats or with *Conocephalum salebrosum*. J-2-15-13, J-5-12-13, J-7-16-13.


**Conocephalum japonicum** (Thunb.) Grolle L5, 110 m. Clay covering rocks in slope to stream in mesic conditions in part shade in the secondary forests. Only one collection. With *Dumortiera hirsuta* and *Plectocolea horikawana*. J-5-2-13.

*Conocephalum salebrosum* Szweyk., Bucz.-kowska & Odrzykoski spor. L1, 5, 7, 10, 60–390 m. Wet clay and sandy road cuts, moist rotten log, wet cliffs along stream and in the spray zone of waterfall, clay covering rocks in slope to stream in mesic conditions, in part shade to open places mostly in the secondary forests. Very common species in pure mats or with *Aneura maxima, Calypogea japonica, Cavicularia densa, Chiloscyphus polyanthos, Dumortiera hirsuta, Heteroscyphus coailitus, H. planus, Makinoa crispat, Pallavicinia subciliata, Pellia neesiana, Plectocolea unispiris, Radula kojana, Riccardia chamaedryfolia, R. tamariscina, Trichocolea tomentella* and *Wiesnerella denuda*. J-1-38-13, J-5-28-13, J-7-17-13, J-10-12-13.

This species was recorded for Japan (Kyushu, Miyazaki-ken) relatively recently (Szweykovsky et al., 2005). In the same paper (l.c.) it was shown that the distribution of *C. conicum* (L.) Underw. mainly restricted to Europe, with the westernmost known locality in Turkey. Further researches by Borovichev et al. (2009) showed the similar tendency (the westernmost locality of *C. conicum* in Eurasia is in Altai Mts.). In our researches we did not recognize this species in the Russian Far East, Korean Peninsula and China (unpublished), where all population of the species previously named as *C. conicum* are really belonging to *C. salebrosum*. Akiyama (2006) suggested that *Conocephalum conicum* doesn’t occur in Japan. The present research rather confirms this point of view.

**Diplophyllum taxifolium** (Wahlenb.) Dumort. L1, 7, ant., per. 60–240 m. Moist to wet cliffs along streams and wet stone walls in the valley in the secondary forests. In pure mats or with *Blepharostoma minus* and *Scapania parvitexta*. J-1-10-13, J-7-14-13.

**Dumortiera hirsuta** (Sw.) Nees in Reinw. L1, 2, 5, 7, 10, arch. 40–390 m. Moist to wet clayish road cuts, cliffs along stream, boulders and clay covering rocks on slopes to valleys, cliff in spray zone of waterfall, mostly in part shade in the secondary forests. Very common species growing in pure mats or with *Conocephalum japonicum, C. salebrosum, Heteroscyphus coailitus, Jubula hutchinsiae, Pallavicinia subciliata, Pellia neesiana, Plectocolea sp.* and *Wiesnerella denudata*. J-1-41-13, J-2-10-13, J-5-2-13, J-7-21-13, J-10-4-13.

**Frullania appendiculata** Steph. L1, 60 m. Tree trunks in the secondary forest. In pure mats. J-1-22-13.

**Frullania davurica** Hampe L1, 60 m. Tree

Frullania muscicola Steph. L1, 3, per., spor. 40–60 m. Tree trunk in open places near the roads or trunk in the secondary forests in part shade. In pure mats. J-1-23a-13, J-3-4-13.


Heteroscyphus coalitus (Hook.) Schiffn. L1, 2, 5, 7, 10, 40–390 m. Moist to wet clay to sandy road cuts in part shade, moist to wet cliffs along streams, near waterfalls, mostly in part to full shade in the secondary forests. Very common species. In pure mats or with Aneura maxima, Cephalozia otaruensis, Conocephalum salebrosum, Dumortiera hirsuta, Heteroscyphus planus, Makinoa crispata, Pallavicinia subciilata, Plagiochila ovalifolia, P. sciophila, Radula kojana, Riccardia chamaedryfolia, Pellia neesiana, Trichocolea tomentella and Wiesnerella denudata. J-1-57-13, J-2-22-13, J-5-22-13, J-7-23-13, J-10-12-13.

Heteroscyphus planus (Mitt.) Schiffn. L1, 5, 6, 7, 60–240 m. Moist to wet clay to sandy road cuts in part shade, moist cliffs and tree trunks in stream valleys in the secondary forests. In pure mats or with Conocephalum salebrosum, Heteroscyphus coalitus, Plagiochila sciophila and Trichocolea tomentella. J-1-39-13, J-5-19-13, J-6-4-13, J-7-25-13.

Jubula hutchinsiae (Hook.) Dumort. ssp. javanica (Steph.) Verd. L2, 5, 6, 7, 10, ant., arch., per. 40–390 m. Moist boulders and humus on slopes to and along of the streams in part to full shade in the secondary forests. In pure mats or with Dumortiera hirsuta, Makinoa crispat, Plagiochila ovalifolia, Riccardia chamaedryfolia and Wiesnerella denudata. J-2-5-13, J-5-33-13, J-6-13-13, J-7-1-13, J-10-5-13.

Kurzia makinoana (Steph.) Grolle L1, per. 60 m. Rotten logs and wet clay road cuts in part shade in the secondary forests. In pure mats or with Bazzania tridens, Blepharostoma minus, Plagiochila ovalifolia and Plectocolea ovalifolia. J-1-2-13.


Lophocolea minor Nees L1, 4, 5, 6, gemm., per. 60–500 m. Tree trunks in open places and moist rotten log in part shade in the secondary forests. In pure mats or with Metzgeria lindbergii. J-1-13, J-4-1-13, J-5-8-13, J-6-3-13.

This species is listed as Chiloscyphus minor (Nees) J.J.Engel & R.M.Schuster in Katagiri and Furuki (2012).

Macvicaria ulophylla (Steph.) S.Hatt L3, 40 m. Tree trunk in open place near the road across rice fields. In pure mats or with Radula constricta. J-3-2-13.

Makinoa crispata (Steph.) Miyake L1, 5, 6, 60–170 m. Wet stone walls, boulders and moist cliffs in part shade along streams in the secondary forests. In pure mats or with Conocephalum salebrosum, Heteroscyphus coalitus, Makinoa crispat, Plagiochila sciophila and Trichocolea tomentella. J-1-39-13, J-5-19-13, J-6-4-13, J-7-25-13.

*Megaceros flagellaris* (Mitt.) Steph. L2, 6, 7, sporr. 40–240 m. Very wet cliffs in spray zone of waterfalls, wet to moist boulders in the stream valleys in part shade in the secondary forests. In pure mats or with Jubula hutchinsiae, Makinoa crispata and Riccardia chamaedryfolia. J-2-21-13, J-5-11-13; Higuchi 51349.


**Nardia assamica** (Mitt.) Amakawa L3, 6, per., spor. 40–170 m. Clayish roadside in mesic condition in open to partly shaded places along road across rice fields or in the secondary forests. In pure mats or with *Plectocolea infusca* var. *ovicalyx*. J-3-1-13, J-6-5-13.

**Odontoschisma denudatum** (Mart.) Dumort. L1, gemm. 60 m. Rotten log in part shade in the secondary forests. In pure mats or with *Cephalozia otaruensis* and *Riccardia latifrons* var. *miyakeana*. J-1-5-13.

**Pallavicinia subciliata** (Austin) Stephani L1, 5, 6, 7, 10, ant., arch., per., spor. 60–390 m. Wet to moist clay, humus, stones on slopes to and along streams, near waterfalls, along roads or in forest floor, mostly in part shade in the secondary forests. Very common species. In pure mats or with *Aneura maxima*, *Calypogeia tosana*, *Conocephalum salebrosum*, *Dumortiera hirsuta*, *Heteroscyphus coalitus*, *Pellia neesiana*, *Plectocolea truncata*, *Radula kojana*, *Riccardia chamaedryfolia* and *Trichocolea tomentella*. J-1-17-13, J-5-25-13, J-6-6-13, J-7-31-13, J-10-12-13; Higuchi 51313.

**Pellia neesiana** (Gott.) Limpr. L1, 7, 10, arch., spor. 60–390 m. Wet clay road cuts, wet to moist cliffs along streams or in the spray zone of waterfalls in part shade in the secondary forests. In pure mats or with *Aneura maxima*, *Conocephalum salebrosum*, *Dumortiera hirsuta*, *Heteroscyphus coalitus*, *Pellia neesiana*, *Plectocolea truncata*, *Radula kojana*, *Riccardia chamaedryfolia* and *Trichocolea tomentella*. J-1-17-13, J-5-25-13, J-6-6-13, J-7-31-13, J-10-12-13; Higuchi 51313.

**Pellia ovicalyx** (Steph.) Bakalin L1, 40 m. Clayish road cut along road across rice fields in open place. Only one collection. With *Nardia assamica*. J-3-1-13.

This variety is listed as *Solenostoma horikawanum* (Amakawa) Váňa, Hentschel & J.Heinrichs in Katagiri and Furuki (2012).

**Plectocolea infusca** var. *ovicalyx* (Steph.) Bakalin L1, 40 m. Clayish road cut along road across rice fields in open place. Only one collection. With *Nardia assamica*. J-3-1-13.

This species is listed as *Solenostoma infuscum* (Mitt.) J.Hentschel var. *ovicalyx* (Steph.) Potemkin & Sofronova in Katagiri and Furuki (2012).

**Plectocolea ovalifolia** (Amakawa) Bakalin & Vilnet L1, per., spor. 60 m. Wet clay road cut in part shade in the secondary forest. Only one collection. With *Diplophyllum taxifolium*, *Kurzia makinoana*. J-1-56-13.

This species is listed as *Solenostoma infuscum* (Mitt.) J.Hentschel var. *ovalifolium* (Amakawa) Potemkin & Sofronova in Katagiri and Furuki (2012).

**Plectocolea truncata** (Nees) Bakalin L1, 5, ant., per., spor. 60–110 m. Mesic to wet clay on slope to stream or along road cuts in part shade in the secondary forests. In pure mats or with *Calypogeia tosana* and *Pallavicinia subciliata*. J-1-50-13, J-5-10-13.

This species is listed as *Solenostoma truncatum* (Nees) R.M.Schust. ex Váňa & D.G.Long in Katagiri and Furuki (2012).

**Plectocolea unispiris** Amakawa L5, 7, ant., per., spor. 110–240 m. Moist to wet cliffs and boulders on slopes and along streams, in part shade to open places in the secondary forests. In pure mats or with *Cavicularia densa* and *Conocephalum salebrosum*. J-5-23-13, J-7-11-13.
This species is listed as *Solenostoma unispire* (Amakawa) Váňa, Hentschel & J.Heinrichs in Katagiri and Furuki (2012).

**Porella densifolia** (Steph.) S.Hatt. L1, 7, 60–240 m. Tree trunks on slope to valleys, in part shade in the secondary forests. In pure mats. J-1-21-13, J-7-8-13.

**Porella japonica** (Sande Lac.) Mitt. L7, per., spor. 240 m. Tree trunks on slope to valley, in part shade in the secondary forests. In pure mats. J-7-5-13.

**Porella perrottetiana** (Mont.) Trevis. L7, arch. 240 m. Tree trunks on slope to valley, in part shade in the secondary forests. In pure mats. J-7-3-13.


**Radula constricta** Steph. L1, 3, gemm. 40–60 m. Tree trunks in open place near road across rice fields and in part shade in the secondary forests. In pure mats or with *Cololejeunea japonica* and *Macvicaria ulophylla*. J-1-24-13, J-3-2-13.


**Radula kojana** Steph. L2, 5, 7, 40–240 m. Moist to wet cliffs in part shade along streams in the secondary forests. In pure mats or with *Conocephalum salebrosum*, *Heteroscyphus coalitus*, *Plagiochila sciophila*, *Pallavicinia cf. subciliata* and *Wiesnerella denudata*. J-2-11-13, J-5-20-13, J-7-26-13.

**Reboulia hemisphaerica** (L.) Raddi ssp. orientalis R.M.Schust. L5, 6, 7, 10, ant., arch., spor. 110–390 m. Moist to wet and mesic stones and cliffs in part shade to in open places along streams, on slopes to valleys and in the spray zone of waterfalls in the secondary forests. In pure mats or with *Wiesnerella denudata*. J-2-11-13, J-5-20-13, J-7-26-13.

**Scapania parvitexta** Steph. L1, 2, ant., per. 40–60 m. Wet clay road cuts and stone walls along streams, in part shade in the secondary forests. In pure mats or with *Calypogeia japonica* and *Conocephalum salebrosum*. J-1-40-13.

**Trichocolea tomentella** (Ehrh.) Dumort. L7, 240 m. Moist to wet cliffs along stream in part shade in the secondary forests. In pure mats or with *Conocephalum salebrosum*, *Heteroscyphus coalitus*, *H. planus* and *Pallavicinia subciliata*. J-7-25-13.

**Wiesnerella denudata** (Mitt.) Steph. L2, 5, 10, ant., arch. 40–390 m. Moist to wet cliffs, boulders (including clay covered) and humus along streams, on slopes, in the spray zone of waterfalls, mostly in part shade in the secondary forests. In pure mats or with *Conocephalum salebrosum*, *Dumortiera hirsuta*, *Heteroscyphus*...
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References


