

Nivicolous Taxa of the Myxomycetes in Japan

M. TAMAYAMA

Abstract

Nivicolous taxa of the myxomycetes so far reported from Japan are reviewed and an identification key to them is provided. The vertical distribution of the nivicolous taxa of the myxomycetes and the environmental limiting factors on their growth are briefly discussed.

Introduction

The myxomycetes which fructificate at snow melting sites are called "nivicolous". In the springtime there are no myxomycetes at any other places but snow melting sites. Charles MEYLAN from Switzerland reported the nivicolous taxa of the myxomycetes enough from Europe for the first time in their history of study. He published 22 reports about this group from 1908 to 1937. Then, from 1966 to 1975 Donald T. KOWALSKI published several important reports about the nivicolous taxa of the myxomycetes intensively and extensively from the western mountains in the United States of America. Nowadays, some countries on several continents in the world have the devoted researchers studying this group. One of them is Japan.

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Japan locates at the latitudes of between 25 and 45 degrees north. Japan has much various kinds of climate conditions along its length. There is much snow in several regions in winter, some areas have snow cover of 2 m or more in depth. The snow packs begin to melt there at late in March or early in April and vanish at early in May or early in June, sometimes, in some places even in July. The myxomycetes can be found at the snow melting sites in spring. Some taxa of the nivicolous myxomycetes, particularly those of the genre *Lamproderma*, may be necessary to be re-classified under more clear-cut conceptions of each taxon. For this purpose, the information and the collections of the nivicolous taxa of the myxomycetes made in Japan are indispensable,

which is one of the reasons that the author presented this article.

The Nivicolous Taxa of the Myxomycetes so far Reported from Japan

Thirty-three taxa of the nivicolous myxomycetes so far reported from Japan are as below. The author has been collecting and studying the myxomycetes in the northern part of Japan, mainly in Iwate Prefecture. The collections made by the author himself are indicated by MT numbers, and the collections reported from Japan except for the author's ones are added, when they are described in the papers,

Fig. 1: Records of nivicolous myxomycetes in the administrative divisions of Japan.

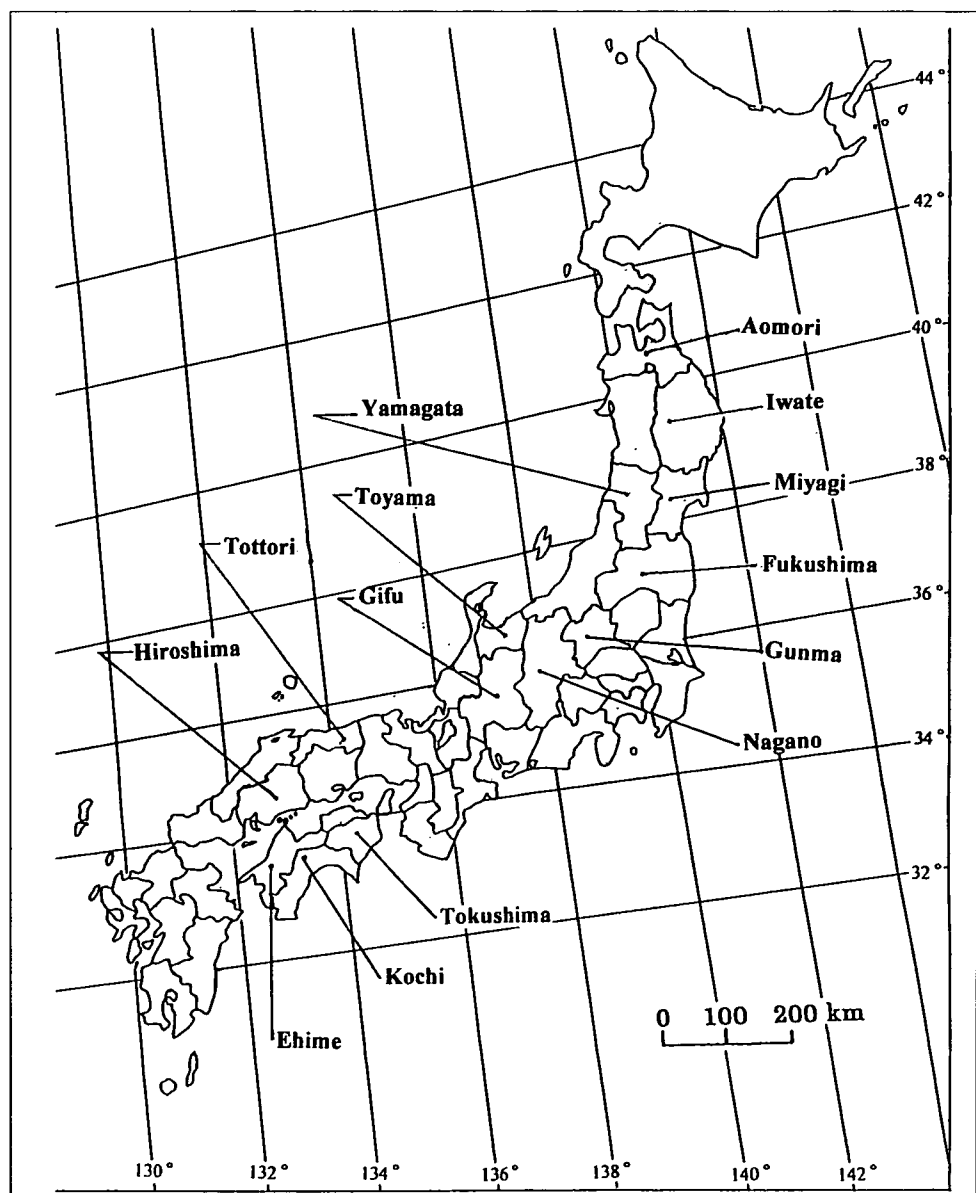


Table 1: pHs of the melting snow in the fields where myxomycetes were collected.

Fields	Date	Time	Weather	pH	Myxomycetes
MatsuoGlobal	1997-03-17	12:28	fine	6.0	<i>Didymium dubium</i>
Himekamisen	1997-03-26	14:37	fine	4.5	<i>Lamproderma ovoideum</i>
Himekamisen	1997-03-26	14:58	fine	5.0	<i>L. ovoideum</i>
Himekamisen	1997-04-14	16:19	cloudy	5.0	<i>L. ovoideum</i>
Kitanomata	1997-04-16	10:27	fine	5.0	<i>L. cf. ovoideum</i>
Appi I	1997-04-19	15:16	fine	5.0	<i>Lamproderma</i> sp.
Hakkoda Sukayu	1997-04-28	15:26	fine	4.5	<i>Lepidoderma carestianum</i>
Hakkoda Jogakura	1997-04-29	09:08	fine	4.5	<i>Diderma cf. alpinum</i>

as follows: YY = Yukinori YAMAMOTO, MH = Masanobu HARIO, HS = Hideyuki SANTO, KT = Kazunari TAKAHASHI, JM = Jun MATSUMOTO. The administrative divisions (Fig. 1) represent the locality. The most commonly found nivicolous taxon of the myxomycetes in Iwate Prefecture is *Lamproderma ovoideum* sensu lato. This taxon, which may be a group of some different taxa, appear on plant litter widely and abundantly.

Order Physarales

Badhamia alpina LISTER

Locality: Tottori (YY-14883).

Collected at: Alt. 1300 m (1 collection: YY-14883).

Diderma alpinum MEYLAN

Locality: Aomori, Fukushima (MH-94038, 94070, 94091), Iwate.

Collected at: Alt. 500 m (8 collections: MT-887, 888, 889, 890, 891, 892, 893, 894); Alt. 560 m (7 collections: MT-1694, 1695, 1696, 1697, 1698, 1699, 1700); Alt. 930 m (45 collections: MT-651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 663, 664, 665, 666, 679, 980, 981, 982, 983, 984, 985, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1811, 1812, 1813, 1814); Alt. 980 m (14 collections: MT-1437, 1438, 1439, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1466, 1467, 1468, 1469); Alt. 1350 m (1 collection: MH-94038); Alt. 1500 m (1 collection: MH-94070, 94091); Alt. 1560 m (4 collections: MT-686, 687, 688, 689).

D. globosum PERSOON var. *europaeum* BUYCK

Locality: Aomori, Fukushima (MH-96088, YY-15128), Iwate.

Collected at: Alt. 560 m (2 collections: MT-1700, 1701); Alt. 930 m (1 collection: MT-1428); Alt. 1270 m (1 collection: MH-96088); Alt. 1580 m (1 collection: YY-15128).

Didymium dubium ROSTAFINSKI

Locality: Aomori, Ehime (YY-15598, 15599, 15600, 15616, 15617, 15618, 15699), Fukushima (MH-95026, 95027), Iwate, Kochi (YY-15591, 15592, 15593, 15662, 15663, 15664, 15665).

Collected at: Alt. 400 m (36 collections: MT-416, 417, 418, 419, 420, 421, 422, 423, 443, 444, 445, 446, 447, 759, 760, 761, 762, 763, 764, 765, 766, 873, 874, 875, 876, 1477, 1478, 1504, 1505, 1510, 1511, 1521, 1522, 1523, 1524, 1709, 1710); Alt. 445 m (1 collection: MT-1765); Alt. 470 m (1 collection: MT-1514); Alt. 500 m (3 collections: MT-886, 920, 1561); Alt. 530 m (30 collections: MT-368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 399, 400, 401, 402, 403, 404, 405, 406, 424, 453, 454, 755, 756, 757, 758, 877, 878, 1503); Alt. 560 m (7 collections: MT-853, 854, 855, 856, 1495, 1698, 1699,); Alt. 580 m (1 collection: MT-1753); Alt. 600 m (7 collections: MT-442, 505, 506, 571, 572, 573, 579); Alt. 640 m (2 collections: MH-95036, 95027); Alt. 930 m (11 collections: MT-751, 753, 754, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436); Alt. 980 m (3 collections: MT-1440, 1441, 1442,).

D. leptotrichum (RACIBORSKI) MASSEE

Locality: Fukushima (MH-94017), Iwate.

Collected at: Alt. 930 m (2 collections: MT-661, 662); Alt. 940 m (1 collection: MH-94017).

***D. nivicola* MEYLAN**

Locality: Fukushima (MH-94036, 96065, 94086, 94087), Nagano (YY-13167).

Collected at: Alt. 850 m (1 collection: MH-94036); Alt. 1250 m (1 collection: MH-96065); Alt. 1780 m (2 collections: MH-94086, 94087); Alt. 2380 m (1 collection: YY-13167).

***Lepidoderma carestianum*
(RABENHORST) ROSTAFINSKI**

Locality: Aomori, Ehime (YY-15700, 15701, 15702, 15703), Fukushima (MH-94012, 94014, 94028, 94069, 94089), Iwate, Yamagata (MH-94039).

Collected at: Alt. 400 m (1 collection: MT-210); Alt. 700 m (2 collections: MH-94012, 94014); Alt. 800 m (1 collection: MH-94028); Alt. 930 m (25 collections: MT-451, 452, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1043, 1044, 1045, 1046, 1047, 1054, 1055, 1056, 1057, 1058, 1061, 1062, 1063, 1064, 1427); Alt. 1350 m (1 collection: MH-94039); Alt. 1500 m (2 collections: MH-94069, 94089).

***L. carestianum* (RABENHORST)
ROSTAFINSKI var. *chailletii* (ROSTAFINSKI)
G. LISTER**

Locality: Aomori, Ehime (YY-15608, 15609, 15610, 15611), Iwate.

Collected at: Alt. 465 m (2 collections: MT-1844, 1845); Alt. 500 m (3 collections: MT-1567, 1568, 1569); Alt. 528 m (1 collection: MT-1921); Alt. 580 m (7 collections: MT-1091, 1092, 1093, 1094, 1095, 1096, 1097).

***L. cf. didermoides* KOWALSKI**

Locality: Iwate.

Collected at: Alt. 810 m (6 collections: MT-1848, 1849, 1850, 1851, 1852, 1853).

***L. granuliferum* (PHILLIPS) R. E. FRIES**

Locality: Aomori, Fukushima (MH-95050, 96066), Iwate, Nagano (KT-920724g).

Collected at: Alt. 400 m (1 collection: MT-210); Alt. 930 m (17 collections: MT-993, 994, 995, 996, 997, 998, 999, 1000, 1001, 1013, 1014, 1018, 1023, 1024, 1025, 1026, 1027); Alt. 980 m (4 collections: MT-1462, 1463, 1464, 1465); Alt. 1000 m (1 collection: MH-95050); Alt. 1250 m (1 collection: MH-95066); Alt. 1438 m (2 collections: MT-1859, 1860); Alt. 2000 m (1 collection: KT-920724g).

***Physarum albescens* ELLIS**

Locality: Fukushima (MH-94065), Nagano (KT-920726a).

Collected at: Alt. 1520 m (1 collection: MH-94065); Alt. 2400 m (1 collection: KT-920726a).

***P. alpestre* MITCHEL, CHAPMAN & FARR**

Locality: Iwate, Nagano (YY-12488, KT-920724d, 920726c).

Collected at: Alt. 560 m (1 collection: MT-1700); Alt. 2000 m (3 collections: YY-12488, KT-920724d, 920726c).

Order Stemonitales

***Diacheopsis kowalski* MEYER &
POULAIN**

Locality: Iwate.

Collected at: Alt. 560 m (2 collections: MT-1846, 1847).

***D. metallica* MEYLAN**

Locality: Fukushima (MH-96109A), Iwate.

Collected at: Alt. 930 m (1 collection: MT-667); Alt. 1610 m (1 collection: MH-96109A).

***Dianema nivale* (MEYLAN) G. LISTER**

Locality: Fukushima (MH-96053), Gunma (YY-14810).

Collected at: Alt. 800 m (1 collection: MH-96053).

***Lamproderama cf. album* NEUBERT,
NOWOTNY & BAUMANN**

Locality: Iwate.

Collected at: Alt. 400 m (28 collections: MT-382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 768, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 1089, 1090, 1506).

***L. atrosporum* MEYLAN**

Locality: Aomori, Fukushima (MH-94024, 95096), Iwate, Nagano (YY-12497).

Collected at: Alt. 445 m (1 collection: MT-833); Alt. 500 m (3 collections: MT-921, 922,

923); Alt. 800 m (1 collection: MH-94024); Alt. 930 m (17 collections: MT-648, 649, 650, 668, 669, 670, 671, 672, 986, 987, 988, 989, 990, 991, 992, 1924, 1925); Alt. 1520 m (1 collection: MH-95096); Alt. 2000 m (1 collection: YY-12497).

***L. atrosporum* MEYLAN var. *anglicum*
G. LISTER & HOWARD**

Locality: Iwate.

Collected at: Alt. 560 m (3 collections: YY-15557 =MT-, MT-848, 849).

***L. carestiae* (CESATI & DE-NOTARIS)
MEYLAN**

Locality: Ehime (YY-15594, 15595, 15595, 15596, 15597, 15613, 15614, 15615, 15705, 15706, 15708, 15709), Miyagi (MH-94029), Fukushima (MH-95024, 94026), Iwate, Nagano (HS-92-3, KT-920724b), Kochi (YY-15670, 15674).

Collected at: Alt. 350 m (1 collection: MH-94029); Alt. 500 m (14 collections: MT-915, 916, 963, 964, 1555, 1556, 1557, 1558, 1559, 1562, 1563, 1564, 1565, 1566); Alt. 530 m (9 collections: MT-407, 408, 409, 410, 411, 412, 413, 414, 415); Alt. 640 m (1 collection: MH-95024); Alt. 800 m (1 collection: MH-94026); Alt. 930 m (8 collections: MT-1030, 1031, 1032, 1033, 1034, 1035, 1052, 1053); Alt. 2000 m (2 collections: HS-92-3, KT-920724b).

***L. cribrarioides* (FRIES) R. E. FRIES
sensu lato**

Locality: Aomori, Ehime (YY-15710, 15731), Fukushima (MH-94023, 94043, 94081, 95043), Iwate, Nagano (KT-920727c), Kochi (YY-15686, 15696).

Collected at: Alt. 500 m (14 collections: MT-957, 958, 959, 960, 961, 962, 1543, 1544, 1545, 1550 1551, 1552, 1553, 1554); Alt. 560 m (8 collections: MT-1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109); Alt. 600 m (36 collections: MT-509, 510, 511, 512, 564, 565, 566, 567, 568, 569, 630, 631, 632, 633, 634, 635, 636, 924, 925, 926, 927, 928, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955); Alt. 800 m (1 collection: MH-94023); Alt. 980 m (13 collections: MT-1455, 1456, 1457, 1458, 1459, 1460, 1461, 1470, 1471, 1472, 1924, 1925, 1926); Alt. 1000 m (1 collection: MH-94043); Alt. 1120 m (1 collection: MH-95043); Alt. 1500 m (1 collection: MH-94081); Alt. 2000 m (1 collection: KT-920727c).

***L. cristatum* MEYLAN**

Locality: Hiroshima (YY-16684).

Collected at: Alt. 900 m (1 collection: YY-16684 =YH-347).

***L. echinosporum* MEYLAN**

Locality: Fukushima (95031B), Iwate.

Collected at: Alt. 500 m (2 collections: MT-895, 896); Alt. 530 m (1 collection: MT-462); Alt. 600 m (19 collections: MT-436, 437, 438, 439, 440, 441, 513, 514, 515, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938); Alt. 1000 m (1 collection: MH-95031B).

***L. fuscatum* MEYLAN**

Locality: Nagano.

Collected at: Alt. 1850 m (2 collections: YY-14974, 14977).

***L. maculatum* KOWALSKI var. *macrosporum* MEYER & POULAIN**

Locality: Toyama (YY-16214).

Collected at: (1 collection: YY-16214).

***L. ovoideum* MEYLAN sensu lato**

Locality: Ehime (YY-15604, 15605, 15606, 15607), Iwate, Nagano (YY-12504).

Collected at: Alt. 400 m (8 collections: MT-1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709); Alt. 445 m (15 collections: MT-833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847); Alt. 500 m (21 collections: MT-897, 898, 899, 900, 901, 902, 903, 911, 912, 913, 914, 917, 918, 919, 1537, 1538, 1539, 1540, 1548, 1549, 1560); Alt. 530 m (67 collections: MT-704, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 1496, 1497, 1498, 1499, 1500, 1501, 1502, 1525, 1526, 1527, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1546, 1547, 1570, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1772, 1773, 1774, 1815, 1816, 1817, 1818, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1841, 1842, 1843); Alt. 560 m (53 collections: MT-539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 858, 859, 860, 861, 850, 851, 852, 865, 866, 867, 868, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 1099, 1100, 1101); Alt. 600 m (44 collection: MT-520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591,

592, 593, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647); Alt. 930 m (1 collection: MT-667); Alt. 2000 m (1 collection: YY-12504).

***L. ovoideum* MEYLAN var. *cucumer*
MEYLAN**

Locality: Fukushima (MH-96032), Iwate.

Collected at: Alt. 500 m (10 collections: MT-904, 905, 906, 907, 908, 1541, 1542, 1580, 1581, 1582); Alt. 970 m (1 collection: MH-96032).

***L. pseudomaculatum* MEYER &
POULAIN**

Locality: Ehime (YY-15707, 15712, 15718), Fukushima (MH-95082, YY-14746, 14747), Iwate.

Collected at: Alt. 500 m (2 collections: MT-1838, 1839); Alt. 1450 m (2 collections: YY-14746, 14747); Alt. 1500 m (1 collection: MH-95082).

***L. sauteri* ROSTAFINSKI**

Locality: Ehime (YY-15704, 15711, 15714, 15715, 15716, 15717, 15720, 15721, 15722, 15723, 15724, 15725, 15726, 15728, 15729, 15730), Fukushima (MH-95022, 95029, 94082), Iwate, Kochi (15666, 15667, 15668, 15669, 15671, 15672, 15673, 15675, 15676, 15677, 15678, 15679, 15680, 15681, 15682, 15683, 15687, 15688, 15689, 15690, 15691, 15692, 15694, 15695, 15697, 15698), Nagano (YY-13176), Tokushima (YY-?), Yamagata (MH-94031).

Collected at: Alt. 400 m (1 collection: MH-94031); Alt. 420 m (16 collections: MT-463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 478, 479); Alt. 445 m (17 collections: MT-463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479); Alt. 500 m (5 collections: MT-879, 880, 881, 882, 883); Alt. 530 m (15 collections: MT-425, 426, 427, 428, 429, 430, 431, 432, 433, 456, 457, 458, 459, 460, 461); Alt. 560 m (2 collections: MT-862, 863); Alt. 640 m (2 collections: MH-95022, 95029); Alt. 1500 m (1 collection: MH-94082); Alt. 1560 m (2 collections: MT-690, 691); Alt. 2000 m (1 collection: YY-13176)

***L. spinulosporum* MEYER & POULAIN**

Locality: Iwate.

Collected at: Alt. 810 m (2 collections: MT-1854, 1855)

***L. splendens* MEYLAN**

Locality: Fukushima (MH-94044), Iwate, Nagano (YY-15741), Tottori (YY-14590).

Collected at: Alt. 1000 m (1 collection: MH-94044); Alt. 1438 m (5 collections: MT-1083, 1084, 1085, 1086, 1087); Alt. 1560 m (13 collections: MT-673, 674, 675, 676, 677, 678, 1066, 1067, 1070, 1071, 1077, 1078, 1079).

***L. splendens* MEYLAN var. *leucotrichum* MEYLAN**

Locality: Gifu (YY-14241, 14242), Iwate.

Collected at: Alt. 445 m (2 collections: MT-1767, 1768); Alt. 470 m (1 collection: MT-1513); Alt. 500 m (4 collections: MT-909, 910, 1856, 1857); Alt. 1700 m (2 collections: YY-14241, 14242)

Order Trichiales

***Trichia alpina* (R. E. FRIES) MEYLAN**

Locality: Aomori, Ehime (YY-15601, 15602, 15603, 15612), Fukushima (MH-94045, 94046, 94090), Iwate, Kochi (YY-15659, 15660, 15661), Nagano (YY-12489, KT-920727b, JM-359), Tokushima (YY-15732).

Collected at: Alt. 400 m (4 collections: MT-870, 871, 872, 1512); Alt. 500 m (3 collections: MT-884, 885, 985); Alt. 530 m (2 collections: MT-394, 395); Alt. 560 m (5 collections: MT-857, 860, 861, 862, 869); Alt. 580 m (1 collection: MT-1098); Alt. 600 m (12 collections: MT-442, 516, 517, 518, 519, 570, 574, 575, 576, 577, 578, 939); Alt. 930 m (2 collections: MT-752, 1042); Alt. 980 m (2 collections: MT-1453, 1454); Alt. 1000 m (2 collections: MH-94045, 94046); Alt. 1438 m (1 collection: MT-1088); Alt. 1500 m (1 collection: MH-94090); Alt. 2000 m (3 collections: YY-12489, KT-920727b, JM-35).

T. contorta* (DITMAR) ROSTAFINSKI var. *contorta

Locality: Iwate.

Collected at: Alt. 600 m (11 collections: MT-480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490).

It is generally said that the nivicolous taxa of the myxomycetes grow in higher mountains over 1000 m altitude, in so-called 'alpine' areas. But, what does this term 'alpine' mean? The above-listed data of the altitudes of collections show undoubtedly that the nivicolous

taxa are not automatically equal to 'alpine'. For the nivicolous taxa of the myxomycetes, whether or not they are 'alpine' is not important. Researches on the nivicolous taxa of the myxomycetes held in Europe and North America have lacked the investigations at the lower altitude places. If enough snow packs remain at the lower altitudes, such as of 400 m or lower, and if researches are held at those places, it comes to be found that the nivicolous taxa of the myxomycetes such as *Diderma*, *Didymium*, *Lamproderma* and *Trichia*, grow normally and abundantly enough.

Identification Key to the Nivicolous Taxa of the Myxomycetes in Japan

For the collectors' convenience, an identification key with short words on characteristics to determine the commonly found nivicolous taxa of the myxomycetes was provided below. Of course, the more detailed description of each taxon should be referred in order to determine its precise taxonomic position.

1. Lime present at some parts of fructification.....	2
– Lime absent at any parts of the fructification	3
2. Lime amorphous.....	4
– Lime crystalline	6
3. Columella present	14
– Columella absents	29
4. Capillitium not calcareous	7
– Capillitium calcareous	8
5. Capillitium uniformly calcareous without fine filaments.....	<i>Badhamia alpina</i>
– Capillitium of fine non-calcareous filaments and calcareous nodes	6
6. Sporangiate, stalked	<i>Physarum albescens</i>
– Plasmodiocarpous, sessile	<i>P. alpestre</i>
7. Peridial outer wall inside not white, sporangiate	<i>Diderma alpinum</i>
– Peridial outer wall inside white, Plasmodiocarpous	<i>D. globosum</i> var. <i>europaeum</i>
8. Lime crystals stellate.....	9
– Lime crystals united into scales.....	11
9. Spores spiny	<i>Didymium nivicola</i>
– Spores warted or spinulose	10
10. Spores 9.5-11.5 µm in diameter.....	<i>D. dubium</i>
– Spores 12-14 µm in diameter.....	<i>D. leptotrichum</i>
11. Vesicles present in the capillitium.....	<i>Lepidoderma granuliferum</i>
– Vesicles absent in the capillitium	12

12. Lime on the peridium reddish, spores spiny.....	<i>L. didermoides</i>
- Lime on the peridium not reddish, spores spinulose	13
13. Spores 13-16 µm in diameter, plasmodiocarpous	<i>L. carestianum</i>
- Spores 11-13 µm in diameter, sporangiate	<i>L. carestianum</i> var. <i>chailletii</i>
14. Dark areas present on the peridium	15
- Dark areas absent on the peridium.....	18
15. Capillitium pale to almost colourless, hoary.....	<i>Lamproderma</i> cf. <i>album</i>
- Capillitium dark, not hoary.....	16
16. Spores spiny	<i>L. echinosporum</i>
- Spores warted or spinulose.....	17
17. Spores 15-18 µm in diameter	<i>L. maculatum</i> var. <i>macrosporum</i>
- Spores 11-14 µm in diameter.....	<i>L. pseudomaculatum</i>
18. Capillitial tips expanded into funnel	19
- Capillitial tips not expanded, pointed.....	20
19. Spores spiny or broken spiny-reticulate	<i>L. atrosorum</i>
- Spores reticulate or spiny-reticulate.....	<i>L. atrosorum</i> var. <i>anglicum</i>
20. Capillitium pale to almost colourless, hoary.....	21
- Capillitium dark, not hoary	24
21. Spores spiny or spiny-reticulate.....	<i>L. cribrarioides</i> s. lato
- Spores warted or spinulose	22
22. Spores 13-15 µm in diameter	<i>L. sauteri</i>
- Spores 10-12 µm in diameter	23
23. Capillitium almost colourless	<i>L. splendens</i>
- Capillitium pale brown to colourless.....	<i>L. splendens</i> var. <i>leucotrichum</i>
24. Spores with vesicles	<i>L. cristatum</i>
- Spores without vesicles	25
25. Sporangium brown.....	<i>L. fuscatum</i>
- Sporangium not brown, bluish.....	26
26. Spores loosely spiny.....	<i>L. spinulosporum</i>
- Spores densely warted or spinulose.....	27
27. Capillitium colourless at the extremities.....	<i>L. carestiae</i>
- Capillitium not colourless at the extremities	28
28. Sporangium ovoid, spore 13-15 µm in diameter	<i>L. ovoideum</i>
- Sporangium ellipsoid, spore 12 µm in diameter.....	<i>L. ovoideum</i> var. <i>cucumer</i>
29. Capillitium with spiral bands	30
- Capillitium without spiral bands.....	31
30. Spores 15-20 µm in diameter, yellow	<i>Trichia alpina</i>
- Spores 13 µm in diameter, ochraceous to brown	<i>T. contorta</i> var. <i>contorta</i>
31. Sporangium ochraceous, spores yellow.....	<i>Dianema nivale</i>
- Sporangium bluish iridescent, spores purple-brown.....	32
32. Spores spinulose, capillitium uniformly purple-brown.....	<i>Diacheopsis metallica</i>
- Spores warted, capillitium pale and dark purple-brown.....	<i>D. kowalskii</i>

Environmental Limiting Factors on the Growth of the Nivicolous Taxa of the Myxomycetes

For the nivicolous taxa of the myxomycetes, it is not important whether they are 'alpine' or not. The factors to regulate the growth of the nivicolous taxa of the myxomycetes are caused not by the altitudes but by the environments made by the snow pack.

The author measure preliminarily the pHs of the snow packs at several snow melting sites where the nivicolous taxa of the myxomycetes were collected using Whitman pH Indicator Papers. The results are shown in Table 1. All the measured pH were between 4.5 and 6.0 degrees. They are slightly more acidic than those of the substrates on which non-nivicolous taxa of the myxomycetes grow.

These data are not much enough to say something definitely, the measurements of such pH should be worthy of being made more definitely and extensively. Nevertheless, the author believes that the nivicolous taxa must be induced to germinate their spores and grow their plasmodia and fructificate their sporophores by the as yet so far unknown environmental factors derived from snow packs' atmosphere, including pH.

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Address of the author:

Mitsunori TAMAYAMA

17 Imoda, Tamayamamura

Iwate 028-4131

Japan

e-mail: tamax@mb.infoweb.ne.jp

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