A Study of Taxonomy and Distributions of Genus *Stemonitis*（Myxomycetes）

Takami HATANO

（平成19年 9 月25日受理　最終原稿平成19年12月10日受理）

The author has collected Myxomycetes in Japan and foreign countries for 40 years from 1967 to 2006, and studied taxonomically about 600 specimens of 12 species belong to the Genus *Stemonitis* in this study. This result is very important to discuss in a taxonomical and a morphological point. It is also mentioned localities in Japan and World distribution of these species. This result is very important to make clear the distribution of Myxomycetes in an ecological point. It is proposed following some new findings in taxonomical and distributional points in this study. Sporangia of *S. axifera* and some species are crowded and sporangia of *S. pallida* and a few species are solitary or gregarious in its occurrence. The size of a sporangium of 12 species is 0.3-0.7mm in diameter, 4-10mm in height. A stalk is 0.9-3.0mm in length, a mesh of capillitial threads is 12-42 μm in diameter. The color of sporangium has two types. One is light brown as *S. axifera*, the other one is black or ferruginous as *S. fusca*. The spore shape of 12 speices is globose, 6-9 μm in average diameter. The surface pattern of a spore has three types of warted, spiny and reticulated. It made clear the collection localities in Japan and some foreign countries. *S. fusca* and some species are commonly developed and *S. herbatica* and some speices are rarely developed. It also made the arrangement of the world distribution from the representative literatures. As this result, *S. splendens* and some species are worldwide distributional species. *S. ubifera* is regulated the distribution in the world. The number of the world distribution has a correlative relation with the number of locality in Japan.

Key Words：Myxomycetes, Stemonitis, Taxonomy, Sporangia, Distribution

1 . Introduction

Myxomycetes develops worldwide in every places from tropical regions to frigid regions in the world. It has been reported about 400 species from the world until now. Morphological features of Myxomycetes vary from the regions and environmental conditions. However, these varied features are not defined enough because the development of Myxomycetes is accidentally occurred and it is very difficult to find and collect in the field because a mature sporangium is so fragile and easily disappear by the wind and rainfall. Even though Myxomycetes develops any places in the world, generally Myxomycetes develops in high temperature and high humidity regions. A certain species characteristically develops at a margin of remaining snow in an early spring season. Basically substrate

of Myxomycetes is a rotten wood, a follen leaf and a follen twig. Some kinds of species may be observed on a living herb and wood. Rare species may be also observed on a non-living thing. However, a study for Myxomycetes is not enough in ecological and plant geographical approach. It has been taken clear out taxonomical features and its localities of the **12** species belong to Genus *Stemonitis* mainly collected in Japan, some specimens from the World in this study.

2. Materials and methods

The materials used in this study are collected in Japan and foreign countries for **40** years from **1967** to **2006**. A dried specimen of a sporangium has been used in this study. The number of specimens used in this study is about **600** individuals, these were mainly collected in Japan, some specimens were collected from Belgium, Canada, Korea and the USA. A collected specimen was preserved in a stock box after dring in natural condition. Kinds of specimens collected in a dripping area were artificially dried using an electric dring oven. The morphological and taxonomical observation of a sporangium did using a light microscopy, but the observation of the surface ornamentation of a spore has been used a scanning electron microscopy (SEM). The preparation of a specimen for SEM operation is as followings. Dried spores or a sporangium were mounted on an aluminum specimen stub with a double faced adhesive tape and sealed with silver paste after dehydration of the sample. Using an Eiko ion coater, a specimen was coated with about **35**nm of gold palladium. The coated specimen was observed with a Hitachi H-**4000** SEM at **30**kv accelerating voltage. The taxonomical systematics of Myxomycetes has been carried out by some Myxomycetal researchers. In this study, it was used the systematics proposed by Martin and Alexopoulos (**1969**). Literatures of Y. Emoto (**1977**), M. L. Farr (**1976**), T. N. Lakhampal and K. G. Mukerji (**1981**), G. Lister (**1925**) G. W. Martin (**1949**), G. W. Martin and C. J. Alexopoulos (**1969**), G. Massee (**1892**), N. E. Nannenga-Bremekanp (**1991**), K. S. Thind (**1977**), Y. Yamamoto (**1998**) and other books have been used to identified the specific name of collected specimens. A collecting locality is arranged from northern to southern part in Japan, after that, arranged foreign countries. For the sign of specific number, it is indicated that GWM is G. W. Martin, HTN is T. Hatano, the author, HWK is H. W. Keller, TEB is T. E. Brooks and UEU is U. H. Eliasson. The description of a world distribution is from literatures of Choe (**1981**), Emoto (**1977**), Farr (**1976**), Hatano (**1986**), Lakhampal and Mukerji (**1981**), Lister (**1925**), Martin and Alexopoulos (**1969**), Thind (**1977**) and Yamamoto (**1998**). A distribution is orderly arranged from a continent to a country and a local point. The country name is alphabetically arranged.

3. Results

Descriptions of species

It includes a taxonomical description, a collection locality and a world distribution of **12** species belong to the Genus *Stemonitis* treated in this study.

***Stemonitis axifera*（Bull.）Macbr.**

Fructification: crowded, often forming large colonies, sporangiate, stipitate. *Sporangium*: cylindrical, acuminate at the apex, slender, erect or slightly bending, fasciculate, deep brown, ferruginous or rusty brown, becoming paler after the dispersion of spores, **0.4-0.7**mm in diameter, **7-20**mm in height. *Stalk*: elect, rigid, slender, subulate, cylindrical, arising from the membranous hypothallus, slightly expanding at the base and gradually tapering upwards, black, shining, **3-7**mm in height. *Peridium*: fugacious. *Dehiscens*: irregularly breaking. *Hypothallus*: abundant, membranous, thin, round, shining, silvery brown. *Columella*: prominent, cylindrical, tapering upwards, nearly reaching the apex of the sporangium and branching freely below the apex to form primary stout branches of the capillitium, black. *Capillitium*: consisting of an internal network and a peridial network of branches. *Branch*: arising around the surface of the columella, usually thick, rather stout, tapering outwards, branching and anastomosing to form an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of internal network*: large, variable in shape and size, usually **7-30** μm in diameter, polygonal, small, delicate, smooth, close, without free-ends, persistent, violaceous brown or reddish brown. *Spore*: globose, nearly smooth, minutely warted, ferruginous or deep brown in the mass, pallid or violaceous brown by transmitted light, **4-7** μm in diameter.

SEM aspects of spore surface ornamentation: scattered with many warts, **0.2-0.3** μm in diameter, **0.2-0.3** μm in height, being numerous fine hollows and fine ridges except warts on the surface, with fine networks composed by fine ridges.

Localities collected: HTN**501**: Mt. Hiuchigadake, Hinoematamura, Minamiauzugun, Fukushima pref., HTN**439**: Oze, Hinoematamura, Minamiaizugun, Fukushima pref., HTN**760**: Oze, Katashinamura, Tonegun, Gunma pref., HTN**209**: Shiga Heights, Yamanouchicho, Shimotakaigun, Nagano pref., HTN**201**: Mt. Hakuba, Hakubamura, Kitaazumigun, Nagano pref., HTN**290**: Mt. Ontake, Mitakemura, Kisogun, Nagano pref., HTN**301**: Mt. Kisokomagadake, Agematsucho, Kisogun, Nagano pref., HTN**3605**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**4107**: Nanjo, Anancho, Shimoinagun, Nagano pref., HTN**4022**: Kurishita, Uemura, Shimoinagun, Nagano pref., HTN**4000**: Kaminakane, Uemura, Shimoinagun, Nagano pref., HTN**3527**: Gosyodaira, Oshikamura, Shimoinagun, Nagano pref., HTN**4292**: Kita, Tenryumura, Shimoinagun, Nagano pref., HTN**4365**: Nakaizamurai, Tenryumura, Shimoinagun, Nagano pref., HTN**3933**: Kuwashirazu, Yasuokamura, Shimoinagun, Nagano pref., HTN**5268**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**5542**: Tokinagayamaguchi, Uchiuracho, Suzugun, Ishikawa pref., HTN**5527**: Kasukawa, Otanicho, Suzushi, Ishikawa pref., HTN**5188**: Uemachi, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5385**: Yanagida, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5089**: Enku, Takigaharacho, Komatsushi, Ishikawa pref., HTN**9507**: Takitani, Umegadani, Shimizushi, Shizuoka pref., HTN**9562**: Mt. Kunosan, Nekoya, Shimizushi, Shizuoka pref., HTN**9486**: Hara, Yamaharayama, Shimizushi, Shizuoka pref., HTN**8281**: Mt.

Fjiwaradake, Fujiwaracho, Inabegun, Mie pref., HTN**9801**: Chikusa, Komonocho, Miegun, Mie pref., HTN**9233**: Onimichi, Komeicho, Tsushi, Mie pref., HTN**8858**: Kitayama, Takanoocho, Tsushi, Mie pref., HTN**7988**: Misatomura, Agegun, Mie pref., HTN**956**: Mt. Kyogamine, Anocho, Agegun, Mie pref., HTN**9080**: Mukumoto, Geinocho, Agegun, Mie pref., HTN**9343**: Aikawa, Kitakuchicho, Hisaishi, Mie pref., HTN**3451**: Sakakibaracho, Hisaishi, Mie pref., HTN**9460**: Takaoyama, Nishitakatocho, Hisaishi, Mie pref., HTN**8929**: Hagiwara, Sekicho, Suzukagun, Mie pref., HTN**8743**: Mt. Nonoboriyama, Asakayamacho, Kameyamashi, Mie pref., HTN**6091**: Higashianraku, Asakayamacho, Kameyamashi, Mie pref., HTN**5604**: Oka, Shirakicho, Kameyamashi, Mie pref., HTN**5667**: Fujisan, Shirakicho, Kameyamashi, Mie pref., HTN**7641**: Aoyamacho, Nakagun, Mie pref., HTN**9012**: Abo, Aoyamacho, Nakagun, Mie pref., HTN**1223**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**2405**: Ono, Misugimura, Ichishigun, Mie pref., HTN**8493**: Mie Univ. forest, Kawakami, Misugimura, Ichishigun, Mie pref., HTN**2443**: Yakii, Odaicho, Takigun, Mie pref., HTN**2768**: Higashiaikanose, Takicho, Takigun, Mie pref., HTN**2555**: Hara, Tamakicho, Wataraigun, Mie pref., HTN**2367**: Chayahiro, Wataraicho, Wataraigun, Mie pref., HTN**7674**: Hosono, Sakauchicho, Matsusakashi, Mie pref., HTN**2688**: Seitsucho, Matsusakashi, Mie pref., HTN**3460**: Fukanagacho, Matsusakashi, Mie pref., HTN**9409**: Kuratayama, Kandakushimotocho, Iseshi, Mie pref., HTN**2310**: Tsumuracho, Iseshi, Mie pref., HTN**2882**: Fujisatocho, Iseshi, Mie pref., HTN**2854**: Awano, Iidakacho, Iinangun, Mie pref., HTN**2648**: Funato, Iinancho, Iinangun, Mie pref., HTN**6908**: Happudani, Eigenjicho, Kanzakigun, Shiga pref., HTN**6904**: Minokawa, Eigenjicho, Kanzakigun, Shiga pref., HTN**6891**: Wanami, Eigenjicho, Kanzakigun, Shiga pref., HTN**6185**: Kozuke, Muromura, Udagun, Nara pref., HTN**6167**: Musan, Muromura, Udagun, Nara pref., HTN**5890**: Ko, Tsukigasemura, Soekamigun, Nara pref., HTN**5778**: Tokano, Tsukigasemura, Soekamigun, Nara pref., HTN**5925**: Shimofukagawa, Tsugemura, Soekamigun, Nara pref., HTN**7728**: Unkeiyama, Tokano, Soekamigun, Nara pref., HTN**7846**: Tsugemura, Yamabegun, Nara pref., HTN**5766**: Sukawacho, Narashi, Nara pref., HTN**5745**: Mizumacho, Narashi, Nara pref., HTN**7721**: Yagyu, Narashi, Nara pref., HTN**6813**: Kamisyoda, Fukuzumicho, Tenrishi, Nara pref., HTN**6024**: Inabuchi, Asukamura, Takaichigun, Nara pref., HTN**859**: Mt. Sanjogadake, Tenkawamura, Yoshinogun, Nara pref., HTN**6235**: Nakaguro, Higashiyoshinomura, Yoshinogun, Nara pref., HTN**5986**: Nishitani, Yoshinocho, Yoshinogun, Nara pref., HTN**5975**: Mt. Yoshinoyama, Yoshinocho, Yoshinogun, Nara pref., HTN**6300**: Tomobuchi, Miyamamura, Hidakagun, Wakayama pref., HTN**6477**: Ryujin, Ryujinmura, Hidakagun, Wakayama pref., HTN**8677**: Mt. Kurama, Kibunecho, Sakyoku, Kyotoshi, Kyoto pref., HTN**8335**: Hase, Sonobecho, Funaigun, Kyoto pref., HTN**8300**: Rurikei, Sonobecho, Funaigun, Kyoto pref., HTN**6981**: Asyu, Miyamacho, Kitakuwatagun, Kyoto pref., HTN**7129**: Saho, Ibarakishi, Osaka pref., HTN**7304**: Tano, Takatsukishi, Osaka pref., HTN**7400**: Kirihata, Toyonocho, Toyonogun, Osaka pref., HTN**7231**: Tokiwadai, Toyonocho, Toyonogun, Osaka pref., HTN**7497**: Osato, Nosecho, Toyonogun, Osaka pref., HTN**7582**: Yamabe, Nosecho, Toyonogun, Osaka pref., HTN**8442**: Onoyama, Inagawacho, Kawabegun, Hyogo pref., HTN**288**: Mt. Hokotori,

Senogawacho, Akigun, Hiroshima pref., HTN**4864**: Ushida, Higashiku, Hiroshimashi, Hiroshima pref., HTN**687**: Miyajima, Miyajimacho, Saekigun, Hiroshima pref., HTN**103**: Mt. Ishizuchi, Omogomura, Kamiukenagun, Ehime pref., HTN**11467**: Mt. Mulchangul, Chochon-up, Pukcheju-gun, Cheju-do, Korea, HWK**2891**: Columbia Co., Arkansas, USA.

World distribution: Widely distributed and abundant in temprate and tropical regions; Africa, Asia, Europe, North America, Oceania, South America; Argentina, Brazil, Canada, Ceylon, Chile, Colombia, Costa Rica, Dominica, Eduador, Guadeloupe, Haiti, Honduras, India, Jamaica, Japan, Martinique, Mexico, Nicaragua, Panama, Puerto Rico, Rep. Dominicana, Switzerland, Trinidad, Uruguay, USA, Venezuela; Great Britain, Java.

***Stemonitis confluens* Cooke & Ellis.**

Fructification: densely clustered, often forming large colonies, sporangiate, stipitate. *Sporangium:* usually completely united except the tip and the base, flexuous, fasciculate, black or fuscous, **0.2-0.6**mm in diameter, **2-6**mm in height. *Stalk*: stout, short, sometimes very short, black, shining. *Peridium*: fugacious except the connected portions of the sporangium. *Hypothallus*: membranous, thin, shining, silvery brown. *Columella*: modelately flexuous, often not reaching to the apex of the sporangium, fuscous or black. *Capillitium*: consisting of an internal network and a peridial network of branches. *Branch*: arising around the surface of the columella, branching and anastomosing to form an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of internal network*: large, variable in shape and size, with membranously broadened and angled expansions. *Mesh of peridial network*: usually incomplete, large, fuscous, grayish black. *Spore*: globose, spinulose, brownish black in the mass, purplish brown by transmitted light, **8-11** μm in diameter.

SEM aspects of spore surface ornamentation: scattered with many spines, **0.2-0.3** μm in diameter, **0.2-0.4** μm in height, with slight fine hollows except spines on the surface.

Collection localities: HTN**464**: Oze, Hinoematamura, Minamiaizugun, Fukushima pref., HTN**3611**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**4379**: Nakaizamurai, Tenryumura, Shimoinagun, Nagano pref., HTN**5369**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**9532**: Kashioyama, Umegadani, Shimizushi, Shizuoka pref., HTN**9177**: Haseyama, Wakebecho, Tsushi, Mie pref., HTN**2697**: Anagura, Misatomura, Agegun, Mie pref., HTN**9377**: Kitakuroda, Kawagecho, Agegun, Mie pref., HTN**9360**: Hamada, Kawagecho, Agegun, Mie pref., HTN**9273**: Higashihano, Hegicho, Hisaishi, Mie pref., HTN**3410**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**2400**: Ono, Misugimura, Ichishigun, Mie pref., HTN**2579**: Hara, Tamakicho, Wataraigun, Mie pref., HTN**2636**: Chayahiro, Wataraicho, Wataraigun, Mie pref., HTN**2299**: Tsumuracho, Iseshi, Mie pref., HTN**2849**: Awano, Iidakacho, Iinangun, Mie pref., HTN**6110**: Kirihata, Yamazoemura, Yamabegun, Nara pref., HTN**6692**: Ryujin, Ryujinmura, Hidakagun, Wakayama pref., HTN**95**: Higashisendamachi, Nakaku,

Hiroshimashi, Hiroshima pref., HTN**4982**: Ushida, Higashiku, Hiroshimashi, Hiroshima pref., TEB**3882**：Alexander Co., Illinois, USA, HWK**296**: Thebes, Alexander Co., Illinois, USA.

World distribution: Africa, Asia, Europe, North America; France, Germany, India, Japan, Korea, Panama, USA; Great Britain.

***Stemonitis flavogenita* Jahn**

Fructification: densely clustered, sporangiate, stipitate. *Sporangium*: cylindrical, obtuse at the apex, erect, slightly narrowed at both ends, slightly bending, usually short-stalked, sometimes near sessile, dark brown, becoming lighter after the dispersion of spores, **0.3**-**0.7**mm in diameter, **4**-**10**mm in height. *Stalk*: elect, rigid, slender, subulate, cylindrical, short, sometimes very short, expanding at the base, gradually tapering upwards, arising from the membranous hypothallus, black, shining, **1**-**3**mm in height. *Peridium*: often inconspicuous, fagacious. *Dehiscens*: irregularly beaking. *Hypothallus*: well developed, membranous, thin, round, reddish brown, slivery brown or colorless, shining. *Columella*: prominent, cylindrical, thick, slender, gradually tapering upwards, nearly reaching the apex of the sporangium with a membranous cupulate expansion, black. *Capillitium*: consisting of an internal network and a peridial network of branches, *Branch*: arising around the surface of the columella, usually thick, rather stout, tapering outwards with many broadened and angled expansions, branching and anastomosing to form an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of internal network*: large, loose, with many membranously broadened and angled expansions. *Mesh of peridial net work*: delicate, sometimes with spine-like free ends, often fugacious at the maturity in the upper portion of the sporangium, polygonal or irregular, **5**-**20** μm in diameter. *Spore*: globose, faintly warted, dull brown or ferruginous in the mass, pale ferruginous or lilaceous brown by transmitted light, **7**-**9** μm in diameter.

SEM aspects of spore surface ornamentation: scattered with many spines, **0.1**-**0.3** μm in diameter, **0.2**-**0.4** μm in height, with slight hollows except spines, usually smooth except spines and hollows on the surface.

Localities collected: HTN**427**: Oze, Hinoematamura, Minamiaizugun, Fukushima pref., HTN**734**: Oze, Katashinamura, Tonegun, Gunma pref., HTN**208**: Shiga Heights, Yamanouchicho, Shimotakaigun, Nagano pref., HTN**298**: Mt. Ontake, Mitakemura, Kisogun, Nagano pref., HTN**340**: Mt. Kisokomagadake, Agematsucho, Kisogun, Nagano pref., HTN**3628**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**4086**: Nanjo, Anancho, Shimoinagun, Nagano pref., HTN**4039**: Kurishita, Uemura, Shimoinagun, Nagano pref., HTN**3506**: Gosyodaira, Oshikamura, Shimoinagun, Nagano pref., HTN**4287**: Kita, Tenryumura, Shimoinagun, Nagano pref., HTN**4342**: Nakaizamurai, Tenryumura, Shimoinagun, Nagano pref., HTN**3858**: Kuwashirazu, Yasuokamura, Shimoinagun, Nagano pref., HTN**5328**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**5452**: Hioki, Oritocho, Suzushi, Ishikawa pref., HTN**5392**: Yanagida, Yanagidamura, Hoshigun, Ishikawa pref., HTN**886**: Mt.

Fjiwaradake, Fujiwaracho, Inabegun, Mie pref., HTN**1106**: Mt. Fukuosan, Komonocho, Miegun, Mie pref., HTN**3407**: Ishinden, Tsushi, Mie pref., HTN**9180**: Haseyama, Wakebecho, Tsushi, Mie pref., HTN**9354**: Shiroyama, Kawagecho, Agegun, Mie pref., HTN**2355**: Sakakibaracho, Hisaishi, Mie pref., HTN**9253**: Hegiyama, Hegicho, Hisaishi, Mie pref., HTN**5630**: Oka, Shirakicho, Kameyamashi, Mie pref., HTN**8997**: Nakanosyocho, Kameyamashi, Mie pref., HTN**2352**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**2411**: Ono, Misugimura, Ichishigun, Mie pref., HTN**2782**: Higashiaikanose, Takicho, Takigun, Mie pref., HTN**2725**: Koma, Ouchiyama, Wataraigun, Mie pref., HTN**2289**: Hara, Tamakicho, Wataraigun, Mie pref., HTN**2322**: Chayahiro, Wataraicho, Wataraigun, Mie pref., HTN**3402**: Iseteramachi, Matsusakashi, Mie pref., HTN**3404**: Fukanagacho, Matsusakashi, Mie pref., HTN**2305**: Tsumuracho, Iseshi, Mie pref., HTN**1438**: Isejigu Shirine, Toyokawacho, Iseshi, Mie pref., HTN**2456**: Fujisatocho, Iseshi, Mie pref., HTN**6208**: Matsui, Edano, Udagun, Nara pref., HTN**6181**: Kozuke, Muromura, Udagun, Nara pref., HTN**6166**: Musan, Muromura, Udagun, Nara pref., HTN**5882**: Ko, Tsukigasemura, Soekamigun, Nara pref., HTN**5795**: Tokano, Tsukigasemura, Soekamigun, Nara pref., HTN**5936**: Shimofukagawa, Tsugemura, Soekamigun, Nara pref., HTN**6118**: Kirihata, Yamazoemura, Yamabegun, Nara pref., HTN**5773**: Sukawacho, Narashi, Nara pref., HTN**5752**: Mizumacho, Narashi, Nara pref., HTN**5705**: Kaminyuta, Fukuzumicho, Tenrishi, Nara pref., HTN**5947**: Inabuchi, Asukamura, Takaichigun, Nara pref., HTN**6233**: Nakaguro, Higashiyoshinomura, Yoshinogun, Nara pref., HTN**6221**: Natsumi, Yoshinocho, Yoshinogun, Nara pref., HTN**5991**: Nishitani, Yoshinocho, Yoshinogun, Nara pref., HTN**5968**: Mt. Yoshinoyama, Yoshinocho, Yoshinogun, Nara pref., HTN**6457**: Tomobuchi, Miyamamura, Hidakagun, Wakayama pref., HTN**8707**: Asyu, Miyamacho, Kitakuwatagun, Kyoto pref., HTN**7126**: Saho, Ibarakishi, Osaka pref., HTN**8439**: Onoyama, Inagawacho, Kawabegun, Hyogo pref., HTN**4904**: Ushida, Higashiku, Hiroshimashi, Hiroshima pref., HTN**79**: Miyajima, Miyajimacho, Saekigun, Hiroshima pref., HWK**908**: Jarre Canyon, Douglas Co., Colorado, USA.

World distribution: Africa, Asia, Europe, North America, Oceania, South America; Argentina, Bohemia, Brazil, Costa Rica, Dominica, Ecuador, France, Germany, Hungary, India, Jamaica, Japan, Panama, Roumania, Sweden, Switzerland, Trinidad, Venezuela, USA.

***Stemonitis fusca* Roth**

Fructification: densely clustered, usually forming large colonies, often tufted, sporangiate, stipitated. *Sporangium*: cylindrical, obtuse at the apex, slender erect or bending, deep fuscous, black or purplish black, becoming pallid after the dispersion of spores, **0.6-1.0**mm in diameter, **9-20**mm in height. *Stalk*: cylindrical, slender, rigid, erect, slightly expanding at the base, black, shining, **2-5**mm in height. *Peridium*: often inconspicuous, fugacious, *Dehiscens*: irregularly breaking. *Hypothallus*: membranous, thin, well developed, colorless, silvery brown. *Columella*: prominent, cylindrical, thick, slender, gradually tapering upwards, almost reaching the apex and branching below the apex of the sporangium to form primary branches of the capillitium. *Capillitium*: consisting of an internal network and a peridial

network of branches. *Branch*: arising numerously around the surface and the top of the columella, usually stout, thick, tapering towards the tip, sometimes with broadened and angled expansions, branching and anastomosing freely to form an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of internal network*: variable in shape and size, with many membranously broadened and angled expansions. *Mesh of peridial net*: delicate, small, with many spine-like free ends, polygonal or round, irregular in size, **5**-**40** μm in diameter. *Spore*: globose, warted, sometimes faintly reticulated, purplish black or dark fuscous in the mass, pale purplish brown or purplish gray by transmitted light, **8**-**10** μm in diameter.

SEM aspects of spore surface ornamentation: consisting of small reticulations **0**.**6**-**1**.**0** μm in diameter, composed of perforated wall, about **0**.**1** μm in the thickness, **0**.**3**-**0**.**4** μm in height, smooth without the walls.

Localities collected: HTN**502**: Mt. Hiuchigadake, Hinoematamura, Minamiauzugun, Fukushima pref., HTN**429**: Oze, Hinoematamura, Minamiaizugun, Fukushima pref., HTN**740**: Oze, Katashinamura, Tonegun, Gunma pref., HTN**216**: Shiga Heights, Yamanouchicho, Shimotakaigun, Nagano pref., HTN**422**: Mt. Kisokomagadake, Agematsucho, Kisogun, Nagano pref., HTN**3647**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**4172**: Nanjo, Anancho, Shimoinagun, Nagano pref., HTN**3967**: Kaminakane, Uemura, Shimoinagun, Nagano pref., HTN**4443**: Kita, Tenryumura, Shimoinagun, Nagano pref., HTN**4347**: Nakaizamurai, Tenryumura, Shimoinagun, Nagano pref., HTN**3817**: Kuwashirazu, Yasuokamura, Shimoinagun, Nagano pref., HTN**5257**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**5502**: Kasukawa, Otanicho, Suzushi, Ishikawa pref., HTN**5451**: Hioki, Oritocho, Suzushi, Ishikawa pref., HTN**5546**: Watase, Higashiyamanakacho, Suzushi, Ishikawa pref., HTN**5462**: Toyama, Wakayamacho, Suzushi, Ishikawa pref., HTN**5171**: Uemachi, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5166**: Kanayama, Yanagidamura, Hoshigun, Ishikawa pref., HTN**9561**: Mt. Kunosan, Nekoya, Shimizushi, Shizuoka pref., HTN**7834**: Ishigure, Daiancho, Inabegun, Mie pref., HTN**9767**: Mt. Oikedake, Fujiwaracho, Inabegun, Mie pref., HTN**9778**: Sakamoto, Fujiwaracho, Inabegun, Mie pref., HTN**8264**: Mt. Fjiwaradake, Fujiwaracho, Inabegun, Mie pref., HTN**1078**: Ugawara Shirine, Komonocho, Miegun, Mie pref., HTN**9793**: Chikusa, Komonocho, Miegun, Mie pref., HTN**2022**: Ejimacho, Suzukashi, Mie pref., HTN**5026**: Ogisucho, Suzukashi, Mie pref., HTN**1752**: Ubushina, Tsushi, Mie pref., HTN**9146**: Kitadani, Kannonji, Tsushi, Mie pref., HTN**9156**: Yakushiyama, Kobunecho, Tsushi, Mie pref., HTN**7646**: Shiroyama, Tsushi, Mie pref., HTN**8871**: Kitayama, Takanoocho, Tsushi, Mie pref., HTN**7989**: Misatomura, Agegun, Mie pref., HTN**9135**: Uchida, Anocho, Agegun, Mie pref., HTN**1348**: Kawanishi, Anocho, Agegun, Mie pref., HTN**1361**: Mt. Kyogamine, Anocho, Agegun, Mie pref., HTN**9198**: Ueno, Kawagecho, Agegun, Mie pref., HTN**8206**: Sakakibaracho, Hisaishi, Mie pref., HTN**9322**: Kamiyamada, Morimachi, Hisaishi, Mie pref., HTN**1535**: Sekisuikei, Asakayamacho, Kameyamashi, Mie pref., HTN**8672**: Mt. Nonoboriyama, Asakayamacho, Kameyamashi, Mie pref., HTN**6088**: Higashianraku, Asakayamacho, Kameyamashi,

Mie pref., HTN**1384**: Ogawacho, Kameyamashi, Mie pref., HTN**6252**: Fujisatocho, Iseshi, Mie pref., HTN**1311**: Sumiyamacho, Kameyamashi, Mie pref., HTN**9001**: Abo, Aoyamacho, Nakagun, Mie pref., HTN**1220**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**1447**: Mt. Isesanjosan, Ureshinocho, Ichishigun, Mie pref., HTN**8169**: Hikawa, Ureshinocho, Ichishigun, Mie pref., HTN**2827**: Futamata, Hakusancho, Ichishigun, Mie pref., HTN**8488**: Mie Univ. forest, Kawakami, Misugimura, Ichishigun, Mie pref., HTN**1395**: Shimonokawa, Ichishicho, Ichishigun, Mie pref., HTN**2394**: Yachi, Misugimura, Ichishigun, Mie pref., HTN**9056**: Sahara, Odaicho, Takigun, Mie pref., HTN**2741**: Higashiaikanose, Takicho, Takigun, Mie pref., HTN**2418**: Shimomate, Miyagawamura, Takigun, Mie pref., HTN**2740**: Koma, Ouchiyama, Wataraigun, Mie pref., HTN**2548**: Hara, Tamakicho, Wataraigun, Mie pref., HTN**2358**: Chayahiro, Wataraicho, Wataraigun, Mie pref., HTN**1183**: Izawanomiya Shirine, Isobecho, Shimagun, Mie pref., HTN**3401**: Iseteramachi, Matsusakashi, Mie pref., HTN**7693**: Hosono, Sakauchicho, Matsusakashi, Mie pref., HTN**2681**: Seitsucho, Matsusakashi, Mie pref., HTN**2490**: Tsumuracho, Iseshi, Mie pref., HTN**1495**: Isejigu Shirine, Toyokawacho, Iseshi, Mie pref., HTN**2318**: Yokowacho, Iseshi, Mie pref., HTN**2650**: Funato, Iinancho, Iinangun, Mie pref., HTN**8577**: Mikisato, Owaseshi, Mie pref., HTN**6900**: Minokawa, Eigenjicho, Kanzakigun, Shiga pref., HTN**6893**: Wanami, Eigenjicho, Kanzakigun, Shiga pref., HTN**8809**: Kisugi, Kutsukimura, Takashimagun, Shiga pref., HTN**6194**: Matsui, Edano, Udagun, Nara pref., HTN**6163**: Musan, Muromura, Udagun, Nara pref., HTN**5913**: Ko, Tsukigasemura, Soekamigun, Nara pref., HTN**5858**: Tokano, Tsukigasemura, Soekamigun, Nara pref., HTN**5938**: Shimofukagawa, Tsugemura, Soekamigun, Nara pref., HTN**6148**: Kirihata, Yamazoemura, Yamabegun, Nara pref., HTN**7893**: Nakahatacho, Narashi, Nara pref., HTN**5744**: Mizumacho, Narashi, Nara pref., HTN:**5730**: Kaminyuta, Fukuzumicho, Tenrishi, Nara pref., HTN**5945**: Inabuchi, Asukamura, Takaichigun, Nara pref., HTN**6000**: Nishitani, Yoshinocho, Yoshinogun, Nara pref., HTN**6046**: Mt. Yoshinoyama, Yoshinocho, Yoshinogun, Nara pref., HTN**6301**: Tomobuchi, Miyamamura, Hidakagun, Wakayama pref., HTN**6460**: Ryujin, Ryujinmura, Hidakagun, Wakayama pref., HTN**8675**: Mt. Kurama, Kibunecho, Sakyoku, Kyotoshi, Kyoto pref., HTN**8349**: Hase, Sonobecho, Funaigun, Kyoto pref., HTN**8692**: Asyu, Miyamacho, Kitakuwatagun, Kyoto pref., HTN**7185**: Kamitodoromi, Minoshi, Osaka pref., HTN**7248**: Aoiwasaka, Ibarakishi, Osaka pref., HTN**7286**: Tano, Takatsukishi, Osaka pref., HTN**7389**: Kirihata, Toyonocho, Toyonogun, Osaka pref., HTN**7521**: Osato, Nosecho, Toyonogun, Osaka pref., HTN**7564**: Yamabe, Nosecho, Toyonogun, Osaka pref., HTN**8409**: Onoyama, Inagawacho, Kawabegun, Hyogo pref., HTN**4855**: Takatori, Asaminamiku, Hiroshimashi, Hiroshima pref., HTN**4861**: Ushida, Higashiku, Hiroshimashi, Hiroshima pref., HTN**64**: Miyajima, Miyajimacho, Saekigun, Hiroshima pref., HTN**105**: Mt. Ishizuchi, Omogomura, Kamiukenagun, Ehime pref., HTN**574**: Mt. Onogaradake, Onohara, Tarumizushi, Kagoshima pref., HTN**11439**: Mujuguchondong Gorge, Muju-gun, Chollabuk-do, Korea, HTN**11495**: Mt. Hallasan, Orimok, Pukcheju-gun, Cheju-do, Korea, HWK**60**: Forest Park, Gergia, USA.

World distribution: Common in temperate and tropical regions; Africa, Asia, Europe, North

America, Oceania, South America; Antigua, Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Ecuador, French Guiana, Guadeloupe, India, Jamaica, Japan, Mexico, Nicaragua, Panama, Puerto Rico, Rep. Dominicana, Tobago, Trinidad, Uruguay, USA, Venezuela; Hawaii, U. S. Virgin Isls.

Stemonitis herbatica **Peck**

Fructification: sporangiate, stipitate, occasionally almost sessile, densely clustered into tufts, densely gregarious. *Sporangium*: cylindrical, obtuse, erect to bent, obtuse to apex, dark brown, army brown, **0.3-0.5**mm in diameter, **3-8**mm in height. *Stalk*: short, erect, solid, expanded at the base, black, fuscous to black, shining, **0.5-2.0**mm in height. *Peridium*: evanescent. *Dehiscens*: Irregular. *Hypothallus*: prominent, sometimes rather inconspicuous, membranous, reddish brown, silvery, shining. *Columella*: prominent, thick, central, simply a prolongation of the stalk, gradually tapering to the apex, flexuous above, sometimes not reaching to the apex, black. *Capillitium*: dense, arising from the entire columella, often with expanded nodes, *Primary branches*: prominent, numerous, branching and anastomosing to form an irregular internal net, **5-30** μm in diameter. *Surface net*: paler, the meshed small, polygonal, violaceous brown. *Spore*: globose, minutely but, distinctly warted, dark brown in mass, violaceous brown or paler by transmitted light, **6-9** μm in diameter.

SEM aspects of spore surface ornamentation: scattered with fine warts **0.1-0.2** μm in diameter, **0.1-0.2** μm in height, almost smooth without warts.

Localities collected: HTN**3639**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**3569**: Koseto, Hasemura, Kamiinagun, Nagano pref., HTN**4170**: Nanjo, Anancho, Shimoinagun, Nagano pref., HTN**3983**: Kaminakane, Uemura, Shimoinagun, Nagano pref., HTN**4579**: Kita, Tenryumura, Shimoinagun, Nagano pref., HTN**3895**: Kuwashirazu, Yasuokamura, Shimoinagun, Nagano pref., HTN**5320**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**5511**: Kasukawa, Otanicho, Suzushi, Ishikawa pref., HTN**5435**: Hioki, Oritocho, Suzushi, Ishikawa pref., HTN**5547**: Watase, Higashiyamanakacho, Suzushi, Ishikawa pref., HTN**5481**: Toyama, Wakayamacho, Suzushi, Ishikawa pref., HTN**5170**: Uemachi, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5126**: Kanayama, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5413**: Terawake, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5404**: Yanagida, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5075**: Shimotanimachi, Yamanakacho, Enumagun, Ishikawa pref., HTN**9499**: Takitani, Umegadani, Shimizushi, Shizuoka pref., HTN**9496**: Kawagishi, Takahashicho, Shimizushi, Shizuoka pref., HTN**9554**: Mt. Kunosan, Nekoya, Shimizushi, Shizuoka pref., HTN**9597**: Mt. Fjiwaradake, Fujiwaracho, Inabegun, Mie pref., HTN**5029**: Ogisucho, Suzukashi, Mie pref., HTN**9173**: Yakushiyama, Kobunecho, Tsushi, Mie pref., HTN**9417**: Shimizu, Handa, Tsushi, Mie pref., HTN**9225**: Nakase, Kawagecho, Agegun, Mie pref., HTN**8612**: Okumano, Oyamadamura, Ayamagun, Mie pref., HTN**6852**: Higashianraku, Asakayamacho, Kameyamashi, Mie pref., HTN**5651**: Fujisatocho, Iseshi, Mie pref., HTN**2346**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**8117**: Izeki, Misugimura, Ichishigun, Mie pref., HTN**2341**: Katano,

Seiwamura, Takigun, Mie pref., HTN**2743**: Higashiaikanose, Takicho, Takigun, Mie pref., HTN**2290**: Hara, Tamakicho, Wataraigun, Mie pref., HTN**2639**: Chayahiro, Wataraicho, Wataraigun, Mie pref., HTN**2534**: Yokowacho, Iseshi, Mie pref., HTN**7017**: Tobao, Eigenjicho, Kanzakigun, Shiga pref., HTN**6910**: Happudani, Eigenjicho, Kanzakigun, Shiga pref., HTN**6200**: Matsui, Edano, Udagun, Nara pref., HTN**6186**: Kozuke, Muromura, Udagun, Nara pref., HTN**6160**: Musan, Muromura, Udagun, Nara pref., HTN**5920**: Ko, Tsukigasemura, Soekamigun, Nara pref., HTN**6111**: Kirihata, Yamazoemura, Yamabegun, Nara pref., HTN**5760**: Sukawacho, Narashi, Nara pref., HTN**5802**: Mizumacho, Narashi, Nara pref., HTN**6827**: Kamisyoda, Fukuzumicho, Tenrishi, Nara pref., HTN**6027**: Inabuchi, Asukamura, Takaichigun, Nara pref., HTN**6245**: Nakaguro, Higashiyoshinomura, Yoshinogun, Nara pref., HTN**6067**: Nishitani, Yoshinocho, Yoshinogun, Nara pref., HTN**5964**: Mt. Yoshinoyama, Yoshinocho, Yoshinogun, Nara pref., HTN**6448**: Tomobuchi, Miyamamura, Hidakagun, Wakayama pref., HTN**6487**: Ryujin, Ryujinmura, Hidakagun, Wakayama pref., HTN**7335**: Tano, Takatsukishi, Osaka pref., HTN**7381**: Kirihata, Toyonocho, Toyonogun, Osaka pref., HTN**7486**: Osato, Nosecho, Toyonogun, Osaka pref., HWK**327**: Gainesville, Alachua Co., Florida, USA.

World distribution: Cosmopolitan; Africa, Asia, Europe, North America, Oceania, South America; Antigua, Argentina, Belize, Brazil, Ceylon, Costa Rica, Dominica, Fiji, Guadeloupe, Guatemala, India, Japan, Mexico, Puerto Rico, Rep. Dominicana, USA, Venezuela; Great Britain, Hawaii, Java.

***Stemonitis hyperopta* Meylan**

Fructification: Densely gregarious, crowded in small clusters, sporangiate, stipitate. *Sporangium*: cylindrical or elongated ovoid, obtuse at the apex, erect or slightly bent, rusty pink or pale purplish brown, becoming pallid with the dispersion of spores, **0.3-1.0**mm in diameter. **2-7**mm in height. *Stalk*: slender, rigid, erect, short, slightly expanded at the base, black, shining, **0.1-2.0**mm in height. *Peridium*: often inconspicuous, fugacious, *Dehiscens*: irregularly breaking. *Hypothallus*: membranous, thin, well developed, small, round, sometimes inconspicuous, usually colorless, dark brown. *Columella*: prominent, slender, short, erect, rigid, subulate, gradually tapering upwards, almost reaching to the apex of the sporangium. *Capillitium*: consisting of an internal network and a peridial network of branches. *Branch*: arising around the surface of the columella, numerous, tapering towards the tip, freely branching and anastomosing to form an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of internal network*: irregular in diameter. *Mesh of peridial network*: close, rather delicate, flexuous, without free-ends, fugacious at the upper portion of the sporangium, persistent at the lower portion of the sporangium at the maturity, irregular in diameter, **30-50** μm in diameter. *Spore*: globose, warted, purplish brown in the mass, pale purplish brown or pale purplish gray by transmitted light, **6-8** μm in diameter.

SEM aspects of spore surface ornamentation: composed of fine reticuration, **0.3-0.8** μm in diameter, vein-like ridges, **0.1-0.2** μm in thickness, **0.1-0.2** μm in height, smooth without reticulations

and ridges on the surface.

Localities collected: HTN**3617**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**4074**: Nanjo, Anancho, Shimoinagun, Nagano pref., HTN**4616**: Kita, Tenryumura, Shimoinagun, Nagano pref., HTN**4354**: Nakaizamurai, Tenryumura, Shimoinagun, Nagano pref., HTN**5295**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**5252**: Uemachi, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5401**: Yanagida, Yanagidamura, Hoshigun, Ishikawa pref., HTN**9501**: Takitani, Umegadani, Shimizushi, Shizuoka pref., HTN**9490**: Hara, Yamaharayama, Shimizushi, Shizuoka pref., HTN**9784**: Sakamoto, Fujiwaracho, Inabegun, Mie pref., HTN**9595**: Mt. Fjiwaradake, Fujiwaracho, Inabegun, Mie pref., HTN**9148**: Osatokubotacho, Tsushi, Mie pref., HTN**9154**: Yakushiyama, Kobunecho, Tsushi, Mie pref., HTN**9139**: Uchida, Anocho, Agegun, Mie pref., HTN**9194**: Ueno, Kawagecho, Agegun, Mie pref., HTN**9363**: Kitakuroda, Kawagecho, Agegun, Mie pref., HTN**9349**: Shiroyama, Kawagecho, Agegun, Mie pref., HTN**9187**: Nakano, Kawagecho, Agegun, Mie pref., HTN**9339**: Aikawa, Kitakuchicho, Hisaishi, Mie pref., HTN**8201**: Sakakibaracho, Hisaishi, Mie pref., HTN**9280**: Higashihano, Hegicho, Hisaishi, Mie pref., HTN**9257**: Hegiyama, Hegicho, Hisaishi, Mie pref., HTN**8915**: Hagiwara, Sekicho, Suzukagun, Mie pref., HTN**5679**: Fujisatocho, Iseshi, Mie pref., HTN**3415**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**2815**: Futamata, Hakusancho, Ichishigun, Mie pref., HTN**8128**: Izeki, Misugimura, Ichishigun, Mie pref., HTN**2406**: Ono, Misugimura, Ichishigun, Mie pref., HTN**8079**: Mie Univ. forest, Kawakami, Misugimura, Ichishigun, Mie pref., HTN**2372**: Chayahiro, Wataraicho, Wataraigun, Mie pref., HTN**9396**: Asamayama, Kusubecho, Iseshi, Mie pref., HTN**8571**: Mikisato, Owaseshi, Mie pref., HTN**8432**: Onoyama, Inagawacho, Kawabegun, Hyogo pref., HTN**4885**: Ushida, Higashiku, Hiroshimashi, Hiroshima pref., CBN**197**: Chester Co., Pennsylvania, USA.

World distribution: Africa, Asia, Europe, North America, Oceania, South America; Argentina, Chile, Dominica, Germany, India, Jamaica, Japan, Korea, Puerto Rico, USA; Great Britain.

***Stemonitis nigrescens* Rex**

Fructification: gregariously or loosely clustered, sometimes densely clustered in small colonies, sporangiate, stipitate. *Sporangium*: cylindrical, obtuse at the apex, bent, sometimes erect, purplish brown, becoming lighter after the dispersion of spores, shining, **0.2-0.8**mm in diameter, **3-7**mm in height. *Stalk*: cylindrical, erect, rigid, gradually tapering upwards, black, shining, **0.1-0.5**mm in diameter. *Peridium*: often inconspicuous, fugacious, *Dehiscens*: irregularly breaking. *Hypothallus*: well developed, membranous, thin, shining, silvery, sometimes reddish brown or reddish black. *Columella*: prominent, cylindrical, thick, slender, gradually tapering upwards, almost reaching to the apex of the sporangium, divided to form branches of the capillitium just below the apex of the sporangium, black or purplish black, shining. *Capillitium*: consisting of an internal network and a peridial network of branches. *Branch*: arising at the tip and around the surface of the columella, stout, gradually tapering upwards, bearing angled membranous expansions, branching and anastomosing to form an internal

network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of internal network*: flexuous, large, irregular, mesh of peridial network, small, irregular, delicate, lax, sometimes incomplete or lacking, often with spine-like free-ends, falling away early at the upper portion, dark brown, deep purplish brown. *Spore*: globose, marked with fine and small reticulations, dark brown to black in the mass, pale to purplish brown by transmitted light, **8-10** μm in diameter.

SEM aspects of spore surface ornamentation: composed of fine reticulations **0.6-1.0** μm in diameter, composed of partially thickened and perforated wall about **0.1** μm in thickness and **0.2-0.3** μm in height, basically smooth without reticulations.

Localities collected: HTN**9530**: Kashioyama, Umegadani, Shimizushi, Shizuoka pref., HTN**9235**: Onimichi, Komeicho, Tsushi, Mie pref., HTN**9176**: Haseyama, Wakebecho, Tsushi, Mie pref., HTN**9214**: Ueno, Kawagecho, Agegun, Mie pref., HTN**8219**: Sakakibaracho, Hisaishi, Mie pref., HTN**9305**: Motomura, Myojincho, Hisaishi, Mie pref., HTN**5623**: Oka, Shirakicho, Kameyamashi, Mie pref., HTN**8174**: Hikawa, Ureshinocho, Ichishigun, Mie pref., HTN**8528**: Mie Univ. forest, Kawakami, Misugimura, Ichishigun, Mie pref., HTN**9387**: Asamayama, Kusubecho, Iseshi, Mie pref., HTN**8290**: Rurikei, Sonobecho, Funaigun, Kyoto pref., HTN**8460**: Yamabe, Nosecho, Toyonogun, Osaka pref., HTN**8422**: Onoyama, Inagawacho, Kawabegun, Hyogo pref.

World distribution: Asia, Europe, North America, Oceania, South America; Australia, Brazil, Chile, Dominica, India, Ireland, Jamaica, Japan, Panama, Puerto Rico, USA; Wales.

***Stemonitis pallida* Wingate**

Fructification: gregarious or scattered, sometimes clustered or densely clustered, sporangiate, stipitate. *Sporangium*: cylindrical, erect or bent, slender, obtuse at the apex, tapering towards both ends, purplish brown, dark brown or blackish brown, becoming palid after the dispersion of spores, **0.3-0.6**mm in diameter, **3-8**mm in height. *Stalk*: cylindrical, rigid, gradually tapering upwards, black or dark purplish brown, shining, **2-6**mm in height. *Peridium*: often inconspicuous, fugacious, sometimes persistent small fragments after the breaking of membranes at the dehiscence. *Dehiscens*: irregular breaking. *Hypothallus*: membranous, thin, round, brown or silvery gray, shining. *Columella*: prominent, cylindrical, slender, gradually tapering upwards, almost reaching to the apex of the sporangium and divided abruptly to fomr branches of the capillitium below the apex of the sporangium, black, shining. *Capillitium*: consisting of an internal network and a peridial network of branches. *Branch*: arising around the surface of the columella, stout, tapering towards the tip, often with broadened and angled expansions, branching and anastomosing to form abundant internal networks at the surface of the sporangium. *Mesh of internal network*: large, irregular, often with a few broadened nodular expansions. *Mesh of peridial network*: dense ,flexuous, small, delicate, usually polygonal, often incomplete and lacking at the top, fugacious at the upper portion and persistent at the lower portion at maturity. *Spore*:

globose, minutely warted or nearly smooth, dark brown in the mass, reddish gray or pale purplish brown by transmitted light, **6-8** μm in diameter.

SEM aspects of spore surface ornamentation: scattered with fine warts **0.1-0.2** μm in diameter, **0.1-0.2** μm in height, almost smooth without warts.

Localities collected: HTN**446**: Oze, Hinoematamura, Minamiaizugun, Fukushima pref., HTN**3621**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**4083**: Nanjo, Anancho, Shimoinagun, Nagano pref., HTN**3508**: Gosyodaira, Oshikamura, Shimoinagun, Nagano pref., HTN**4272**: Hara, Tamakicho, Wataraigun, Mie pref., HTN**4286**: Kita, Tenryumura, Shimoinagun, Nagano pref., HTN**3847**: Kuwashirazu, Yasuokamura, Shimoinagun, Nagano pref., HTN**5378**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**5218**: Uemachi, Yanagidamura, Hoshigun, Ishikawa pref., HTN**9777**: Sakamoto, Fujiwaracho, Inabegun, Mie pref., HTN**8278**: Mt. Fjiwaradake, Fujiwaracho, Inabegun, Mie pref., HTN**9808**: Chikusa, Komonocho, Miegun, Mie pref., HTN**5003**: Ogisucho, Suzukashi, Mie pref., HTN**9078**: Mukumoto, Geinocho, Agegun, Mie pref., HTN**3453**: Sakakibaracho, Hisaishi, Mie pref., HTN**8633**: Okumano, Oyamadamura, Ayamagun, Mie pref., HTN**8938**: Hagiwara, Sekicho, Suzukagun, Mie pref., HTN**6097**: Higashianraku, Asakayamacho, Kameyamashi, Mie pref., HTN**5607**: Oka, Shirakicho, Kameyamashi, Mie pref., HTN**5696**: Fujisatocho, Iseshi, Mie pref., HTN**3427**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**2807**: Futamata, Hakusancho, Ichishigun, Mie pref., HTN**8966**: Yakii, Odaicho, Takigun, Mie pref., HTN**2781**: Higashiaikanose, Takicho, Takigun, Mie pref., HTN**2602**: Chayahiro, Wataraicho, Wataraigun, Mie pref., HTN**2457**: Fujisatocho, Iseshi, Mie pref., HTN**6909**: Happudani, Eigenjicho, Kanzakigun, Shiga pref., HTN**5937**: Shimofukagawa, Tsugemura, Soekamigun, Nara pref., HTN**7845**: Tsugemura, Yamabegun, Nara pref., HTN**5749**: Mizumacho, Narashi, Nara pref., HTN**6843**: Kamisyoda, Fukuzumicho, Tenrishi, Nara pref., HTN**6563**: Ryujin, Ryujinmura, Hidakagun, Wakayama pref., HTN**8337**: Hase, Sonobecho, Funaigun, Kyoto pref., HTN**8703**: Asyu, Miyamacho, Kitakuwatagun, Kyoto pref., HTN**7302**: Tano, Takatsukishi, Osaka pref., HTN**8454**: Yamabe, Nosecho, Toyonogun, Osaka pref., HTN**7441**: Kirihata, Toyonocho, Toyonogun, Osaka pref., HTN**7489**: Osato, Nosecho, Toyonogun, Osaka pref., HTN**8413**: Onoyama, Inagawacho, Kawabegun, Hyogo pref., HTN**4867**: Ushida, Higashiku, Hiroshimashi, Hiroshima pref., HTN**564**: Mt. Onogaradake, Onohara, Tarumizushi, Kagoshima pref., UE**3709**: Washington Co., Arkansas, USA.

World distribution: Asia, Europe, North America, Oceania; Argentina, Brazil, England, India, Jamaica, Japan, Korea, Malaysia, Mexico, Moldavia, New Caredonia, Panama, Puerto Rico, Taiwan, Trinidad, USA, Venezuela; Galapagos Isls., Malay peninsula.

***Stemonitis smithii* Macbr.**

Fructification: clustered or crowded, often densely crowded, sporangiate, stipitate. *Sporangium*: subcylindrical or cylindrical, erect or bent, obtuse at the apex, tapering towards both ends, light brown, becoming paler after the dispersion of spores, **0.2-0.4**mm in diameter, **3-6**mm in height. *Stalk*:

cylindrical, slender, rigid, erect, smooth, slightly expanded at the base, gradually tapering upwards, black, shining, **0.5-1.2**mm in height. *Peridium*: often inconspicuous, fugacious. *Dehiscens*: irregularly breaking. *Hypothallus*: membranous, thin, dark brown or brown. *Columella*: prominent, thick, cylindrical, stout, slender, flexuous at the upper portion, gradually tapering upwards, divided to form branches of the capillitium below the apex of the sporangium, dark purplish brown or black. *Capillitium*: consisting of an internal network and a peridial network of branches, *Branch*: arising at the tip and around the surface of the columella, numerous, thick, stout, tapering towards the tip, bearing broadened and angled expansions at the axil, branching and anastomosing to form an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of internal network*: delicate, small, regular, polygonal, **15-25** μm in diameter, light brown, *Spore*: globose, minutely warted or nearly smooth, brown or purplish brown in the mass, pale purplish brown, almost colorelss by transmitted light, **4-5** μm in diameter.

SEM aspects of spore surface ornamentation: obviously warted **0.1-0.2** μm in diameter, **0.1-0.2** μm in height, composed of finely reticulations formed by numerous very fine hollows and delicate vein-like ridges without warts.

Localities collected: HTN**1031**: Mt. Nonoboriyama, Ogisucho, Suzukashi, Mie pref., HTN**2693**: Anagura, Misatomura, Agegun, Mie pref., HTN**8203**: Sakakibaracho, Hisaishi, Mie pref., HTN**1383**: Ogawacho, Kameyamashi, Mie pref., HTN**1217**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**8060**: Mt. Yazusan, Ichishicho, Ichishigun, Mie pref., HTN**1445**: Mt. Sanjogadake, Tenkawamura, Yoshinogun, Nara pref., HTN**1440**: Ohara, Ureshinocho, Ichishigun, Mie pref., HTN**2819**: Futamata, Hakusancho, Ichishigun, Mie pref., HTN**8119**: Izeki, Misugimura, Ichishigun, Mie pref., HTN**8498**: Mie Univ. forest, Kawakami, Misugimura, Ichishigun, Mie pref., HTN**1519**: Izawanomiya Shirine, Isobecho, Shimagun, Mie pref., HTN**2545**: Yokowacho, Iseshi, Mie pref., HTN**8587**: Kuki, Owaseshi, Mie pref., HTN**8364**: Hase, Sonobecho, Funaigun, Kyoto pref., HTN**8408**: Onoyama, Inagawacho, Kawabegun, Hyogo pref., UE**3751**: Holiday Island, Carroll Co., Arkansas, USA.

World distribution: Cosmopolitan; Africa, Asia, Europe, North America, Oceania, South America; Canada, Ceylon, Chile, Guatemala, India, Jamaica, Japan, New Zealand, Nicaragua, Panama, Scotland, Switzerland, USA; Hawaii, Java.

***Stemonitis splendens* Rost.**

Fructification: densely crowded, very large clustered, forming large colonies, densely fasciculated, sporangiate, stipitate. *Sporangium*: cylindrical or long cylindrical, bent, obtuse to acuminate at the apex, nearly black, blackish brown, fuscous, deep purplish brown, becoming brown or dark brown after the dispersion of spores, **0.4-1.0**mm in diameter, **6-20**mm in height. *Stalk*: slender, long, erect, expanded at the base, rigid, black or blackish brown, shining, **1-5**mm in height. *Peridium*: often inconspicuous, fagacious. *Dehiscens*: irregularly breaking. *Hypothallus*: well developed, membranous, thin, widely

expanded, purplish brown, silvery, shining. *Columella*: prominent, thick, cylindrical, long, stout, firm, gradually tapering upwards, reaching near the apex of the sporangium divided into the capillitium, black, *Capillitium*: consisting of an internal network and a peridial network of branches, *Branch*: arising at the tip and around the surface of the columella, usually thick , stout, tapering towards the tip, sometimes with broadened and angled expansions, branching anastomosing to form an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of internal network*: large, irregular, round or polygonal, incomplete or absent in the agglutinated sporangia. *Mesh of peridial net*: smooth, sometimes with spinules **10-70** μm in diam, round or polygonal, flexuous, purlish brown, shining. *Spore*: globose, faintly and densely warted, purplish brown or black in the mass, pale reddish brown, pale purplish brown or pale purple by transmitted light, **7-9** μm in diameter.

SEM aspects of spore surface ornamentation: composed of many fine spines **0.1-0.2** μm in diameter, **0.2-0.3** μm in height, numerous very fine hollows or fine reticulations without fine spines.

Localities collected: HTN**259**: Shiga Heights, Yamanouchicho, Shimotakaigun, Nagano pref., HTN**986**: Mt. Hakuba, Hakubamura, Kitaazumigun, Nagano pref., HTN**3610**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**4221**: Nanjo, Anancho, Shimoinagun, Nagano pref., HTN**4020**: Kurishita, Uemura, Shimoinagun, Nagano pref., HTN**4282**: Kita, Tenryumura, Shimoinagun, Nagano pref., HTN**4359**: Nakaizamurai, Tenryumura, Shimoinagun, Nagano pref., HTN**3814**: Kuwashirazu, Yasuokamura, Shimoinagun, Nagano pref., HTN**5315**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**5544**: Tokinagayamaguchi, Uchiuracho, Suzugun, Ishikawa pref., HTN**5494**: Kasukawa, Otanicho, Suzushi, Ishikawa pref., HTN**5463**: Toyama, Wakayamacho, Suzushi, Ishikawa pref., HTN**5172**: Uemachi, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5409**: Terawake, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5406**: Yanagida, Yanagidamura, Hoshigun, Ishikawa pref., HTN**5112**: Enku, Takigaharacho, Komatsushi, Ishikawa pref., HTN**5529**: Asadani, Tsuhatacho, Kahokugun, Ishikawa pref., HTN**5085**: Shimotanimachi, Yamanakacho, Enumagun, Ishikawa pref., HTN**9528**: Kashioyama, Umegadani, Shimizushi, Shizuoka pref., HTN**9545**: Udosan, Miyakami, Shimizushi, Shizuoka pref., HTN**1127**: Horaijisan, Horaicho, Minamishidaragun, Aichi pref., HTN**7841**: Ishigure, Daiancho, Inabegun, Mie pref., HTN**888**: Mt. Fjiwaradake, Fujiwaracho, Inabegun, Mie pref., HTN**1054**: Ichinose, Hasemura, Kamiinagun, Nagano pref., HTN**1068**: Ugawara Shirine, Komonocho, Miegun, Mie pref., HTN**9850**: Chikusa, Komonocho, Miegun, Mie pref., HTN**1103**: Mt. Fukuosan, Komonocho, Miegun, Mie pref., HTN**1578**: Ejimacho, Suzukashi, Mie pref., HTN**5064**: Ogisucho, Suzukashi, Mie pref., HTN**1022**: Mt. Nonoboriyama, Ogisucho, Suzukashi, Mie pref., HTN**9064**: Kitayama, Takanoocho, Tsushi, Mie pref., HTN**2690**: Anagura, Misatomura, Agegun, Mie pref., HTN**1378**: Mt. Kyogamine, Anocho, Agegun, Mie pref., HTN**1353**: Kusawa, Anocho, Agegun, Mie pref., HTN**9209**: Ueno, Kawagecho, Agegun, Mie pref., HTN**9094**: Mukumoto, Geinocho, Agegun, Mie pref., HTN**7741**: Inabacho, Hisaishi, Mie pref., HTN**8186**: Sakakibaracho, Hisaishi, Mie pref.,

HTN**9229**: Tobioka, Shinmachi, Hisaishi, Mie pref., HTN**8925**: Hagiwara, Sekicho, Suzukagun, Mie pref., HTN**1538**: Sekisuikei, Asakayamacho, Kameyamashi, Mie pref., HTN**8659**: Mt. Nonoboriyama, Asakayamacho, Kameyamashi, Mie pref., HTN**1391**: Asakayamacho, Kameyamashi, Mie pref., HTN**6851**: Higashianraku, Asakayamacho, Kameyamashi, Mie pref., HTN**1340**: Ogawacho, Kameyamashi, Mie pref., HTN**5628**: Oka, Shirakicho, Kameyamashi, Mie pref., HTN**6273**: Fujisan, Shirakicho, Kameyamashi, Mie pref., HTN**1319**: Sumiyamacho, Kameyamashi, Mie pref., HTN**7627**: Aoyamacho, Nakagun, Mie pref., HTN**9005**: Abo, Aoyamacho, Nakagun, Mie pref., HTN**7768**: Ichishicho, Ichishigun, Mie pref., HTN**1394**: Shimonokawa, Ichishicho, Ichishigun, Mie pref., HTN**1213**: Haze, Ichishicho, Ichishigun, Mie pref., HTN**1449**: Mt. Sanjogadake, Tenkawamura, Yoshinogun, Nara pref., HTN**2809**: Futamata, Hakusancho, Ichishigun, Mie pref., HTN**7792**: Mitsukano, Hakusancho, Ichishigun, Mie pref., HTN**2399**: Ono, Misugimura, Ichishigun, Mie pref., HTN**8075**: Mie Univ. forest, Kawakami, Misugimura, Ichishigun, Mie pref., HTN**2391**: Yachi, Misugimura, Ichishigun, Mie pref., HTN**889**: Odaicho, Takigun, Mie pref., HTN**9040**: Sahara, Odaicho, Takigun, Mie pref., HTN**2795**: Choga, Odaicho, Takigun, Mie pref., HTN**2436**: Yakii, Odaicho, Takigun, Mie pref., HTN**2742**: Higashiaikanose, Takicho, Takigun, Mie pref., HTN**1406**: Osugidani, Miyagawamura, Takigun, Mie pref., HTN**2424**: Shimomate, Miyagawamura, Takigun, Mie pref., HTN**2724**: Koma, Ouchiyama, Wataraigun, Mie pref., HTN**2287**: Hara, Tamakicho, Wataraigun, Mie pref., HTN**2361**: Chayahiro, Wataraicho, Wataraigun, Mie pref., HTN**2680**: Seitsucho, Matsusakashi, Mie pref., HTN**3459**: Fukanagacho, Matsusakashi, Mie pref., HTN**9442**: Hiyoriyama, Iwasakicho, Iseshi, Mie pref., HTN**9411**: Kuratayama, Kandakushimotocho, Iseshi, Mie pref., HTN**2301**: Tsumuracho, Iseshi, Mie pref., HTN**1173**: Isejigu Shirine, Toyokawacho, Iseshi, Mie pref., HTN**2473**: Fujisan, Shirakicho, Kameyamashi, Mie pref., HTN**2859**: Awano, Iidakacho, Iinangun, Mie pref., HTN**2645**: Funato, Iinancho, Iinangun, Mie pref., HTN**8561**: Mikisato, Owaseshi, Mie pref., HTN**1560**: Tamura Shrine, Tsuchiyamacho, Kogagun, Shiga pref., HTN**6903**: Minokawa, Eigenjicho, Kanzakigun, Shiga pref., HTN**6892**: Wanami, Eigenjicho, Kanzakigun, Shiga pref., HTN**8803**: Kisugi, Kutsukimura, Takashimagun, Shiga pref., HTN**561**: Matsui, Edano, Udagun, Nara pref., HTN**560**: Ono, Muromura, Udagun, Nara pref., HTN**6174**: Kozuke, Muromura, Udagun, Nara pref., HTN**5777**: Tokano, Tsukigasemura, Soekamigun, Nara pref., HTN**5931**: Shimofukagawa, Tsugemura, Soekamigun, Nara pref., HTN**7851**: Tsugemura, Yamabegun, Nara pref., HTN**6119**: Kirihata, Yamazoemura, Yamabegun, Nara pref., HTN**5764**: Sukawacho, Narashi, Nara pref., HTN**7883**: Nakahatacho, Narashi, Nara pref., HTN**5739**: Mizumacho, Narashi, Nara pref., HTN**7717**: Yagyu, Narashi, Nara pref., HTN**6816**: Kamisyoda, Fukuzumicho, Tenrishi, Nara pref., HTN**5738**: Kaminyuta, Fukuzumicho, Tenrishi, Nara pref., HTN**7977**: Asukamura, Takaichigun, Nara pref., HTN**5949**: Inabuchi, Asukamura, Takaichigun, Nara pref., HTN**6223**: Natsumi, Yoshinocho, Yoshinogun, Nara pref., HTN**5990**: Nishitani, Yoshinocho, Yoshinogun, Nara pref., HTN**5965**: Mt. Yoshinoyama, Yoshinocho, Yoshinogun, Nara pref., HTN**904**: Mt. Nachisan, Nachikatsuuracho, Higashimurogun, Wakayama pref., HTN**6299**:

Tomobuchi, Miyamamura, Hidakagun, Wakayama pref., HTN**6478**: Ryujin, Ryujinmura, Hidakagun, Wakayama pref., HTN**8678**: Mt. Kurama, Kibunecho, Sakyoku, Kyotoshi, Kyoto pref., HTN**8339**: Hase, Sonobecho, Funaigun, Kyoto pref., HTN**8318**: Rurikei, Sonobecho, Funaigun, Kyoto pref., HTN**8710**: Asyu, Miyamacho, Kitakuwatagun, Kyoto pref., HTN**7181**: Kamitodoromi, Minoshi, Osaka pref., HTN**7242**: Aoiwasaka, Ibarakishi, Osaka pref., HTN**7135**: Saho, Ibarakishi, Osaka pref., HTN**7392**: Kirihata, Toyonocho, Toyonogun, Osaka pref., HTN**7212**: Tokiwadai, Toyonocho, Toyonogun, Osaka pref., HTN**7478**: Osato, Nosecho, Toyonogun, Osaka pref., HTN**7578**: Yamabe, Nosecho, Toyonogun, Osaka pref., HTN**8426**: Onoyama, Inagawacho, Kawabegun, Hyogo pref., HTN**930**: Taishakukyo, Tojocho, Hibagun, Hiroshima pref., HTN**611**: Sandankyo, Geihokucho, Yamagatagun, Hiroshima pref., HTN**799**: Tomo, Numatacho, Asaminamiku, Hiroshimashi, Hiroshima pref., HTN**100**: Higashisendamachi, Nakaku, Hiroshimashi, Hiroshima pref., HTN**4866**: Ushida, Higashiku, Hiroshimashi, Hiroshima pref., HTN**804**: Mt. Ominesan, Saekicho, Saekigun, Hiroshima pref., HTN**82**: Miyajima, Miyajimacho, Saekigun, Hiroshima pref., HTN**13**: Ishigadanikyo, Yukicho, Saekigun, Hiroshima pref., HTN**117**: Mt. Ishizuchi, Omogomura, Kamiukenagun, Ehime pref., HTN**582**: Mt. Onogaradake, Onohara, Tarumizushi, Kagoshima pref., HTN**561**: Mt. Kaimondake, Kaimoncho, Ibusukigun Kagoshima pref., HTN**11414**: Mujuguchondong Gorge, Muju-gun, Chollabuk-do, Korea, HTN**11409**: Mt. Kayasan, Hapchon-gun, Kyongsangnam-do, Korea, HTN**11494**: Mt. Hallasan, Orimok, Pukcheju-gun, Cheju-do, Korea, HWK**60**: Forest Park, Georgia, USA.

World distribution: Widely distributed in temperate and tropical regions; Africa, Asia, Europe, North America, Oceania, South America; Antigua, Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, England, Guadeloupe, India, Ireland, Jamaica, Japan, Martinique, Mexico, Nicaragua, Panama, Paraguay, Puerto Rico, Trinidad, Uruguay, USA, Venezuela; Galapagos Isls., Great Britain, Hawaii, Juan Fernandes, U. S. Virgin Isls.

***Stemonitis ubifera* Macbr.**

Fructification: sporangiate, stipitate, clustered or gregarious, sometimes densely clustered, often recumbent. *Sporangium*: cylindrical, slender, obtuse at the apex, blackish brown or deep fuscous brown, **0.2-0.4**mm in diameter, **5-10**mm in heigit. *Stalk*: cylindrical, slender, rigid, expanded at the base, gradually tapering upwards, black or dark brown, shining, **0.8-2.0**mm in height. *Peridium*: often inconspicuous, fugacious. *Dehiscens*: irregularly breaking. *Hypothallus*: well developed, membranous, thin, round, purplish brown or silvery, shining. *Columella*: prominent, cylindrical, stout, gradually tapering upwards, reaching near the apex of the sporangium, divided into the capillitium, deep purplish brown or black, *Capillitium*: consisting of an internal network and a peridial network of branches. *Branch*: arising at the tip and around the surface of the columella, stout, tapering towards the tip, bearing broadened membranous expansions at the axil, branching and anastomosing to from an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium.

Mesh of internal network: large, irregular. *Mesh of peridial network*: complete, variable in shape and size, **15-80** μm in diameter, with many free-ends, purplish to fuscous brown. *Spore*: globose, minutely spinulose, often clustered **4-12** or more, dark brown or black in the mass, purplish gray or pale purplish brown by transmitted light, **8-10** μm in diameter.

SEM aspects of spore surface ornamentation: reticulated **0.7-1.1** μm in diameter, composed of a perforated wall about **0.1** μm in thickness, **0.2-0.4** μm in height, almost smooth without walls.

Localities collected: HTN**9468**: Osawayama, Umegadani, Shimizushi, Shizuoka pref., HTN**9435**: Chitosegaoka, Tsushi, Mie pref., HTN**9462**: Takaoyama, Nishitakatocho, Hisaishi, Mie pref., HTN**9445**: Hiyoriyama, Iwasakicho, Iseshi, Mie pref., HTN**8311**: Rurikei, Sonobecho, Funaigun, Kyoto pref., HTN**7314**: Tano, Takatsukishi, Osaka pref., GWM**201**: Iowa city, Iowa, USA.

World distribution: Africa, Asia, North America; India, Japan, Taiwan, USA.

***Stemonitis virginiensis* Rex**

Fructification: sporangiate, stipitated, scattered or grouped in small clusters, *Sporangium*: cylindrical or elongated ovate, slightly acuminate at the upper portion, purplish brown, **0.3-0.8**mm in diameter, **2-5**mm in height. *Stalk*: slender, rigid, black ,shining, **0.5-2**mm in diameter. *Peridium*: evanescent. *Dehiscens*: irregular. *Hypothallus*: membranous, round, thin, dark brown. *Columella*: prominent, cylindrical, gradually tapering upwards, reaching near the apex of the sporangium and divided into the capillitium, dark brown or black. *Capillitium*: consisiting of an internal network and a peridial network of branches, *Branch*: arising at the tip and around the surface of the columella, tapering towards the tip, branching and anastomosing to form an internal network, more branching and more anastomosing to form a peridial network at the surface of the sporangium. *Mesh of peridial network*: close, slender, small, sometimes with spinules, sometimes incomplete, early falling at the upper portion of the sporangium, brown to dark brown. *Spore*: globose, marked with fine reticulations, brown in the mass, pale purplish brown by transmitted light, **6-8** μm in diameter. **5-8** μm in diam.

SEM aspects of spore surface ornamentation: reticulated, **0.9-1.5** μm in diameter, composed of perforated tall walls about **0.2** μm in thickness and **0.3-0.6** μm in height, smooth without walls.

Localities collected: HTN**3874**: Kuwashirazu, Yasuokamura, Shimoinagun, Nagano pref., HTN**5300**: Tokinagatowasoku, Uchiuracho, Suzugun, Ishikawa pref., HTN**5467**: Toyama, Wakayamacho, Suzushi, Ishikawa pref., HTN**5155**: Kanayama, Yanagidamura, Hoshigun, Ishikawa pref., HTN**1074**: Ugawara Shirine, Komonocho, Miegun, Mie pref., HTN**5027**: Ogisucho, Suzukashi, Mie pref., HTN**8850**: Kitayama, Takanoocho, Tsushi, Mie pref., HTN**2695**: Anagura, Misatomura, Agegun, Mie pref., HTN**8986**: Hagiwara, Sekicho, Suzukagun, Mie pref., HTN**8662**: Mt. Nonoboriyama, Asakayamacho, Kameyamashi, Mie pref., HTN**6294**: Fujisan, Shirakicho, Kameyamashi, Mie pref., HTN**8997**: Abo, Aoyamacho, Nakagun, Mie pref., HTN**8033**: Tajiri, Ichishicho, Ichishigun, Mie pref., HTN**2836**: Futamata, Hakusancho, Ichishigun, Mie pref., HTN**9047**:

Sahara, Odaicho, Takigun, Mie pref., HTN**1182**: Izawanomiya Shirine, Isobecho, Shimagun, Mie pref., HTN**7020**: Happudani, Eigenjicho, Kanzakigun, Shiga pref., HTN**6333**: Tomobuchi, Miyamamura, Hidakagun, Wakayama pref., HTN**6719**: Ryujin, Ryujinmura, Hidakagun, Wakayama pref., HTN**8681**: Mt. Kurama, Kibunecho, Sakyoku, Kyotoshi, Kyoto pref., HTN**8715**: Asyu, Miyamacho, Kitakuwatagun, Kyoto pref., HTN**8396**: Onoyama, Inagawacho, Kawabegun, Hyogo pref.

World distribution: Asia, Europe, North America, Oceania; India, Japan, Portugal, Switzerland, USA.

4. Discussion and conclusion

12 species belong to the Genus *Stemonitis* were taxonomically and morphologically studied and following points were clarified in this study. Representative taxonomical characteristics of species are shown at Tab. **1**. These characteristics are very important to discuss in taxonomical classification.

Tab. 1. Representative taxonomical and distributional characteristics of 12 species belong to Genus *Stemonitis*

Species Name	Sporangium		Stalk	Spore		Nrs.of	Nrs.of
	Diam.(mm)	Height(mm)	Height(mm)	Diam.(μm)	Surface orna.	locality	country
S. axifera	0.4-0.7	7.0-20.0	3.0-7.0	4-7	warted	94	26
S. confluens	0.2-0.6	2.0-6.0	0.1-0.3	8-11	spiny	22	7
S. flavogenita	0.3-0.7	4.0-10.0	1.0-3.0	7-9	spiny	57	19
S. fusca	0.6-1.0	9.0-20.0	2.0-5.0	810	reticulated	103	24
S. herbatica	0.3-0.5	3.0-8.0	0.5-2.0	6-9	warted	54	18
S. hyperopta	0.3-1.0	2.0-7.0	0.1-2.0	6-8	reticulated	35	10
S. nigrescens	0.2-0.8	3.0-7.0	0.1-0.5	8-10	reticulated	13	12
S. pallida	0.3-0.6	3.0-8.0	2.0-6.0	6-8	warted	42	17
S. smithii	0.2-0.4	3.0-6.0	0.5-1.2	4-5	warted	17	13
S. splendens	0.4-1.0	6.0-20.0	1.0-5.0	7-9	spiny	127	26
S. ubifera	0.2-0.4	5.0-10.0	0.8-2.0	8-10	warted	7	4
S. virginiensis	0.3-0.8	2.0-5.0	0.5-2.0	6-8	reticulated	22	6

*** Diam.: Diameter, Surface orna.: Surface ornamentation, Nrs. of locality: Numbers of collection localities, Nrs. of country: Numbers of countries confirmed occurrence.**

The shape of sporangium of **12** species is cylindrical and stipitated. In a long size of sporangium, usually it is curving from under to upper portion. A sporangium of *S. axifera*, *S. flavogenita*, *S. fusca* and *S. splendens* is conspicuously crowded but, a sporangium of *S. confluens* and *S. pallida* is solitary or gregarious. Usually many sporangia make a cluster, but each sporangium independently occurred, but sporangium of *S. nigrescens* is tightly adhesive each other. The color of a sporangium is classified roughly into two categories. One is deep to light brown, ferruginous or rusty brown as *S. axifera*, *S.*

flavogenita and *S. smithii*. Another one is black or fuscous as *S. confluens*, *S. fusca*, *S. nigrescens*, *S. splendens* and *S. ubifera*. The average diameter of a sporangium of **12** species is **4**-**10**mm. The diameter of a sporangium is **0**.**2**mm in a thin case, **1**.**0**mm in a thick case. The average length of a sporangium of **12** species is **4**-**10**mm, **2**mm in short case, **20**mm in long case. Especially the sporangium of *S. splendens* is very long and it is up to **20**mm. The average length of stalk of **12** species is **0**.**9**-**5**.**0**mm, **0**.**5**mm in short case, **6**mm in long case. The stalk of S. pallida is comparatively long against the length of sporangium. The diameter of a mesh of capillitial threads is varied in every species. It is averagely **12**-**42** μm in diameter. The mesh of *S. fusca*, *S. flavogenita* or *S. herbatica* is smaller, **5**-**20** μm in diameter. The mesh of *S. splendens* and *S. ubifera* is evidently larger, about **70**-**80** μm in diameter. The spore shape of **12** species is globose. The average diameter of a spore is **6**-**9**um, the spore of *S. axifera* and *S. smithii* is smaller than another species. The spore of *S. fusca*, *S. confluens* and *S. ubirera* is larger than another species. Each spore of most species is usually not combined as a cluster, but the spore of *S. ubirera* and *S. confluens* is usually or very often united in a cluster. Spore is very small, **4**-**10** μm in diameter and the fine surface ornamentation of a spore could not be found by a light microscopy. It was used a scanning electron microscopy to observe a fine surface ornamentation. As the result, it was confirmed three types of wart, spine and fine reticulation on a spore surface. Wart type is *S. axifera*, *S. herbatica*, *S. pallida* and *S. smithii*. Spiny type is *S. confluens*, *S. flavogenita* and *S. splendens*. Fine reticulated type is *S. fusca*, *S. hyperopta*, *S. nigrescens*, *S. ubifera* and *S. virginiensis*. Martin and Alexopoulos（**1969**）reported that *S. ubifera* has wart ornamentation, but it was confirmed reticulation patterns on a surface in this study. About the surface without a spine, a wart and a reticulation, *S. pallida* has no ornamentation and smooth, *S. confluens* and *S. flavogenita* has numerous fine hollows, *S. axifera*, *S. smithii* and *S. splendens* have numerous fine hollows and fine vein-like ridges that form fine reticulations. The arrangement of collection localities of **12** species in Japan and some foreign countries are taken in this study. The numbers of collection points are shown at Tab. **1**. Specimens of *S. splendens*, *S. fusca* and *S. axifera* were collected at so many places of **100** localities or more. The adaptability of this species might be high accommodation to environmental factors. *S. flavogenita*, *S. herbatica* and *S. pallida* were collected about **50** points. The adaptability of these species might be a little less than former species. The collection numbers of *S. nigrescens* and *S. ubifera* is extremely less than other species. It means that the development and its growth of these species strongly controlled in a locality. The arrangement of world distributions of **12** species is also taken out in this study under the representative six literatures. Literatures for a world disturibution has reported from everywhere of the world. It is not enough to mention the distribution using only these literatures, but the representative literatures were used in this study and it might be indicated enough approximate condition of a world distribution. As this result, it is indicated that *S. splendens* and some species are worldwide distribution species and *S. ubifera* and some species are regulated species to develop in the world. The number of world distributions has a correlative relation with a number of localities in Japan, and species which

developd worldwide also occurs a lot in Japan.

Literature cited.

Choe, Du-Mun & Kim, Jong-Gyun **1981**. Studies on the Flora of Myxomycetes in Korea. Rep. of Dept. of Biol., Nat. Kongju Teacher's Coll. **83**-**112**.

Emoto, Y. **1977**. The Myxomycetes of Japan. **263**pp. Tokyo.

Farr, M. L. **1976**. Myxomycetes, Flora Neotropica（ed. C. T. Rogerson）. Monograph No. **16**. **304**pp. New York.

Hatano, T. **1986**. Studies on the Myxomycetes of Japan, with particular reference to the fine structure of spores and capillitia. Rep. Environ. Sci. Mie Univ., **10**: **25**-**106**.

Lakhampal, T. N. & Mukerji, K. G. **1981**. Taxonomy of the Indian Myxomycetes. **450**pp. Vaduz.

Lister. G. **1925**. Monograph of the Mycetozoa（Revised edition）. **296**pp. London.

Martin, G. W. **1949**. Myxomycetes, North American flora Vol.**1**. **190**pp. New York.

Martin, G. W. & Alexopoulos, C. J. **1969**. The Myxomycetes. **477**pp. **41**pls. Iowa.

Massee, G. **1892**. A monograph of the Myxomycetes. **359**pp., Pl.**12**, London.

Nannenga-Bremekamp, N. E. **1991**. A guide to temperate Myxomycetes. **409**pp. Bristol.

Thind, K. S. **1977**. The Myxomycetes of India. **452**pp. New Delhi.

Yamamoto, Y. **1998**. The Myxomycetes biota of Japan, **700**pp. Tokyo.

*Stemonitis*属（変形菌）の分類学的・分布学的研究

羽多野　隆　美

（平成19年 9 月25日受理　最終原稿平成19年12月10日受理）

【要旨】

1967年から2006年にかけて日本各地で変形菌の採集を実施し、*Stemonitis*属の変形菌12種の約600標品の胞子嚢について分類学的な特徴の解析を行い、これらの特徴を明らかにした。本研究は変形菌の本属を分類学的に研究する上できわめて重要である。また、産地学的検討を行い、これらの種がどの地域で発生や生育しやすいかについての検討をおこなった。このことは変形菌の分布を明らかにする上で大変重要である。以上ように精査して検討した結果、次のことを明らかにすることができた。

*Stemonitis*属の変形菌12種の胞子嚢の直径は0.3-0.7mm、高さは 4-10mm、柄の長さは0.9-3.0mm、細毛体の網目の直径は12-42 μm、胞子の直径は 6-9 μmであった。

胞子嚢は*S. axifera*のように群生するもの、*S. pallida*のようにまばらに生育するものなどがあった。単独で生育する種は認められなかった。胞子表面の細部を走査型電子顕微鏡で観察した結果、胞子の表面には、いぼ状突起（ 4 種）、トゲ状突起（ 3 種）、帯状隆起による網目状突起（ 5 種）があることが確認された。胞子の突起のない表面部分は、平滑なもの、微孔を有するもの、微細な畝状隆起による網目構造のあるものが存在することがわかった。

日本国内における採集地を精査して、それぞれの種の生育地を明らかにした。*S. fusca*などは環境に対する適応性が高く多くの生育地が認められた。*S. herbatica*などは採集個体数も少なく環境に対する適応性が低いことが予想された。世界各地からの代表的な研究報告をもとに本研究で取り扱った12種の世界における分布状態を整理した。この結果、*S. splendens*は世界共通種であること、*S. ubifera*は生育環境が極めて限定されていることがわかった。世界において幅広く生育する種は日本においても同様に各地で幅広く生育していることが確認された。

キーワード：変形菌、*Stemonitis*属、分類、胞子嚢、分布