国立科博専報, (47) : 405–410, 2011年4月15日
Mem. Natl. Mus. Nat. Sci., Tokyo, (47): 405–410, April 15, 2011

# Preliminary Mycobiota Assessment on Kita-Iwojima Island, Ogasawara Islands

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**Abstract.** This is the result of a preliminary mycobiota assessment in Kita-Iwojima Island based on the explorations in June, 2009. Mycobiota assessment has seldom been carried out on Kita-Iwojima Island, one of the Volcano Islands south of the Ogasawara Islands. In total, 24 species among 20 genera of fungi are listed (17 species in 13 genera of Ascomycota, 5 species in 5 genera of Basidiomycota, 2 species in 2 genera of anamorphic fungi). Eleven species were recorded for the first time from Ogasawara Islands.

**Key words:** ascomycetes, basidiomycetes, Bonin Islands, distribution, microfungi.

## Introduction

To date, about 12000 species of fungi have been reported in Japan (Katumoto, 2010). The majority of these records are based on Japan's main islands, and smaller islands are not well surveyed except for those given special attention (e.g. Yakushima, Iriomote Isl., etc.).

The Ogasawara Islands consist of about 30 islands in mid-Pacific Ocean, isolated some 1000 km south of Tokyo. They are volcanic islands, formed by mid-ocean eruptions.

The Volcano Islands, under the jurisdiction of the Ogasawara Islands, are composed of three islands -- Kita-Iwojima, Minami-Iwojima, and Iwojima -- about 1200 km away from the main islands of Japan. Although Minami-Iwojima has been uninhabited since recorded history, Kita-Iwojima was once colonized in 1899, uninhabited since 1944 when the inhabitants were forced to evacuate during the war. Because of their geographical isolation and the relative lack of human activity, the natural life on both islands has been receiving attention from researchers. However, due to severe geographical and environmental conditions, approaching these islands has been extremely difficult. Nevertheless, some explorations have been carried out on both islands.

Kita-Iwojima Isl. (25°26′N, 141°17′E) has an area of 5.57 km$^2$, 3.3 km from south to north, 2.1 km from east and west, and 8 km in the periphery. Until the end of the 20$^{th}$ century, assessment of the biological resources on these islands had not been attempted. Since 2000, researchers began to visit the islands to examine the vegetation, insects, bats, and birds. But no fungal explorations had yet been attempted.

Fortunately, the authors of this paper were able to accompany one such biota assessment exploration team to Kita-Iwojima Island. Because the mycobiota (particularly the smaller fungi) in the Volcano Islands are scarcely known, the author mainly collected microfungi and ascomycetes. A more extensive list of the basidiomycetes found there will be presented elsewhere.

## Exploratory Method

The exploration was carried out from June 16–19, 2009. Because of the severe environmental conditions, the collecting sites were relatively limited, along with the exploratory line and its adjacent areas (Fig. 1, Table 1). The fungi were searched with the naked eye and hand lens. Whenever possible, isolation was carried out for DNA extraction. DNA samples will be deposited

in the Molecular Biodiversity Research Center in the National Museum of Nature and Science and are available for research upon request.

## Enumeration of Species

In the following list, fungi with asterisk are new records from Ogasawara Isls. Sites are indicated as alphabetical code (see Fig 1 and Table 1).

### Ascomycota

***Asterina*** sp.

TNS-F-26178 (Site G: 2009-VI-18, on *Trema orientalis* leaf)

***Bionectria*** sp.

TNS-F-26167 (Site B: 2009-VI-17, on *Boehmeria boniensis* branch)

***Coccomyces dentatus*** (J.C. Schmidt & Kunze) Sacc.*

TNS-F-26191 (Site E: 2009-VI-19, on *Machilus kobu* leaf)

***Dimerella*** sp.*

TNS-F-26190 (Site E: 2009-VI-19, on bark of unidentified wood)

***Graphis*** sp.*

TNS-F-26173 (Site A: 2009-VI-17, on unidentified wood)

***Hypocrea*** sp.

TNS-F-26163 (Site D: 2009-VI-17, on identified wood)

***Hypoxylon*** sp. 1

TNS-F-26168 (Site A: 2009-VI-17, on bark), TNS-F-26188 (Site E: 2009-VI-19, on bark)

***Hypoxylon*** sp. 2

TNS-F-26176 (Site G: 2009-VI-18, on *Melicope grisea* wood), TNS-F-26177 (Site G: 2009-VI-18, on *Melicope grisea* wood)

***Lachnum*** cfr. ***brasiliense****

TNS-F-26193 (Site E: 2009-VI-19, on unidentified broad leaved tree trunk)

***Lachnum palmae*** (Kanouse) Spooner*

TNS-F-26170 (Site A: 2009-VI-17, on leaves of *Livistona chinensis* var.*boninensis*), TNS-F-26171 (Site A: 2009-VI-17, on leaves of *Livistona chinensis* var.*boninensis*), TNS-F-26172 (Site A: 2009-VI-17, on leaves of *Livistona chinensis* var.*boninensis*), TNS-F-26185 (Site F: 2009-VI-18, on leaves of *Livistona chinensis* var. *boninensis*)

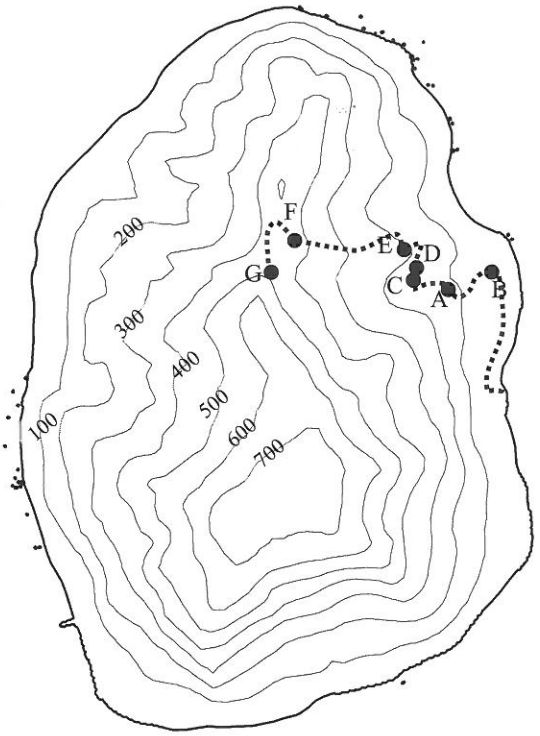


Fig. 1. Map of Kita-Iwojima Island and the collection sites. See Table 1 for coordinates of each site. Dotted line, the exploration root; solid circles, the collection sites.

Table 1. Collection Sites

| Site | Coordinates | Elevation (m) |
|---|---|---|
| A | 25°26′13.2″N, 141°17′21.4″E | 149 |
| B | 25°26′15″N, 141°17′26.5″E | 102 |
| C | 25°26′12.4″N, 141°17′19.4″E | 151 |
| D | 25°26′13.2″N, 141°17′14.6″E | 186 |
| E | 25°26′14.8″N, 141°17′15″E | 212 |
| F | 25°26′19.6″N, 141°16′59.9″E | 451 |
| G | 25°26′14.9″N, 141°16′56.6″E | 528 |

***Meliola livistonae*** H.S. Yates var. ***boninensis*** Katum. & Y. Harada

TNS-F-26179 (Site G: 2009-VI-18), TNS-F-26180 (Site G: 2009-VI-18)

***Micropodia*** sp.*

TNS-F-26183 (Site F: 2009-VI-18, on *Cyathea*

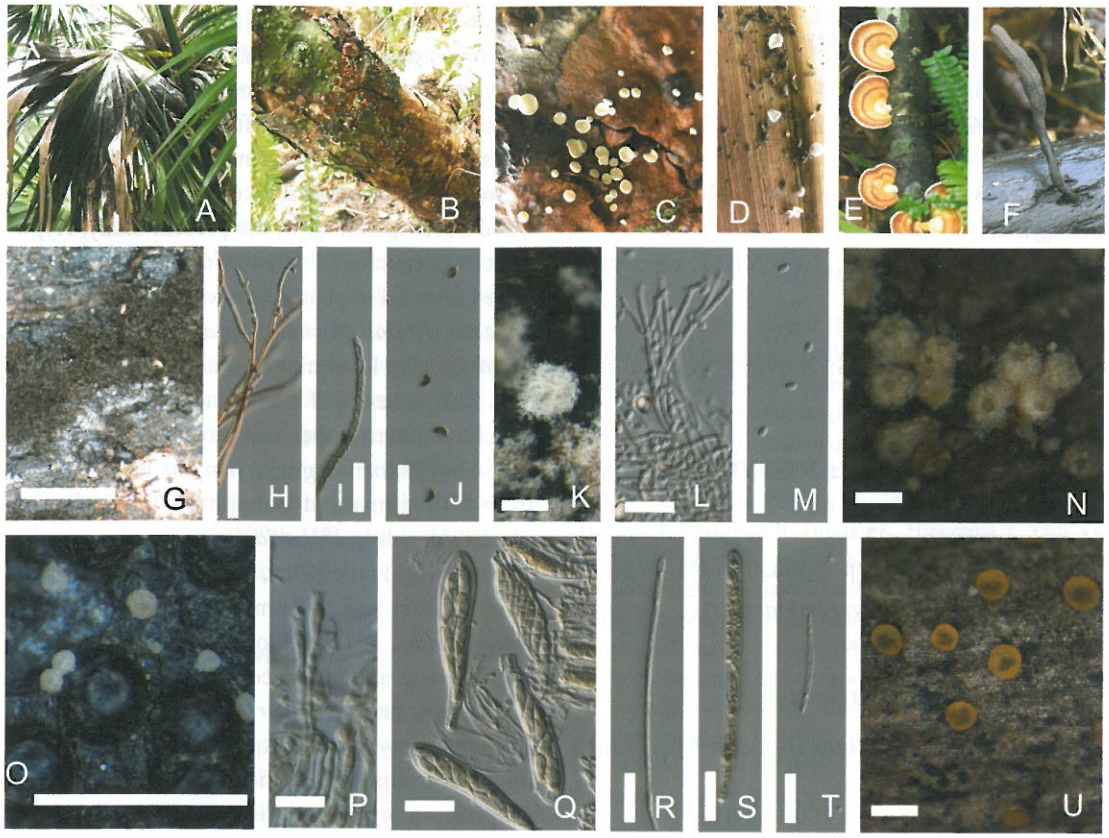


Fig. 2. A–F. *In situ* photo of the collected fungal specimens. A, *Meliola livistonae* var. *boninensis* TNS-F-26179 occurring on *Livistona* leaves; B, *Lachnum* cfr. *brasiliense* TNS-F-26193 occrruing on a tree trunk. Note white spots are the apothecia; C, Close up of the apothecia; D, *Lachnum palmae* TNS-F-26170 on *Livistona* leaf; E, *Microporus affinis* var. *affinis* TNS-F-26182; F, *Xylaria* sp. TNS-F-26165; G, Colony of *Virgaria nigra* TNS-F-26195 under dissecting microscope; H, Conidiophores of *V. nigra* TNS-F-26195; I, Conidia producing cell of *V. nigra* TNS-F-26195. Note denticles; J, Conidia of *V. nigra* TNS-F-26195; K, Colony of *Nodulisporium gregarium* TNS-F-26194 on the substrate under dissecting microscope; L, Conidiophores of *Nodulisporium gregarium* TNS-F-26194; M, Conidia of *Nodulisporium gregarium* TNS-F-26194; N, Perithecia of *Bionectria* sp. TNS-F-26167; O, Apothecia of *Strossmayeria* sp. TNS-F-26187 occurring on *Hypoxylon* sp. 1; P, Microconidia producing structure of *Strossmayeria* sp. TNS-F-26187; Q, Asci of *Strossmayeria* sp. TNS-F-26187; R, Paraphyses of *Lachnum* sp. TNS-F-26193; S, Ascus of *Lachnum* sp. TNS-F-26193; T, Ascospore of *Lachnum* sp. TNS-F-26193; U, Apothecia of *Orbilia* sp. 2. TNS-F-26184.

*spinulosa* petiole)

***Orbilia*** sp. 1.

TNS-F-26189 (Site E: 2009-VI-19, on decaying wood)

***Orbilia*** sp. 2.

TNS-F-26184 (Site F: 2009-VI-18, on decaying *Alpinia zerumbet* leaf)

***Strossmayeria basitricha*** (Sacc.) Dennis*

TNS-F-26164 (Site D: 2009-VI-17, on stroma vestige of *Hyoxylon* sp.)

***Strossmayeria*** sp.*

TNS-F-26187 (Site E: 2009-VI-19, on stroma of *Hyoxylon* sp. 1)

***Xylaria*** sp.

TNS-F-26165 (Site D: 2009-VI-17)

**Basidiomycota**

***Trametes*** sp.

TNS-F-26169 (Site A: 2009-VI-17, on decaying wood)

***Microporus affinis*** (Blume & T. Nees) Kuntze var. ***affinis****

TNS-F-26182 (Site F: 2009-VI-18, on decaying wood)

***Cyphella s. l.*** sp.*

TNS-F-26174 (Site G: 2009-VI-18, on *Casuarina* leaf)

***Flagelloscypha*** sp.*

TNS-F-26166 (Site C: 2009-VI-17, on *Trema orientalis* wood)

***Henningsomyces*** sp.*

TNS-F-26181 (Site F: 2009-VI-18, on petiole of *Livistona chinensis* var.*boninensis*)

Anamorphic fungi

***Nodulisporium gregarium*** (Berk. et M.A. Curt.) Mey.

TNS-F-26194 (Site E: 2009-VI-19)

***Virgaria nigra*** (Link) Nees*

TNS-F-26195 (Site E: 2009-VI-19)

**Discussion**

In total, 24 species among 20 genera of fungi were collected (17 species in 13 genera of Ascomycota, 5 species in 5 genera of Basidiomycota, 2 species in 2 genera of anamorphic fungi). All of them have been recorded for the first time from Kita-Iwojima Island, and 11 species are newly recorded from Ogasawara Isls.

Sooty molds *Asterina* and *Meliola livistonae* var. *boninensis* was frequently observed on the island. Because the former was immature, its specific identification was suspended. The latter was first described from specimens on Chichijima and Hahajima Islands (Katumoto and Harada, 1979; Sato et al. 1991). However, because some plants (including *Livistona)* were imported from both islands, their distribution may have expanded. *Lachnum palmae* is also thought to be distributed from Chichijima and Hahajima Islands because it is strongly associated with *Livistona.*

*Dimerella* and *Graphis* are known to be lichenized. The identity of these fungi will be discussed in a separate paper in the future.

Some ascomycetes are known to contribute to wood decomposition. In the present study, *Hypocrea,* two species of *Hypoxylon* and *Xylaria* sp. were collected as representative of such fungi. In addition, *Nodulisporium gregarium* and *Virgaria nigra* are also known to be anamorphs of Xylariales. The presence of these fungi is more remarkable in southern rather than northern areas in Japan. *Nodulisporium gregarium* has been reported from Chichijima and Hahajima Islands (Sato *et al.*, 1991), while *Virgaria nigra* is a fungus distributed worldwide (Ellis, 1971). It has even been isolated from soil in Aomori Prefecture in Japan (Matsushima, 1971). All of these fungi are known to contribute in lignin decomposition.

*Trametes* and *Microporus* are known as white-rot basidiomycetes, and likewise contribute to lignin decomposition. The numbers of white-rot fungi are more numerous than brown-rot fungi (Deacon, 2006), and are more conspicuous in subtropical areas based on our experience.

*Orbilia* sometimes occurs on the stroma of xylariaceous fungi. *Orbilia* sp. 1 was found on the stroma of *Hypoxyon* sp. 2.

*Lachnum* cf. *brasiliense*. was found to have thin, thread-like ascospores, and was on an unidentified tree trunk. Although no clue remained on the trunk to allow for identification, it was still alive and the fungus seemed to be parasitizing the tree. It is quite rare to find a parasitic *Lachnum.* Another long-spored *Lachnum, L. abnorme* (Mont.) J.H. Haines & Dumont has been known as a pathogen of *Citrus junos* (Sadano, personal communication.). Our previous study suggested that long-spored *Lachnum* occurs in subtropical areas in Japan, and forms a phylogenetically supported group (Hosoya *et al.* 2010). It is suggested that these groups of fungi are pathogenic to their hosts.

Morphological characteristic of the specimen TNS-F-26187 (color of the apothecium, negative

reaction of the ascus apex to Melzer's reagent, shape of ascospores and their germination within the asci, and production of spherical microconida, Fig. 1) all suggest that the specimen belongs to *Strossmayeria*. However, it was found on the stroma of *Hypoxylon* sp., an unusual habitat for *Strossmayeria*. Members of *Strossmayeria* have been mainly collected in Europe and America, although the genus seems to be distributed widely in the world (Iturriaga and Korf, 1991). The present specimen had the smallest ascospores among the 24 hitherto described species in the genus, and is a potentially new species. In Japan, two species, *S. bakeriana* (P. Henn.) Iturriaga and *S. japonica* Iturriaga have been previously reported (Iturriaga and Korf, 1990; Hosoya, 2000), and *S. basitricha* is a newly recorded.

## Acknowledgement

The authors wish to express their gratitude to the members of the exploratory team. In particular, we are deeply indebted to Drs. T. Yamaguchi and H. Kato for providing a very precious occasion to visit Kita-Iwojima Island. We greatly appreciate Mr N. Yoshii for his help in identifying the host. We would also like to thank Mr. T. Shumiya and M. Munakata, The Nature Conservation Society of Japan, and S. Uchida, Hiroshima University for their help during the exploration. Mr. Y. Sakurai, Ogasawara Subprefecture, is greatly acknowledged for obtaining the permission to carry out the exploration. Mr H. Suzuki and other members of Institute of Boninology are also greatly acknowledged for their help during the exploration. We also express our gratitude to Dr. C. Whelan who helped us in correcting English in the text. The current study was partially supported by Grant-in-Aid for Scientific Research (C) 20570087, "Clarifying the species diversity of bryophytes in the oceanic island, and researching for the import route and the speciation to the solitary island".

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# 小笠原諸島北硫黄島の菌類相予備調査

細矢　剛・保坂健太郎・大村嘉人

2009年6月に北硫黄島で行われた菌類調査に基づき，採集標本をリストした．小笠原諸島火山列島に所属する北硫黄島では，過去菌類の調査は過去ほとんど行われていない．子嚢菌類，担子菌類，不完全菌類からなる24種（20属）を採集（子嚢菌13属17種，担子菌5属5種，不完全菌2属2種）した．これらのうち，11種は小笠原諸島新産である．