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ON AN OVO-TESTIS[1] FOUND IN A LARVA OF LOCUST, *PODISMA SAPPOROENSE* SHIRAKI.

BY

BUKÔ NATORI

(With one Plate)

In the suburbs of Sapporo, *Podisma sapporoense* SHIRAKI is found abundantly. During the investigation of chromosomes of this locust in 1927, I found by chance one case of an ovo-testis in fifty males examined. In the adult of the insect, the size of the female is considerably larger than the male, but in the larva, especially in the early stage, the sexual difference can scarcely be distinguished by the body size. Therefore, identification of the sex of the larva is secured only by the external genital organs. By this method, it is ascertained that the gynandromorphic locust under consideration is a normal male in appearance.

In insects, many investigators such as JUNKER (*Perla* 1923), BOVERI (Bee 1888), WHITTING (*Habrobracon* 1927), MORGAN and BRIDGES (*Drosophila* 1927), PEARSON (Katydids 1927, 1929), ÔMACHI (*Madasumma* 1926) and KORNHAUSER (*Thelia* 1919) have already studied on the subject. Among others PEARSON's investigation is very important in the recent research of morphology of chromosomes. He found as many as three different types of appearance of the gynandromorphic individual which are otherwise normal in cytological condition.

However, the frequency of the gynandromorphic individual is by no means great; it has been described to occur in the Drosophila once in one thousand individuals and in the Katydids once in five hundred individuals.

The material on which I proposed to work cytologically was fixed in the strong Flemming's solution, and cut into serial sections 10 μ in thickness. They were stained with HEIDENHAIN's iron haematoxylin.

In the ovo-testis dealt with, a mass of ovarian tissue is attached to a testis.

1) After CHENG (1929) and MAKINO (1931).

[Transact. Sapporo Nat. Hist. Soc., Vol. XII Pt. 1, 1931]

The diameter of the ovarian part measures about 800 μ while the size of the testicular part is normal, that is about five times as large as the size of the ovarian part (Fig. 1). Both ovarian and testicular parts show apparently no abberant structure except chromosomes.

The chromosome number of the normal male, as Prof. OGUMA has studied, is 23 (Fig 2), and all of the chromosomes have telomitic spindle fiber attachment, representing the so-called Hippiscus type after MCCLUNG (1914). However, when I examined the chromosomes of the spermatogonium of this material, I found an astonishing fact that one is unable to account for without difficulty.

In the spermatogonium (Fig. 3, 4, 5), the chromosomes are found always 22 in number (even), instead of 23 as counted in the normal male. It suggests that the difference of the chromosome number in the spermatogonium is due to the linkage of some chromosomes which might be recognized by split or constriction of chromosome, as known already in many animals. But in the present material, so far as observed, there is no abnormal split or constriction which indicates the traces of the association of some chromosomes.

In the first spermatocyte, I found eleven tetrads of autsome and one dyad of sex-chromosome as found in the normal male, that is to say, it is to be analysed into twenty three univalent chromosomes as observed in the normal male. It is expected, therefore, that during the prophase of the first spermatocyte division, the increase of one univalent chromosome will take place, but there is so far no trace of such phenomenon as to prove increase of chromosome number.

In the second spermatocyte, two kinds of daughter cells are produced. These are the no-x-class and the x-class nuclei. In the former there are contained eleven autosomes and one sex-chromosome, while in the latter the sex-chromosome is missed. In both kinds of nuclei all chromosomes take the dyad-form.

The sperm formation is normal and the sperms fill the cysts, but in some cysts the spermatozoa degenerate and the epithelium of the cysts thickens slightly more than usual.

The ova found in the ovo-testis, have various sizes. They are all in the growth period and no ripe ovum is found (Fig. 1, 6). The largest follicle

measures 250 μ × 120 μ in diameter and the smallest one 100 μ × 46 μ. By high magnification, I found in the ovum the cytoplasm which contains deutoplasmic granules, and a large vesicular nucleus (Fig. 7).

The nucleus contains a loosely arranged karyotin network and one nucleolus, in which some irregular karyotin granules are observed.

Many degenerating and degenerated ovarian follicles are observed beside a small number of young follicles (Fig. 6). In all the follicular epithelium of the ovo-testis, many cells are in the process of cell division, but they are flat in shape, instead of having reached the stage in which the cylindrical epithelial cells are found. Some of the follicles have degenerated already at this stage.

Briefly, in the ovo-testis found in a larval locust, the spermatogonia lack one chromosome. In spite of this fact, spermatogenesis is accomplished and ripe speromatozoa are produced abundantly. The development of the ovum, on the contrary, is retarded greatly as compared with the spermatogenesis and they are all seen degenerating.

It is a pleasure to acknowledge here my deep indebtedness to Prof. K. OGUMA by whose suggestion this work was undertaken and under whose helpful supervision it was finished.

From the Zoological Institute,
Faculty of Agriculture,
Hokkaido Imperial University, Sapporo.

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Explanation of figures.

Fig. 1. Showing the ovo-testis. The spermatozoa in the cysts and the largest vesicular follicle in which a nucleus with one nucleolus is located. Photomicrograph. (× 50).

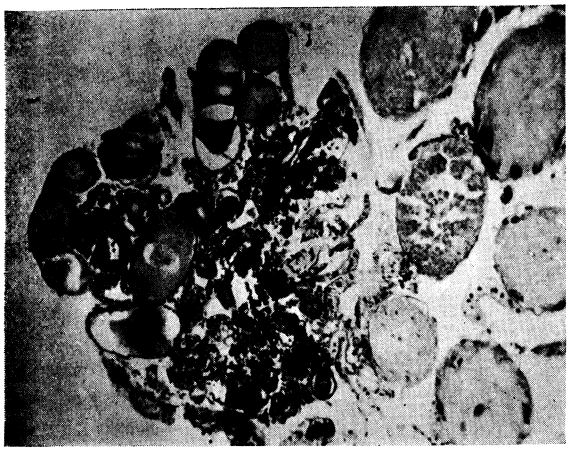
Fig. 2. The metaphase of the spermatogonia in the normal individual. Showing the twenty two autosomes and one sex-chromosome. Drawing. (× 2500).

Fig. 3. The metaphase of the spermatogonia in the gynandromorphic individual. The same number of chromosomes as in Fig. 4, 5. Drawing. (× 2500).

Fig. 4, 5. The metaphase of the final spermatogonia in the gynandromophic individual. The even chromosome number (22) and the slender forms as compared with those in Fig. 3 are shown. Drawing. (× 2500).

Fig. 6. A part of the ovary in the ovo-testis. cd, cell division of the follicular epithelial cell. yo, young ovum. df, degenerating follicle. nl, nucleolus. Photo. (× 150).

Fig. 7. A vesicular follicle. dg, deutoplasmic granule. fc, follicular epithelial cell. n, nucleus. y, yolk. cd, cell division of a follicular epithelial cell. nl, nucleolus. Photo. (× 550).



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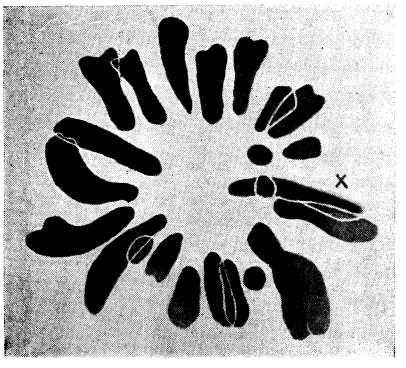

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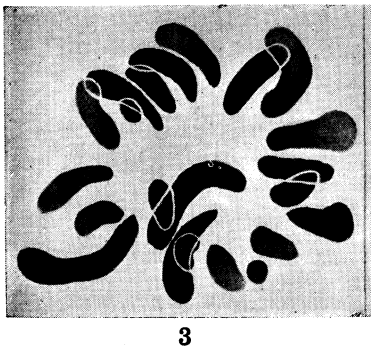

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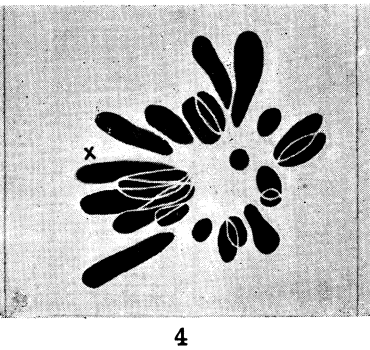

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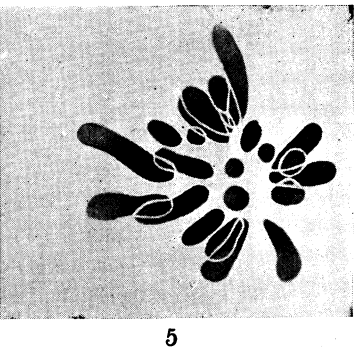

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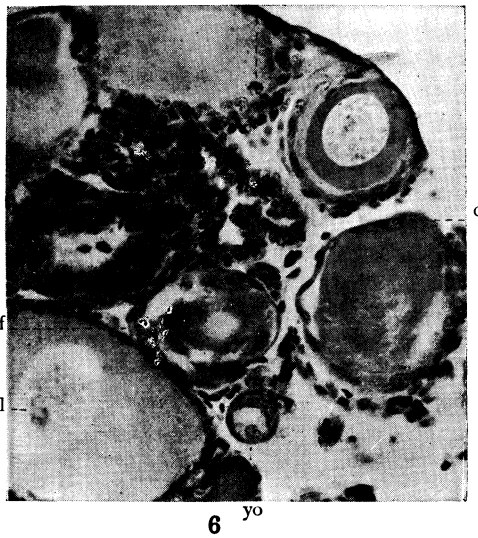

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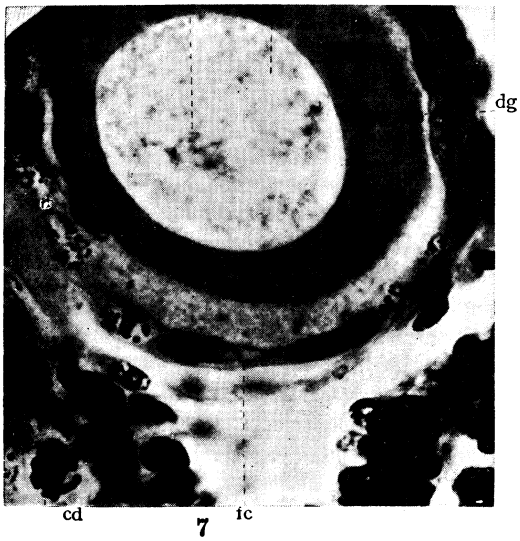

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摘　　要

アシマダラフキバツタ (*Podisma sapporoense* SHIRAKI) の幼蟲に見出されたる *ovo-testis* に就て。

名　取　武　光

余は 1927 年、札幌近郊に於て普通に見られるアシマダラフキバツタの染色體の研究に從事した。其材料中に外觀は正常の雄であるにも係らず ovo-testis を有する個体を遇然發見した。元來雌雄同體の個体は極めて稀に發見されるもので果蠅では千個体中に一、"蠶斯では五百個体中に一位の割合に存在すると報告されてゐる。

余の材料に於ける ovo-testis は普通大の testis に略 800 μ. の直徑を有する卵巢塊が附着してゐるものである。之を細胞學的に觀察した所が精原細胞に於て染色体が一個不足してゐる事實を發見した。アシマダラフキバツタの精原細胞に於ては二十三個の染色体を見るべきであるにも係らず二十二個の偶數である。其中一個は性染色体で他は常染色体である。然るに精母細胞に於ては十二個の染色体を見この中一個は dyad form の性染色体で他の十一個は tetrad form の常染色体である。して見ると第一分裂の前期に於て univalent の染色体が一個增加されてゐる筈である。其處で想像される事は精原細胞の染色体の linkage である。然し余の觀察し得た範圍では此の現象を說明するに足る染色体の spilit 又は constriction. 等の痕跡を見出し得なかつた。又第一分裂の前期に於ても染色体の增加を證し得る樣な現象を見ない。

斯の如く染色体の異常があるにも係らず精虫發生は、各分裂の中期の染色体の配列が多少不規則である外は何等差支なく遂行され cyst には成熟した精虫が充滿してゐる。之に反し卵巢に於ける卵子の發育は精虫のそれに比し遙かに遲れ未だ成熟せる卵子を見ないのみならず旣に形成された卵子も退化の運命を辿つてゐる樣に觀察される。

(北海道帝國大學農學部動物學敎室)

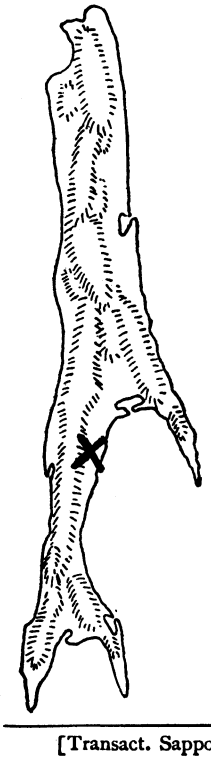
A RECORD OF *OCHOTONA* FROM SAKHALIN

By

TETSUO INUKAI

Ochotona, a rare duplicidentate rodent, is known to be native to the northern Asiatic continent, extending from central Asia to Kamchatka and is also recorded from eastern Europe and North America. However, the occurence of the animal in Chosen, an eastern peninsula of the continent, was already reported by ALLEN and ANDREWS in 1917. Since 1928 when *Ochotona* was captured for the first time in Hokkaido a further exploration has been carried out and it has been found that at present the animal is rather extensively inhabiting the island.

Fig. 1.



Special attention was naturally paid towards the fauna of Sakhalin whence no *Ochotona* had been recorded, since Hokkaido has a close faunistic relation to the Asiatic continent through this island, as is seen in the case of the other mammals such as the brown bear (*Ursus arctos*), the wolf (*Canis lupus lupus*), the fox (*Vulpes anadyrensis*), and the striped squirrel (*Eutamias asiaticus*), etc. (HATTA, 1913 and 1926; KURODA, 1928).

After troublesome explorations which were undertaken first in the summer of 1930 and second in the spring of 1931, the first specimens of *Ochotona* were at last obtained on the 17th of September 1931. The capture was made on the east coast of the island, at a place known as Shiretori (Fig. 1. ×), where Mr. S. SAITO, one of the expedition members, found the animal together with the food stored in its nest.

At present the animal is found living in large associations in the crevices of rocks in the forest along the

[Transact. Sapporo Nat. Hist. Soc, Vol. XXII, Pt. 1, 1931]

Shiretori river (Fig. 2.) It utters characteristic notes especially from late summer until the middle of autumn. At this season a storage fever seems to make the animal particularly busy so that it often comes into sight; otherwise, being very timid the animal is hardly seen in the field. The food of the animal comprises almost every kind of plants found around the dwelling. We can identify twigs and leaves of *Laryx*, of *Acer*, of *Rubus*, mosses, grasses, etc., out of the food hoarded by the animal for the winter use (Fig. 3.).

Fig. 2.

In both sexes the body size of *Ochotona* from Sakhalin measures about 19 cm from the snout to the body end. Though the identification of the animal has not been undertaken, it seems true that the present species is quite akin to the Hokkaido species, to which KISHIDA referred as *Ochotona yezoensis*, so far as the life history as well as the morphology of the animal are concerned. It is worthwhile to note that *Ochotona* from Sakhalin shows again the direct faunistic connection of Hokkaido to the Asiatic continent.

Fig. 3.

Here the writer wishes to express his best thanks to Mr. S. SAITO in the zoological institute who engaged in the collection. The writer is also indebted greatly to Mr. KUWADA, Mr. YOSHIKURA and Mr. YONEUCHI in Saghalin who gave information and kind help during the exploration.

(Zoological Institute, Hokkaido Imp. Univ.)

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摘　　要

樺太に産するナキウサギ

犬飼哲男

ナキウサギは元來中央アジアよりカムチヤツカに亘る地域に産する動物で、歐洲東部及び北米にも棲息することが知られてゐる。當て朝鮮に産することも ALLEN 氏及び ANDREWS 氏により報告され北海道に於ては昭和三年に北見國で發見の新記錄を殘し、それ以來尙多數に全道に棲息することが知られて來た。

北海道とアジア大陸との動物分布上の連絡を考慮すれば、羆、狼、狐、縞栗鼠等の如き哺乳動物で明かな如く樺太を介して大陸と連絡するもの多く、當然ナキウサギの樺太に於ける存在を考へなくてはならない。然るところ昭和六年九月十七日に吾々は三度目の採集で始めて樺太東海岸知取に於てこれを捕獲することが出來たのである。知取地方では知取川の沿岸の森林中に岩石の間隙を利用してナキウサギが群棲し、北海道産のものと等しく、夏期より初秋に亘り盛に出沒して冬期のため食物を貯藏するので人目に觸れる機會が多い、齋藤氏が採集した食物貯藏所中には、落葉松、キイチゴ、イタヤ等の莖葉、草本、及蘇苔等を檢出することが出來た。樺太産のナキウサギはその習性から見ても又形態から見ても北海道産のナキウサギに近似種か或は同種であると思はれる。

本稿を草するに當り直接採集に從事した齋藤三郎氏及び豫てよりこの採集に甚大な援助を賜つた樺太の桑田操氏、吉倉眞氏、米內萬壽雄氏に更めて深甚なる謝意を表すものである。

ON THE CLAVARIACEÆ OF JAPAN III.[1)]
The Species of Clavaria found in Hokkaido and Southern Saghalien

By

SANSHI IMAI

Since the writer reported in the series twenty four species belonging to the Clavariaceae which are new to Japan or to science, a considerable number of species of the family have been deposited in our Herbarium by the collection of the writer and of our colleague.

The present paper was intended to report the species of Clavaria collected in Hokkaido and Southern Saghalien.

The writer wishes to express here his sincere thanks to Profs. K. MIYABE and S. ITO for their kind suggestions throughout the work.

Key to the species of Clavaria in Hokkaido and Southern Saghalien.

I. Plants branched (**Ramaria**-group)

A. Spores white in mass

1. Plants white

a. Branches cristate; spores large, subglobose, smooth, 9–12 × 6–8 μ... ..... *C. cristata*

b. Branches not cristate; spores small, globose, minutely asperulate, 3–5 μ..... *C. Kunzei*

2. Plants yellow, rarely not branched..... *C. corniculata*

3. Plants orange-chrome, small..... *C. crocea*

B. Spores ochraceous or cinnamon in mass

1. Plants usually large sized, growing on ground

a. Plants whitish to buff colored; tips of branches rosy-red colored;

1) The previous reports were published in this Transaction, Vol. XI, Pt. 1 and 2.

spores ellipsoidal, almost smooth or faintly verruculose, not striate nor reticulate..... *C. botrytis*

b. Plants buff-orange colored; tips of branches not different colored; spores ellipsoidal, faintly verruculose ..... *C. aurea*

c. Plants clear yellow or yellowish colored; tips of branches not different colored; spores ellipsoidal, faintly verruculose..... *C. flava*

d. Plants ochraceous to dark-brown; spores large, fusiform, echinulate, 12–18 × 6–8 μ..... *C. Broomei*

2. Plants usually small to medium sized, growing on rotting wood, leaves or needles, usually brownish-yellow colored

a. Plants growing on rotting deciduous wood ..... *C. stricta*

b. Plants growing on rotting coniferous wood..... *C. apiculata*

c. Plants growing on fallen needles of conifers ..... *C. flaccida*

II. Plants usually simple, tufted, growing on ground (**Syncoryne**-group)

A. Plants white or whitish ..... *C. vermicularis*

B. Plants yellow ..... *C. fusiformis*

C. Plants scarlet ..... *C. Miyabeana*

III. Plants usually simple, solitary or in small groups (**Holocoryne**-group)

A. Plants growing on ground or among fallen leaves

1. Plants white

a. Plants very slender, cylindrical ..... *C. acuta*

2. Plants yellow

a. Spores aculeate

* Spores globose or subglobose ..... *C. inaequalis*

b. Spores smooth

* Club cylindrical, drab-color; stem yellow ..... *C. argillacea*

** Club lanceolate, cream-color; stem lemon-yellw ..... *C. lanceolata*

*** Club compressed oblong-clavate, straw-color; stem lemon-yellow ..... *C. meakanensis*

3. Plants ochraceous to brown

a. Plants large, truncate at the apex .....*C. truncata*

b. Plants medium sized, without sclerotium at the base

* Spores 8–10 × 5 μ ..... *C. ligula*

** Spores 17–22 × 5–5.5 μ ..... *C. sachalinensis*

c. Plants medium sized, with sclerotium at the base; spores 12.5–15 × 6–7.5 μ ..... *C. Tochinaiana*

4. Plants avellaneous at first, blacking at maturity ... *C. avellano-nigrescens*

B. Plants growing on rotting wood

1. Plants white or whitish

a. Plants subcylindrical, truncated at the apex ..... *C. quercicola*

b. Plants simple or sometimes forked into very short irregular branches, growing on decorticated rotting wood, usually associated with the green algae ..... *C. mucida*

2. Plants deep-orange-red color, clavate ..... *C. Shimadai*

Ramaria-group

1. *Clavaria cristata* FRIES ex HOLMSK.

Clavaria albida SCHAEFF. Fung. Bavar. pl. 170, 1763.

Clavaria cristata HOLMSK. Beata Ruris I, 92, 1790.

Clavaria fallax PERS. Comm. Fung. Clav. 48, 1797.

Clavaria cristata PERS. Syn. Meth. Fung. 591, 1801.

Clavaria fimbriata PERS. Ibid. 592, 1801.

Clavaria cristata FR. Syst. Myc. I, 473, 1821.

Clavaria alba PERS. Myc. Eur. I, 161, 1822.

Clavaria fuliginea PERS. Ibid. 166, 1822.

Clavulina cristata SCHROET. Pilze Schles. I, 442, 1889.

Hab. On the ground or humus soil in woods. Prov. Ishikari: Mt. Teine. Prov. Kushiro: Mt. Meakan; Lake side of Akan. September.

Jap. name. *Kare-eda-take.*

The present fungus is so very variable in form and color that the various names have been given by many authors. The typical form is white or pallid and it is a tenacious plant which is long stipitate and branching into abruptly crested, small and pointed branchlets. The spores are white in mass, smooth, subglobose or broadly ellipsoidal and apiculate.

The fructification ranges from 3 cm. to 8 cm. in hight. When the plants are much branched the stem is short and thick, but the less branching stem is longer, rather slender and equal or rather attenuated downwards. Color

of the fructification is varied as pure white, dull white, pinkish white, grayish to deep mouse gray, ashy or dull yellow.

2. *Clavaria Kunzei* FRIES

Clavaria Kunzei FR. Syst. Myc. I, 474, 1821.
Clavaria chionea PERS. Myc. Eur. I, 167, 1822.
Clavulina Kunzei SCHROET. Pilze Schles. I, 442, 1889.
Clavaria asperula ATKINS. Ann. Myc. VI, 54, 1908.

Hab. On the humus ground in woods. Prov. Ishikari: Nopporo. September to October.

Jap. name. *Shiro-hime-hôkitake.*

The present fungus is variable in form, but usually characterized by the beautiful white or cream-white, delicate, slender and loosely branched fructification which is 2 to 8 cm. in hight. The spores are white in mass, globose, minutely asperulate or nearly smooth and 3.5–4.5 μ in diameter.

From the preceding species, *Clavaria cristata*, the fungus is distinguished by the loosely branched fructification, lunate axils and non-cristate apices, but it is more easily distinguishable by the smaller and usually asperulate spores.

3. *Clavaria corniculata* FRIES ex SCHAEFF.

Clavaria muscoides LINN. Sp. Pl. 1183, 1753.
Clavaria fastigiata LINN. Fl. Suecica, ed. 2, 457, 1755.
Clavaria corniculata SCHAEFF. Fung. Bavar. pl. 173, 1763.
Clavaria pratensis PERS. Comm. Fung. Clav. 52, 1797.
Clavaria furcata PERS. Ibid. 52, 1797.
Clavaria corniculata FR. Syst. Myc. I, 471, 1821.
Clavaria corniculata var. *pratensis* COTT. et WAKEF. Trans. Brit. Myc. Soc. VI, 182, 1919.

Hab. On the humus ground in woods. Prov. Ishikari: Nopporo. Prov. Iburi: Lake side of Shikotsu.

Jap. name. *Hime-tsuno-take* (n. n.)

The occurrence of the present species has not been reported in our country. The fungus is dintinguishable from others by the yellow branched fructification and by the spores which are white in mass, globose, smooth and 5 to 7 μ in diameter.

The fungus is also variable in form, varying from simple, like the Holocoryne-group, to the much branched form of the typical Ramaria-group.

4. *Clavaria crocea* FRIES ex PERS.

Clavaria crocea PERS. Comm. Fung. Clav. 57, 1797.
Clavaria crocea FR. Syst. Myc. 472, 1821.
Clavariella crocea HARTER, Krypt. Fl. Mark Brand. VI (1), 164, 1910.

Hab. On the ground in woods. Prov. Ishikari: Nopporo. Prov. Kushiro: Lake side of Akan. Prov. Kitami: Oketo-forest. September.

Jap. name. *Aka-hime-hôkitake.*

The present fungus is easily distinguishable from others by the orange-chrome colored, 2 to 4 times branched plants and by the spores which are whitish in mass, globose, and 2.5 to 3.5 μ in diameter.

5. *Clavaria botrytis* FRIES ex PERS.

Clavaria acroporphyrea SCHAEFF. Fung. Bavar. pl. 176, 1763.
Clavaria botrytis PERS. Comm. Fung. Clav. 41, 1797.
Clavaria botrytis FR. Syst. Myc. I, 466, 1821.
Clavaria purpurascens PAULET in PAUL. et LÉV. Icon. Champ. 113, pl. 194, f. 6, 1855.
Clavaria botrytoides PK. Bull. N. Y. St. Mus. XCIV, 21, 1905.
Clavaria conjuncta PK. Ibid. CV, 16, 1906.

Hab. On the ground in woods. Prov. Ishikari: Nopporo.

Jap. name. *Hôki-take.*

The common edible fungus is known under various Japanese names such as *Hôki-take*, *Nezumitake*, *Nezumimotase* and *Murasakihôkitake*. The fructification of the fungus is large, white or pallid and up to 12 cm. high with about the same width.

The branches are short and densely crowded and their tips colored rosy. From the closely related species, *Clavaria formosa*, this fungus is distinguished by the lighter colored fructification which has rosy tips of branches.

6. *Clavaria aurea* FRIES ex SCHAEFF.

Clavaria aurea SCHAEFF. Fung. Bavar. pl. 285 et 287, 1770.
Clavaria aurea FR. Epicr. 574, 1838.

Hab. On the ground in woods. S. Saghalien: Mt. Kashipo. September,

Jap. name. *Kogane-hôkitake.*

Clavaria aurea, C. flava and *C. formosa* are so closely related to one another that often they have been mis-identified by some authors. We may be able to distinguish them by the following key.

1. Stem whitish or yellowish; branches yellow, gold or orange in color.
   a. Branches crowded, ascending dichotomously branched, golden-yellow or orange ..... *C. aurea*
   b. Branches fastigiating, erected, clear yellow..... *C. flava*
2. Stem and branches flesh colored or pink ..... *C. formosa*

7. *Clavaria flava* FRIES ex SCHAEFF.

Clavaria flava SCHAEFF. Fung. Bavar. pl. 175, 1763.

Clavaria flava FR. Syst. Myc. I, 467, 1821.

Clavaria flavobrunescens ATKINS. Ann. Myc. VII, 367, 1909.

Hab. On the ground in woods. Prov. Ishikari: Nopporo. September to October.

Jap. name. *Ki-hôkitake.*

8. *Clavaria Broomei* COTTON et WAKEF.

Clavaria Broomei COTTON et WAKEF. Trans. Brit. Myc. Soc. VI, 170, 1919.

Hab. On the ground in woods. Prov. Ishikari: Nopporo. July to October.

Jap. name. *Ko-arabôki-take.*

The present fungus is easily distinguished from the preceding three species by the darker colored and simpler fructification as well as by its characteristic spores which are large, fusiform, distinctly aculeate and 14–20 × 6–8 μ in size. From *Clavaria grandis,* which has already been reported from our country, the present fungus is easily distinguishable by the simpler frucutification as well as by the longer spores.

9. *Clavaria stricta* FRIES ex PERS.

Clavaria stricta PERS. Comm. Fung. Clav. 45, 1797.

Clavaria stricta FR. Syst. Myc. I, 468, 1821.

Clavariella stricta KARST. Hattsv. II, 188, 1882.

Hab. On rotting deciduous wood in woods. Prov. Ishikari: Nopporo. Prov. Kushiro: Mt. Meakan. Prov. Kitami: Abashiri. September.

Jap. name. *Cha-hôkitake.*

The fungus is characterized as lignicolous growing on deciduous wood. Its fructification is ochraceous in color and 2 to 5 cm. in hight. White mycelial strands are usually observed at the base of stem. The closely related species, *Clavaria apiculata,* is established by the only difference of its habitat on coniferous wood. So we must pay special attention to the substratum in the collection of these fungi.

10. *Clavaria apiculata* FRIES

Clavaria apiculata FR. Syst. Myc. I, 470, 1821.

Clavariella apiculata KARST. Hattsv. II, 188, 1882.

Clavaria Tsugina PK. Bull. N. Y. St. Mus. LXVII, 27, 1903.

Hab. On the rotting coniferous wood in woods. Prov. Ishikari: Nopporo. Prov. Kitami: Notoro forest. September to October.

Jap. name. *Cha-hôkitake-modoki.*

11. *Clavaria flaccida* FRIES

Clavaria flaccida Fr. Syst. Myc. I, 471, 1821.

Clavariella flaccida KARST. Hattsv. II, 186, 1882.

Clavaria abietina f. "*non virescent of pine*" COKER, Clavarias U. S. Canada, 182, 1923.

Clavaria abietina f. "*small, non-virescent*" COKER, Ibid. 184, 1923.

Hab. On the needles of *Abies Mayriana.* Prov. Ishikari: Nopporo. Prov. Iburi: Lake side of Shikotsu. August to October.

Jap. name. *Hime-hôkitake.*

The present fungus grows on the fallen needles of our northern spruce and it is easily recognized by the cinnamon colored fructification (1.5–8 cm. in hight) and its habitat. When their substrata were missed, this fungus is sometimes indistinguishable from *Clavaria stricta* and *C. apiculata* to the naked eyes. Under a microscope, however, the spores of this fungus are pip-shaped, with verrucose wall and 5–7 × 3–3.5 μ in size, while those of *C. stricta* and *C. apiculata* are ellipsoidal, smooth or very faintly warted measuring 7–9 × 3.5–4.5 μ and 7.5–9 × 3.5–4.5 μ respectively.

Syncoryne-group

12. *Clavaria vermicularis* FRIES

Clavaria vermiculata SCOP. Fl. Carn. ed. 2, II, 483, 1772.
Clavaria fragilis HOLMSK. Beata Ruris, I, 7, 1790.
Clavaria gracilis SOWERB. Engl. Fungi, pl. 232, 1799.
Clavaria vermicularis FR. Syst. Myc. I, 484, 1821.
Clavaria fragilis Fr. Ibid. 484, 1821.

Hab. On the ground in woods. Prov. Ishikari: Nopporo, Sapporo. Prov. Iburi: Lake side of Shikotsu. August to October.

Jap. name. *Shiro-sômen-take.*

The present fungus belongs to the Syncoryne-group, having the tufted habit. The fructifications are very fragile, 1 to 10 cm. in hight, and the spores are subglobose, 3–6 × 3–4 μ in size.

In the younger stage the fructifications are pure white in color, but turn gradually into light citron-yellow or yellow-ochre from the tips at maturity or drying.

13. *Clavaria fusiformis* FRIES ex SOWERB.

Clavaria fusiformis SOWERB. Engl. Fungi. pl. 234, 1799.
Clavaria fasciculata PERS. Comm. Fung. Clav. 72, 1797.
Clavaria ceranoides PERS. Syn. Meth. Fung. 594, 1801.
Clavaria fusiformis FR. Syst. Myc. I, 480, 1821.
Clavaria ceranoides FR. Ibid. 481, 1821.

Hab. On the ground in woods. Prov. Ishikari: Nopporo.

Jap. name. *Naginata-take.*

From the other species of the Syncoryne-group the present fungus is easily distinguished by the canary-yellow or dull brownish-yellow colored fructification.

14. *Clavaria Miyabeana* ITO

Clavaria Miyabeana ITO, Trans. Sapporo Nat. Hist. Soc. XI, 72, 1930.

Hab. On humus ground among the fallen leaves in woods. Prov. Kushiro: Lake side of Kuttcharo. August to September.

Jap. name. *Beni-naginatatake.*

The present fungus is easily distinguished from others of the Syncoryne group by the fructification of brilliant scarlet color. Also it is characterized by the large, flattened and rugulose fructification and by the globose spores.

Holocoryne-group.

15. *Clavaria acuta* FRIES ex SOWERB.

Clavaria acuta SOW. Engl. Fungi, pl. 333, 1803.
Clavaria acuta FR. Syst. Myc. I, 485, 1821.

Hab. On the ground in woods. Prov. Iburi: Lake side of Shikotsu. September.

Jap. name. *Shiro-yari-take.*

The fructifications of this fungus are very slender, delicate, smooth and white. The spores are globose or subglobose and $7-10\times6-9\,\mu$ in size.

16. *Clavaria inaequalis* FRIES ex MÜLLER

Clavaria inaequalis MÜLL. Fl. Dan. pl. 836, f. 1, 1780.
Clavaria rufa PERS. Comm. Fung. Clav. 71, 1797.
Clavaria angustata PERS. Ibid. 72, 1797.
Clavaria inaequalis FR. Syst. Myc. I, 481, 1821.
Clavaria angustata FR. Ibid. 481. 1821.
Clavaria dissipabilis BRITZL. Hym. Südb. 289, f. 28, 1885.
Clavaria similis BOUD. et PAT. (non PK.) Journ. de Bot. II, 446, 1888.

Hab. On the ground in woods, garden, etc. Prov. Ishikari: Sapporo. September.

Jap. name. *Ki-sômentake.*

As has been pointed out by COTTON, the present fungus is rather easily distinguished from others of the Holocoryne-group by the yellow fructification and by the subglobose or globose and spiny spores. The fungus sometimes branches one or two times at the apice.

17. *Clavaria argillacea* FRIES ex PERS.

Clavaria argillacea PERS. Comm. Fung. Clav. 74, 1797.
Clavaria ericetorum PERS. Obs. Myc. II, 60, 1799.
Clavaria argillacea FR. Syst. Myc. I, 482, 1821.

Hab. On the ground in woods. Prov. Iburi: Lake side of Shikotsu. September.

Jap. name. *Ki-ashi-senkôtake.*

The fungus is characterized by the drab-colored fructification having the yellow colored stem, as well as by the ellipsoidal and smooth spores which are longer than 10 μ.

18. *Clavaria lanceolata* IMAI

Clavaria lanceolata IMAI, Trans. Sapporo Nat. Hist. Soc. XI, 71, 1930.

Hab. On the ground among the grasses in woods. Prov. Kushiro: Lake side of Akan. September.

Jap. name. *Yari-no-ho-take.*

The present fungus somewhat resembles the preceding species, from which it is distinguishable by the smaller lanceolate fructification, as well as by the smaller spores.

19. *Clavaria meakanensis* IMAI

Clavaria meakanensis IMAI, Trans. Sapporo Nat. Hist. Soc. XI, 71, 1930.

Hab. On the wet humus ground. Prov. Kushiro: Alpine region of Mt. Meakan. September.

Jap. name. *Meakan-naginatatake.*

This fungus somewhat resembles *C. lanceolata* from which it differs by the compressed clavate or subcylindrical club, as well as by the larger spores. From others it is easily distinguished by the characteristic form of its fructification having a creamy-white colored club and a very short, lemon-yellow colored stem.

20. *Clavaria truncata* QUÉL.

Craterellus pistillaris FR. Epicr. 534, 1838.

Clavaria truncata QUÉL. Ench. Fung. 221, 1886.

Clavaria truncata LOVEJOY, Bot. Gaz. L, 385, 1910.

Clavaria pistillaris COKER, Clavaria U. S. Canada, 83, 1923 (p. p.).

Hab. On the ground in coniferous woods. Prov. Ishikari: Nopporo; Jô-

zankei. Prov. Kitami: Notoro-forest.

Jap. name. *Surikogitake-modoki.*

The present species and *C. pistillaris (Surikogi-take)* are the largest fungi in the Holocoryne-group reaching to 20 cm. in hight. The distinction between them depends upon the apex character of the fructification, the former species having a truncate apex. Some authors, however, treated both as an identical species, or recognized the present fungus as a species belonging to the genus Craterellus.

21. *Clavaria ligula* FRIES ex SCHAEFF.

Clavaria ligula SCHAEFF. Fung. Bavar. pl. 171, 1763.
Clavaria caespitosa WULF. in JACQ. Misc. II. 98, 1781.
Clavaria pulvinata PERS. Comm. Fung. Clav. 65, 1797.
Clavaria luteola PERS. Ibid. 66, 1797.
Clavaria ligula FR. Syst. Myc. I, 477, 1821.

Hab. On the ground in woods. Prov. Kushiro: Lake side of Akan. September.

Jap. name. *Ko-surikogitake.*

This species somewhat resembles *C. pistillaris* in general appearance, but it is distinguished from the latter by the much smaller size and lighter color of the fructification.

22. *Clavaria sachalinensis* IMAI

Clavaria sachalinensis IMAI, Trans. Sapporo Nat. Hist. Soc. XI, 73, 1930.

Hab. On the ground among the fallen needles of Picea. S. Saghalien: Mt. Kashipo. September.

Jap. name. *Karafuto-kosurikogitake.*

The present fungus is closely related to *C. ligula*, from which it differs in the darker colored fructification as well as in the longer spores measuring 17.5–22 × 5–5.5 μ against 8–10 × 5 μ in the latter.

23. *Clavaria Tochinaiana* IMAI

Clavaria Tochinaiana IMAI, Trans. Sapporo Nat. Hist. Soc. XI, 72, 1930.

Hab. Sclerotia on the rotting cabbage leaves in spring. Fructifications from sclerotia in autumn. Prov. Ishikari: Sapporo.

Jap. name. *Tama-naginatatake.*

The fructifications of the fungus are reddish-brown in color, and the sclerotia are depressed globose or cap-shaped and light reddish-brown in color.

24. *Clavaria avellano-nigrescens* IMAI sp. nov.

Solitaria vel gregaria, simplex, elongato-clavata, obtusa, 1.5–5 cm. alta, 2–4 mm. crassa, junior avellanea, adulta vel sicca nigricans, a stipite non distincta, ad extremam basim alba et tomentosa, non fistulosa; sporae albae, globosae, laeves, apiculatae, 4–6 μ.

Hab On the ground among the mosses in woods. Prov. Ishikari: Nopporo. September.

Jap. name. *Kuro-senkôtake* (n. n.)

The present fungus is closely allied to *C. Greletii* BOUD., but it is distinguished by the drab colored fructification when young, though it somewhat resembles the latter, becoming black when matured or dried. From *C. asperulospora* ATKINS. whose fructifications are wood-brown color when fresh, this species is easily distinguishable by its smooth spores, not echinulate.

25. *Clavaria quercicola* IMAI

Clavaria quercicola IMAI, Trans. Sapporo Nat. Hist. Soc. XI, 41, 1929.

Hab. On the decaying bark of Quercus lying on the ground in woods. Prov. Ishikari: Nopporo. October.

Jap. name. *Shiro-hime-surikogitake.*

The present fungus is distinguished from others of the white Holocoryne-group by its lignicolous habit and by its small ellipsoidal spores measuring 3–3.5 × 1.5–2.5 μ.

26. *Clavaria mucida* FRIES ex PERS.

Clavaria mucida PERS. Comm. Fung. Clav. 55, 1797.

Clavaria mucida FR. Syst. Myc. I, 476, 1821.

Hab. On the rotten decorticated wood in woods. Prov. Ishikari: Nop-

poro. Prov. Iburi: Chitose, Lake side of Shikotsu. Prov. Kushiro: Lake side of Akan. September.

Jap. name. *Kiri-take*; *Shirauo-take.*

The fungus grows always on the wet rotten decorticated wood and is so usually assoiated with green algae that COKER called attention to the close resemblance to a lichen in its habit.

The fructifications of the fungus are 6 to 10 mm. rarely 1.5 cm. in hight, and simple or irregularly short-branched. The color of fructification is white in youth, but becomes pale-cream and then turned to brownish from the apice.

27. *Clavaria Shimadai* IMAI

Clavaria Shimadai IMAI, Trans. Sapporo Nat. Hist. Soc. XI, 41, 1929.

Hab. On charred wood in woods. Prov. Ishikari: Jôzankei. September.

Jap. name. *Ko-beni-naginatatake.* (n. n.)

The present fungus is distinguished from others by the orange-chrome colored, small fructification having subglobose, 5 μ long spores as well as by its habitat on the fire brand wood.

In the previous paper, the writer gave the Japanese name *Naginatatake-modoki* for the present fungus, but proposes here a new name as above written, thinking that it is better to represent the characters of the present fungus.

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摘　　要

日本産箒茸科に就きてIII.
北海道及び南樺太に産する箒茸屬の種類

今　井　三　子

北海道及び南樺太に於て採集せる箒茸屬の種類、27種を報告せるものなり。

1. カレエダタケ　*Clavaria cristata* Fr.
2. シロヒメハウキタケ　*Cl. Kunzei* Fr.
3. ヒメツノタケ　*Cl. corniculata* Fr.
4. アカヒメハウキタケ　*Cl. crocea* Fr.
5. ハウキタケ　*Cl. botrytis* Fr.
6. コガネハウキタケ　*Cl. aurea* Fr.
7. キハウキタケ　*Cl. flava* Fr.
8. コアラバウキタケ　*Cl. Broomei* Cott. et Wakef.
9. チヤハウキタケ　*Cl. stricta* Fr.
10. チヤハウキタケモドキ　*Cl. apiculata* Fr.
11. ヒメハウキダケ　*Cl. flaccida* Fr.
12. シロソウメンタケ　*Cl. vermicularis* Fr.
13. ナギナタタケ　*Cl. fusiformis* Fr.
14. ベニナギナタタケ　*Cl. Miyabeana* Ito
15. シロヤリタケ　*Cl. acuta* Fr.
16. キソウメンタケ　*Cl. inaequalis* Fr.
17. キアシセンコウタケ　*Cl. argillacea* Fr.
18. ヤリノホタケ　*Cl. lanceolata* Imai
19. メアカンナギナタタケ　*Cl. meakanensis* Imai
20. スリコギタケモドキ　*Cl. truncata* Quél.
21. コスリコギタケ　*Cl. ligula* Fr.
22. カラフトコスリコギタケ　*Cl. sachalinensis* Imai
23. タマナギナタタケ　*Cl. Tochinaiana* Imai
24. クロセンコウタケ　*Cl. avellano-nigrescens* Imai (新種)
25. シロヒメスリコギタケ　*Cl. quercicola* Imai
26. キリタケ(シラウラタケ)　*Cl. mucida* Fr.
27. コベニナギナタタケ　*Cl. Shimadai* Imai

FURTHER NOTE ON *NARCISSUS* BULB-ROT

BY

YOSHIHIKO TOCHINAI and SHOICHI SHIMADA

In 1930 we[1] reported about two fungi parasitic on *Narcissus*-bulbs. One of them was named *Sporotrichum Narcissi* n. sp. and the other was identified with *Sporotrichum radicicolum* ZIMMERMANN. Herein we shall call the former fungus No. 1 and the latter fungus No. 2 for convenience.

In the course of further investigations of the fungi we came to have same questions on the taxonomy of the fungi. Under these circumstances Prof. WESTERDIJK to whom we sent cultures of the fungi under consideration has kindly sent us cultures of several fungi related closely to the present fungi. She has also offered valuable abvice on the points of identification.

In our further examinations of the fungi it was found that fungus No. 1 produces conidia frequently in small heads in hanging drop cultures, and that fungus No. 2 forms sterile ends of conidiophores in old cultures. The production of conidia in heads in fungus No. 1 has been with difficulty observed by ordinary mounting on slide glass according to easy breaking up of the heads, and it could be recognized only in hanging drop cultures by allowing the conidia to be formed freely.

From to the addition of these critical characteristics we came to the conclusion that fungus No. 1 belongs to genus *Trichoderma* and fungus No. 2 to genus *Pachybasium*. Fungus No. 1 is a new species of *Trichoderma*. We propose the name *Trichoderma Narcissi* TOCHINAI et SHIMADA, as a substitute for *Sporotrichum Narcissi* TOCHINAI et SHIMADA. Fungus No. 2 is also a new species hitherto undescribed, and as its name we propose *Pachybasium bulbicolum* TOCHINAI.

(1) Y. TOCHINAI, & S. SHIMADA: *Sporotrichum Narcissi* sp. n. parasitic on Narcissus bulbs. Transact. Sapporo Nat. Hist. Soc., Vol. 11, Pt. 3, pp. 121–128, 1930.

[Transact. Sapporo Nat. Hist. Soc., Vol. XII, Pt. 1, 1931]

Here we give the amended technical descriptions of these fungi under question.

Trichoderma Narcissi TOCHINAI et SHIMADA, nom. nov.

Synonym *Sporotrichum Narcissi* TOCHINAI et SHIMADA, in Transact. Sapporo Nat. Hist. Soc. Vol. XI, pt. 3, 1930.

Caespitulis sparsis vel hinc inde gregariis, saepe confluentibus, subrotundatis, pulvinatis, compactiusculis, dein effusis, initio albis, dein fusco-viridis, hyphis fertilibus ascendentibus, ramosis; conidiis globosis, viridis, 5.0–3.3 × 4.5–3.0 μ, in capitula parva acrogena collectis, saepe in sterigmatibus acrogena solitariis; sterigmatis oblongatis, 10 × 3.0–2.5 μ (15.0–5.0 × 4.0–2.0 μ).

Hab. in bulbis vivis *Narcissi*, *Croci*, et *Lilii*.

The mycerial cushions formed on the surface of the substrata consist of densely gathered hyphae, scattered or gregarious, sometimes confluent, white in color at first, turning dark green later by the formation of conidia. Conidiophores are erect, hyaline, variously branched, 4.5–2.0 μ wide. Sterigmata are observed frequently being formed laterally on the conidiophores or terminally at the ends of short branches of conidiophores, oblong, straight or curved, attenuated or acute, 15.0–5.0 × 4.0–2.0 μ, mostly 10.0 × 3.0–2.5 μ. Conidia are produced directly on the tips of the conidiophores or on the sterigmata, frequently in small heads, almost spherical but sometimes ovoid or ellipsoidal, green in color, 5.0–3.3 × 4.5–3.0 μ

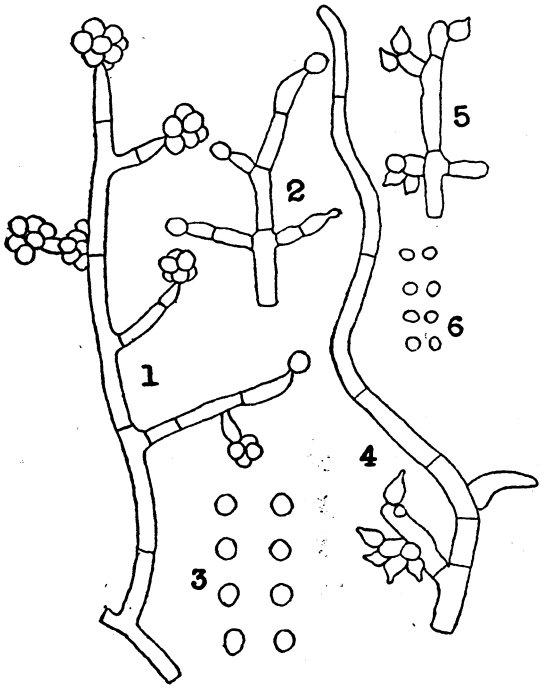
It is parasitic on the living bulbs of *Narcissus pseud-Narcissus* L., *Crocus*, and *Lilium*.

Pachybasium bulbicolum TOCHINAI, sp. nov.

Caespitulis gregariis sparsisque, subinde confluentibus, initio albis, dein ochraceo-viridulis vel griseo-ochraceis; hyphis fertilibus ascendentibus, ramosis, ramis ultimis saepe sterillis; ramulis seu sterigmatis saepe verticillatis; sterigmatis piriformis, 5.5 × 3.5 μ (9.5–4.5 × 5.0–3.3 μ); conidiis globoso-ellipsoideis, pallido ochraceo-viridulis vel fere hyalinis, 4.5–2.5 × 3.0–1.8 μ, achrogenis ad sterigmata.

Hab. in bulbis vivis *Narcissi* et *Croci*.

The mycerial cushions produced on the surface of the substrata consist of



Figures 1-3.

Trichoderma Narcissi nom. nov.

1. Conidiophore with spore heads.
2. Barnch of conidiophore with sterigmata and conidia.
3. Conidia.

Figures 4-6.

Pachybasium bulbicolum sp. n.

4. Conidiophore with sterile end.
5. Branch of conidiophore with sterigmata.
6. Conidia.

(×600. del. Schimada)

densely gathered hyphae, scattered or gregarious, sometimes confluent, white in color at first, turning pale yellowish green or buff color by the formation of conidia. Conidiophores are erect, hyaline, branched, 5.5–4.5 μ wide, with sterile ends sometimes in old cultures. Sterigmata are produced laterally on the conidiophores or terminally on the short branches of conidiophores, piriform, 9.5–4.5 × 5.0–3.3 μ, mostly 5.5 × 3.5 μ. Short branches of conidiophores and sterigmata are sometimes verticilate. Conidia are produced on the attenuated ends of the sterigmata, mostly oval or ellipsoidal, pale yellowish green or almost colorless, 4.5–2.5 × 3.0–1.8 μ in size.

It is weakly parasitic on the bulbs of *Narcissus* and *Crocus* accompanying the former fungus.

The authors wish to express their sincere thanks to Prof. Dr. J. WESTERDIJK to whom they owed very much in the present identification of the fungi.

摘　　要

水仙球莖腐朽病々原菌に就て

栃内吉彦　島田昌一

余等は、昨年本會報第十一卷第三號に於て、水仙の一新病害に就いて報告し、被害水仙球莖に着生する病原菌二種を認めて其の一を新種として、*Sporotrichum Narcissi* と命名し、他の一を*Sporotrichum radicicolum* ZIMMERMANN に該當するものとなしたり。

然るに、兩菌に就きて更に研究を繼續する間に第一菌は、之を馴滿培養中に發育せしめて胞子を形成せしむる場合に、擔子梗先端に分生胞子を頭狀に群生する事を見出し、其の他の性質をも更に詳細に觀察考量したる結果、之を *Trichoderma* に歸屬せしむる事の至當なるを認め、爰に本菌の學名を改めて、*Trichoderma Narcissi* TOCHINAI et SHIMADA とせり。

第二菌は、古き培養基上に於て、屢々擔子梗の先端菌絲狀に伸長し、又擔子梗の小枝或は小柄が輪生する事あり。依りて本菌は *Pachybasium* に屬する未記載の一新種なる事を認め、*Pachybasium bulbicolum* TOCHINAI と命名せり。

本研究の遂行に當りて、有益なる助言を與へられ、貴重なる近緣菌類の生標品を惠附されたる和蘭國ユトレヒト大學教授 WESTERDIJK 女史に深厚なる感謝の意を表す。

A NEW SPECIES OF MILESINA PARASITIC ON POLYPODIUM VULGARE L.

By

SENJI KAMEI

(Wtih 3 Text Figures)

Two species of Milesina parasitic on *Polypodium vulgare* L. have been recorded up to the present. They are *Milesina Dieteliana* MAGNUS in Europe and *M. polypodophila* (Bell) FAULL in North America. The former species was first described in 1903 by SYDOW (8) as a species of Melampsorella and later transferred to the present genus by MAGNUS (6). The uredospores of this fungus are more or less oblong in shape and the wall is sparsely but strongly echinulated as in the case of the typical species of this genus, *Milesina Kriegeriana* MAGNUS. *Milesina polypodophila* was found in Canada and Pennsylvania, and investigated by several authors under Professor J. H. FAULL. H. P. BELL first collected its uredospores by Lake Timagami, Ontario, Canada and named it *Uredinopsis polypodophila* BELL. Observing that its teleutospores are intradermal, FAULL and WATSON (7, p. 826) transferred it to the genus Milesina and ARTHUR (1) renamed it *Milesia pycnogrande* (BELL) ARTHUR. The uredospores of this fungus are more or less fusiform, acute or acuminate above, with an apex prolonged into a moderately strong beak, showing a feature just reminding one of a typical species of Uredinopsis. However, the wall of the uredospores is quite smooth, free from any definite markings as illustrated by Moss (7, p. 840, Fig. 21 E) and the accompanying figure (Fig. 2 A) in this paper. So it is very natural that this species was classified by BELL as a species of Uredinopsis. Moreover, the same author suggested that his *Peridermium pycnogrande* on two to eight year old needles of *Abies balsamea* (L.) MILL. is probably connected with this species and FAULL and WATSON (3) proved the generic connection through inoculation experiments from fern to Abies and *vice versa*. According to BELL (2) and HUNTER (5) the spermogonia of this

[Transact. Sapporo Nat. Hist. Soc., Vol. XII, Pt. 1, 1931]

species are very large sized, deeply immersed under the epidermis of affected needles. In other species of the same genus, such as *Milesina Kriegeriana* MAGNUS and *Milesina marginalis* FAULL et WATSON, they are formed on the first year needles of the same tree, and are much smaller and subcuticular. Considering these characters of uredospores and spermogonia, *Milesina polypodophila* seems to be a very differentiated species. Fortunately, the present writer had a

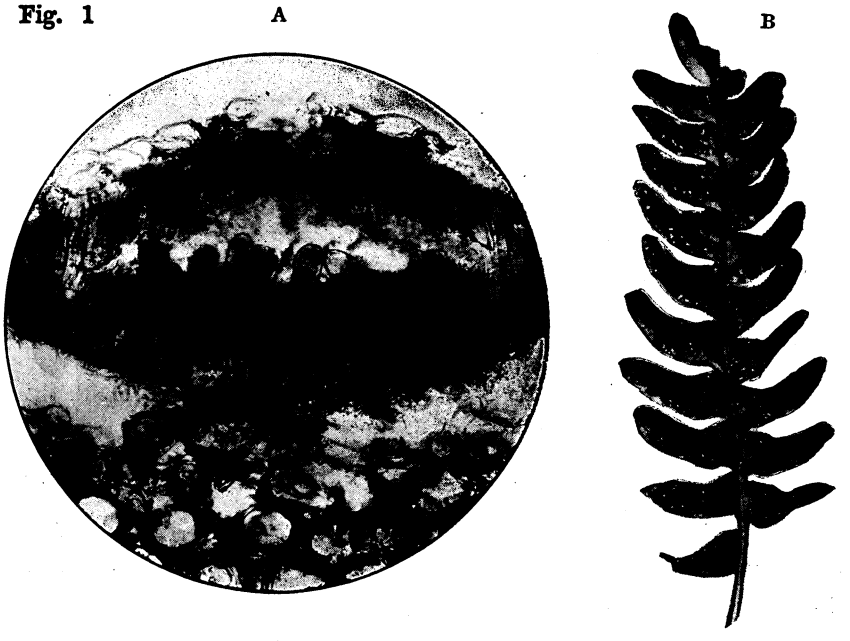


Fig. 1. Uredostage of *Milesina jezoensis*. Collected by the writer at Shikaribetsu on Sept. 30, 1929.
A. Median section of a uredosorus. × 200. B. Uredospores issuing from the sori. ca. × 1.

good opportunity to examine the specimens of *Milesina Dieteliana* in SYDOW's Exsiccati Uredineen No. 2597 preserved in our Herbarium and those of *Milesina polypodophila* which were kindly sent to me from Professors ARTHUR and FAULL.

In Hokkaido, *Polypodium vulgare* L. *(Yezo-denda)* is a common fern. In the summer of 1926, NAOHIDE HIRATSUKA collected the rusted specimens of this fern at Mt. Kurodake in the Taisetsu mountain range. The writer himself obtained rich specimens of the same fungus at the side of Lake Shikaribetsu, Prov. Tokachi in 1929 and studied on its morphological and biological characters in

detail. The diseased fern is noticed easily in the field by brownish to almost blackish discoloration of the fronds, and by the presence of uredopustules on the undersurface from which the spores issue in a white, slender filamentous mass (Fig. 1 B). The present fungus is quite different from the two species

Fig. 2

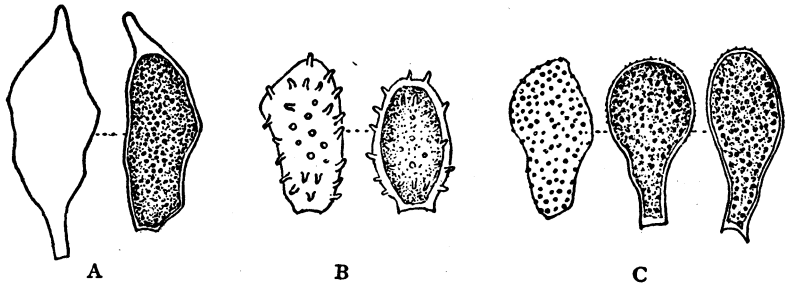


Fig. 2. Uredospores of three species of Milesina on Polypodium vulgare L. Left side: in dry state. Right side: in water. × 480.

A. *Milesina polypodophila* (BELL) FAULL. Collected by J. H. FAULL at Lake Timagami, Ontario, Canada on July 27, 1924. B. *Milesina Dieteliana* (SYDOW) MAGNUS. SYDOW's Exsiccati Uredineen, No. 2597.

C. *Milesina jezoensis* KAMEI et HIRATSUKA. Collected by the writer at Shikaribetsu, on June 11, 1931.

mentioned above which were described on the same host-plant from foreign countries especially in the characters of uredostage. From *Milesina Dieteliana* our fungus clearly differs in the presence of denser, minute markings on the wall of the uredospores and from *M. polypodophila* it is distinguished at once by more or less broadly clavate, never beaked and minutely verrucose uredospores (Fig. 2). The detailed comparison of every character of these three fungi is shown in Table 1. Recognizing that the present fungus is new to science, the writer proposes the name *Milesina jezoensis* KAMEI et HIRATSUKA.

Table 1. *Comparison of three species of Milesina on Polypodium vulgare L.*

	Mil. polypod.	*Mil. Dietelian.* *	*Mil. jezoensis*
Size of uredosori (mm)	0.1–0.4	0.1–0.15	0.2–0.4
Color of uredosori	pale yellow	yellowish brown to nearly black	pale yellow to brownish yellow

	Mil. polypod.	*Mil. Dietelian.**	*Mil. jezoensis*
Pseudo-peridia	delicate, irregularly dehiscent	———	firmer, dehiscent by central pore
Size of uredospores (μ)	15–23 × 45–55	15–25 × 24–42	17–24 × 37–48
Thickness of wall of uredospores (μ)	1	2.0–2.5	1.0–1.5
Shape of uredospores	fusiform-obovoid or fusiform, acute or acuminate above, narrowed below	ovate to oblong, rarely subglobose, very irregular in form	broadly clavate, obovate to oblong-ovate, sometimes angular
Markings of uredospores	smooth	sparsely and strongly echinulate	densely and minutely verrucose
Number of cells in a teleutospore	2–8	2–4	2–7
Shape of teleutospore	irregularly obovoid or oblong	———	subglobose to oblong
Size of teleutospore (μ)	16–26 × 24–45	12–20 × 12–25	23–30 × 26–44.5
Locality	Canada and Pennsylvania (10)	France, Germany, Austria, England, Denmark, and Norway	Hokkaido, Japan

* Characters of this species were taken from the diagnosis given by SYDOW (9). Under this specific name, however, GROVE (4) has given smaller measurements of uredospores (15–16 × 22–30 μ) basing on English specimens (uredospores on *Polypodium vulgare* var *serratum* and *Polypodium vulgare*) and described the spores as "colourless, oblong or obovate, strongly echinulated above, smooth below, wall moderately thick (1.5–2 μ)". But these uredospores described by GROVE seem to be different from SYDOW's diagnosis and also from those in their Exsiccati Uredineen No. 2597.

To pursue the life history of this fern-rust, the writer collected abundant materials of overwintered, affected fronds at Shikaribetsu during the two preceding seasons of 1930 and 1931 and some of the materials were put into a moist chamber which was placed under diffused light. After a comparatively long period (two to three weeks), germination of the teleutospores was detected on the affected, slightly brownish discolored areas of undersurface of the frond. Sections of diseased tissue in such condition have shown that the epidermal layer is easily separable from the mesophyll and hyaline hyphal cushion is seen just under the cells in which matured teleutospores are contained (Fig. 3 D). One or more teleutospores are grown in an epidermal cell. They are found either separated or closely compacted in the cells. They are usually

divided into two to several cells by vertical septations and from each cell one basidium is issued through a minute hole bored in the outer wall of the epidermis (Fig. 3 B and C), and sporidia produced are normally. With the sporidia thus obtained inoculation experiments were at once carried out, by the usual method, on the young needles of seedlings of *Abies Mayriana* which were transplanted in pots from the college nursery. In both of the seasons, only the spermogonial stage was produced in four pots out of nine after about 20 days from the inoculation. The aecidiospores did not develop throughout the experiments and the infected needles mostly dropped off before the winter. The spermogonia thus produced are mostly hypophyllous, few in number, more or less globose and always subcuticular, measuring about 150 μ in breath and about 120 μ in height.

Fig. 3

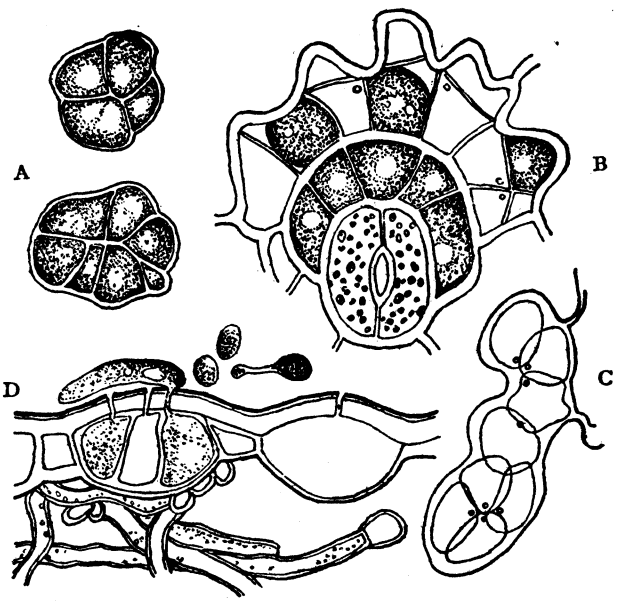


Fig. 3. Teleutospores of *Milesina jezoensis*.

Collected by the writer at Shikaribetsu, June 11, 1931. × 480.

A. Surface view of two teleutospores.
B. Surface view of teleutospores in the host-epidermis.
C. Surface view of teleutospores after germination.
D. Side view of germinating teleutospores and three sporidia.

These characters are quite different from those of *Milesina polypodophila*, but seems to be the same type with those of *Milesina Kriegeriana* and *Milesina marginalis* on *Abies balsamea* which were mentioned by HUNTER (5). The distinction of our present fungus from the American rust on the same species of fern could also be endorsed from the spermogonial characters. Further

research to determine whether the aecidial stage issues on the first year needles or on older needles remains for the future experiments.

The diagnosis of the new species is given as follows:—

Milesina jezoensis KAMEI et HIRATSUKA, n. sp.

0. Spermogonia hypophyllous, scattered on yellowish discolored areas, subcuticular, more or less globose, 110–165 μ in breath, 110–130 μ in height; spermatiophores obclavate, septate; spermatia oblong, 6.5–9.0 μ long, 2.0–3.0 μ broad.

I. Unknown.

II. Uredosori hypophyllous, subepidermal, in yellowish to brownish discolored areas, bullate, small, 0.2–0.4 mm. across, pale yellow to brownish yellow (Fig. 1 A & B). Pseudoperidia firm, cells isodiametric to irregularly polygonal, thin-walled, 7.5–15.0 × 10.0–25.0 μ, dehiscent by central pore formed under stomatal slit (Fig. 1 A). Uredospores broadly clavate, obovate to oblong-ovate, sometimes angular, often short stalked, 17.0–24.0 × 37.0–48.0 μ, wall colorless, thin, 1.0–1.5 μ, densely verruculose; contents colorless (Fig. 2 C); bladdery cells mixed in the sori.

III. Teleutospores mostly hypophyllous, in pale yellowish, discolored spots. Teleutospores in the epidermal cells, formed singly or 2 to several in compact mass, 2 to many celled with radial vertical septa, 23.0–30.0 × 26.0–44.5 μ, each spore subglobose to oblong, wall thin colorless, smooth; contents colorless (Fig. 3 A, B & C). Germinating after hybernation in the next spring. Basidia cylindrical to clavate, four celled, ca. 45 μ long, ca. 10 μ wide; sporidia subglobose, ca. 11 μ long, ca. 7 μ wide (Fig. 3 D).

II & III on *Polypodium vulgare* L. *(Yezo-denda).* At the side of Lake Shikaribetsu, Prov. Tokachi, Sept. 30, 1929 (II); June 6, 1930; June 11, 1931 (II and III) SENJI KAMEI.

At Mt. Kurodake, Taisetsu Mountain range, Prov. Ishikari, July 26, 1926 (II) NAOHIDE HIRATSUKA.

In conclusion the writer wishes to express his heartiest thanks to Prof. Emer. KINGO MIYABE and Prof. SEIYA ITO under whose direction this work was done

and to Prof. FAULL in Harvard University and Prof. Emer. ARTHUR in Purdue University who have kindly sent the valuable specimens. He also appreciates the constant encouragement of Prof. NIIJIMA.

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摘　　要

エゾデンダに寄生するミレシナ屬の一新種に就て

鷲　井　專　次

著者は數年來北海道に自生するトドマツ類と其下草として生ずる羊齒植物との間に異株寄生をなす銹菌並に之が生活史に興味を有し連年繼續研究し來れり、玆に發表せんとする事項は其結果の一部にしてエゾデンダに寄生するミレシナ屬一新種と其生活徑路に關するものなり。エゾデンダは吾國のみならず歐洲諸國並に北米等にも分布する羊齒植物にして本道にありては屢々針葉樹林下又は岩壁上等にも生ず、而して今日此エゾデンダに寄生するミレシナ屬の銹菌に二種あり、甲は *Milesina Dieteliana* MAGN. にして歐洲諸國に發見され乙は *Milesina polypodophila* (BELL) FAULL にして北米カナダ地方及合衆國に發見さる。

元來ミレシナ屬はウレジノプシス屬と共に其生活史の各時代の胞子無色にして其夏胞子の性質（形、大さ及印刻等）と雄精器の性質（位置、大さ、形及發生針葉年數等）は其種類分別の重要準據なりとす、前記二種の中甲種は夏胞子の性質はミレシナ屬代表種に近似する程に本屬の特徴を有するに拘らず後種にありては之が發見並に種々なる研究を果したる北米 FAULL 氏及其門下生一同の結果よりすれば其冬胞子の位置により本屬に隷入され居るも其夏胞子は一見ウレジノプシス種の如く加ふるに其ペリダーミユム時代は北米産 *Abies balsamea* の二年乃至八年の古き針葉に發生し其雄精器の性質はミレシナ屬代表種の夫れに比して著しく大形なるのみならず其發生位置、被害針葉年數に於ても異ることを闡明され結局本種はミレシナ屬としては甚だ偏倚せる性質を有することを認められ居れり。著者は往年平塚直秀氏より同氏採集（一九二六年七月大雪山黒岳上）のエゾデンダ寄生銹菌標本の一部を寄與せられたる際上記二種との分類學的並に生活史的比較研究の必要を思ひたる儘過ぎたりしが偶ま一昨年九月末伊藤教授指導に係る學生修學旅行に參加して十勝然別湖畔に至れるとき同地針葉樹林下に計らずも本菌の多數發生することを知り歸來其形態を精査すると共に越年被害羊齒を採集して其冬胞子を發芽せしめ之をアヲトドマツに接種試驗を試みたり。幸に外國產前記二種の標本に接するを得之と比較するに北海道菌は第一表及第二圖に示せる如く種々の點にて兩菌と異ると共に他に之と一致する種類無きが故に之を新種と認め *Milesina jezoensis* KAMEI et HIRATSUKA と命名し記載文を揭げたり。又接種試驗にありては昨年、本年の二回供試根苗九本中四本は其接種針葉に雄精器を生ぜるも孰れも銹子腔を得ざりしも其雄精器の形態は北米菌の夫とは全く相異ることを認めたり。此等の事項は銹子腔に關するものと共に再三反覆研究を要す。尙ほ *Milesina polypodophila* 菌に關しては菌糸を以て越年し Abies 屬植物なくとも同株的に生存し得ることを擧げたる人あり、吾北海道に於ても或場合（例へば大雪山黒岳上の如き）にありては之と同樣に生存するものならむ、第一圖はミレシナ屬新種夏胞子堆斷面 (A) と夏胞子發生の狀(B)、第二圖はエゾデンダ上ミレシナ屬三種の夏胞子比較〔北米菌 (A)、歐洲菌 (B)、北海道菌(C)〕、第三圖はミレシナ屬新種の冬胞子 (A)、其形成 (B)、及其發芽 (C. D) の狀を示す。

ON THE INTRACELLULAR BODIES ASSOCIATED WITH THE DWARF DISEASE OF RICE PLANT

By

TEIKICHI FUKUSHI

(With 5 Text Figures)

Since KUNKEL (8) demonstrated in 1921 the intracellular bodies associated with the corn mosaic and suggested that these bodies represent living organisms, the possible causative agents for the mosaic disease, a considerable number of publications have accumulated, dealing with the cytological aspects of the virus disease of plants. Consequently the occurrence of similar cell inclusions has been shown in mosaic diseases of tobacco (2, 3, 7, 11, 18, 21), tomato (5), pepper (5), potato (5, 25), *Petunia* (5, 23), *Datura* (23), and some other Solanaceous plants (5, 24); likewise in sugar cane mosaic (1, 11), wheat mosaic (14), Chinese cabbage mosaic (11), *Hippeastrum* mosaic (6, 11, 15), *Phytolacca* mosaic (23), *Dahlia* mosaic and dwarf (4), infectious chlorosis (in BAUR's sense) of *Euonymus japonicus* (23), Fiji-disease of sugar cane (10, 12, 13), and in spike disease of sandal (17).*

As to the nature of these intracellular bodies, there exists a remarkable difference in opinon but the general belief among plant pathologists seems to be in favor of the view that these bodies are the reaction products of the host cells rather than the causal agencies of the disease. Whatever their exact nature may be, it is evident that they are of diagnostic significance, because similar bodies have never been found up to the present time in assosiation with any plant diseases other than viroses.

In the course of studies on the dwarf disease of rice plant, the writer succeeded in revealing the presence of intracellular bodies in the cells of the diseased leaves. This will be the first record of the occurrence of intracellular bodies in association with the streak type of virus diseases of plants including

* In all probability neither SCHAFFNIT-WEBER's elytrosoma associated with the mosaic diseases of beet and broad bean (22), nor PLACKIDAS' bodies in the strawberry yellows and dwarf (19, 20), falls in the same category with the intracellular bodies above mentioned.

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the streak disease of corn and sugar cane (27, 28), the corn stripe disease in Cuba (26), the dwarf disease of rice plant, and others.

Description of the disease

No attempt will be made herein to describe in detail the dwarf disease of rice plant, as a more detailed account will be given in another publication presenting the results of the transmission experiments and discussions on the etiology of the disease.

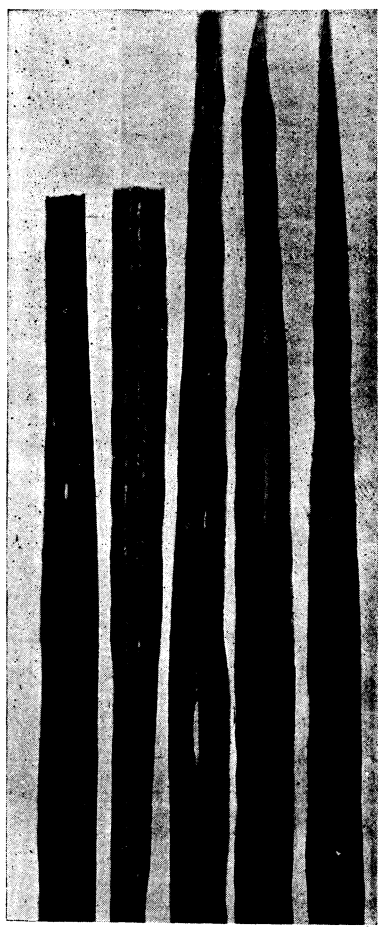

Fig. 1.
Diseased leaves, showing the typical streaks along the veins.

The dwarf disease of rice plant is characterized by small elongated chlorotic areas, or white specks when viewed by transmitted light, arranged along the veins of leaves, and by stunting of the whole plant followed by excessive tillering and a dark green coloration. The white specks which develop before the leaves unfold, elongate and spread out along the leaf parallel to the midrib, forming fine interrupted streaks. These range from mere dots to several millimeters in length and from 0.2 to 1 mm. in width. The plants infected in their very early stage of growth, become severely stunted and produce none or only a few small worthless panicles.

The disease is transmitted by the leafhopper, *Nephotettix apicalis* MOTSCH. var. *cincticeps* UHL. but not through the seed or the soil. All attempts to transmit the disease by mechanical inoculations with unfiltered juice of the diseased plants or by means of leaf mutilation have failed.

The intracellular bodies

Certain intracellular bodies were revealed both in fresh and embedded

material of leaves of the rice plant affected with the dwarf disease. For fixation of the material several fixatives were used including medium chromo-acetic solution, Flemming's fluid, Merkel's fluid, Allen's modification of Bouin's fluid, Gilson's fluid, Zenker's fluid, acetic alcohl, formol-acetic alcohl and Schaudinn's fluid. Chromo-acetic solution and formol-acetic alcohol were considered most suitable for general purposes. The fixed material was embdded in paraffin and sectioned by means of a microtome in the usual way. Transverse and longitudinal sections were cut 5 microns thick and stained with Heidenhain's iron-alum haematoxylin or safranin and Gentian violet. From the protozoological viewpoint, some of the material was fixed in Schaudinn's fluid and stained with Giemsa's stains.

Microscopic studies of free hand sections of the diseased leaf show chlorotic modifications in the mesophyll cells adjacent to certain of the vascular bundles. In sections mounted in water, the chlorotic tissues are lighter in color or nearly colorless, the chloroplasts in these cells being light colored and smaller in size and number, due to their disintegration. In the cell where most of the chloroplasts have been disintegrated, a certain foreign body is found in close proximity to the nucleus. Such foreign bodies are usually round in shape, more or less larger than the host nucleus and contain many vacuoles of various sizes. These bodies stain yellow in dilute iodine potassium iodide solution, brick red in aceto-carmin, Grenadine pink (after RIDGWAY) in the alcoholic solution of Sudan III, and pinkish cinnamon in Millon's reagent.

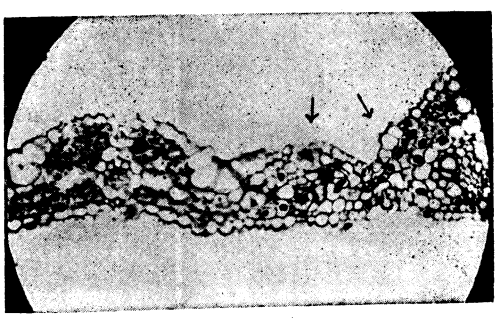

Fig. 2.
A portion of a cross section of diseased leaf showing the chlorotic tissue. (Fixed in chromo-acetic solution and stained with safranin.)

However, more comprehensive studies of the intracellular bodies can be done in the microtomed sections properly stained. In the preparations stained with Heidenhain's haematoxylin, the chlorotic areas are easily recognized since the chloroplasts in these tissue show less affinity for the stain, and they are, according to the degree of chlorosis, smaller and less regular in shape and

fewer in number than those in the apparently healthy tissues of the same leaf. Haematoxylin brings out the intracellular bodies very sharply, since they take

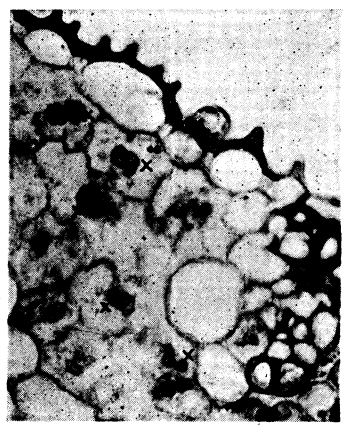

Fig. 3.

Fig. 4.

Intracellular bodies marked × in the mesophyll cells of a diseased leaf. (Fixed in chromo-acetic solution and stained with safranin and Gentian violet.)

the stain as intensely as the host nuclei. When preparations are stained with safranin and Gentian violet, the bodies show a special affinity for safranin while Gentian violet stains the host nuclei violet in color. The foreign bodies under consideration occur singly in the host cells but occasionally two of them are found in the same cell. They are more abundant in the mesophyll cells but it is not unusual to find them in the epidermal cells. The bodies are located near or in close contact with the host nucleus which sometimes becomes more or less enlarged. They vary considerably in shape and size. Round to oval are the most usual forms, but it is not uncommon to find bodies rather irregular in shape. In size they range from 3 to 10 microns in length and 2.5 to 8.5 microns in width, frequently much larger than the

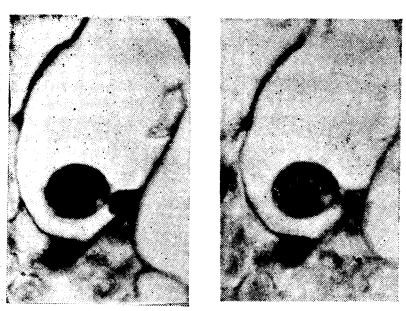

Fig. 5.

An intracellular body in the motor cell photographed at different optical levels to show the host cell-nucleus and the vacuoles in the body. (Fixed in formol acetic alcohol and stained with safranin and Gentian violet.)

host nuclei which are 2.5 to 3.5 microns in diameter. The bodies must be much smaller in their earliest stage of development but in such a case it is rather difficult to distinguish them exactly from the cellular elements of the host cells. The contents of the bodies appear to consist of a somewhat homogeneous structure, surrounded by an indistinct membrane, and contain many vacuoles of various sizes. All attempts to demonstrate a nucleus or chromatin granules in these bodies were unsuccessful. Although these bodies occur invariably in the chlorotic areas of the leaf, as yet they have not been found in the intact tissue of the diseased leaf or in plants free from the disease. The bodies in question are not artifacts, since they can be found in the cells of material studied in the living condition, as well as in material fixed by various method and stained with various stains. It is also evident that these intracellular bodies are neither deformed or degenerating nuclei, nor hypertrophied chloroplasts of the host cells, although their exact nature remains still unknown. Beyond doubt they are similar to the intracellular bodies which have been found in association with certain virus diseases of plants and animals.

Summary

Certain intracellular bodies are invariably present in the chlorotic tissue of the leaf of the rice plant affected with the dwarf disease. These bodies occur near or in close contact with the host cell nucleus. They are usually round to oval but occasionally irregular in shape and much larger than the host nucleus. They are of rather homogeneous structure containing many vacuoles of various sizes and resemble the intracellular bodies in association with certain virus diseases of plants and animals.

The writer gratefully acknowledges his indebtness to Prof. MIYABE, Prof. S. ITO and Prof. TOCHINAI for their valuable suggestions.

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摘　　要

萎縮稻組織內に發見せらるゝ細胞包含体に就て

福　士　貞　吉

萎縮病に冒されたる稻は新葉の表面に、葉脈に沿ひて黃白色の微細なる斑点を生ず、此斑点は葉の未だ展開せず葉鞘中に包まるる時より存在し、反射光線にて見る時は黃綠—黃色を呈するも、病葉を日光にかざして見る時は黃白色—白色の斑點となりて現はる。斑點の大さ0.2-0.5×0.3-3mm. 單獨に散在するものあるも多くは斷續して條線をなす。かゝる葉の切片を檢鏡するに病斑に相應する部分は維管束に隣接する組織にして色彩淡きか無色なるを以て容易に識別し得。且つ病斑部の細胞內には徑5ミクロン前後の球形の小体存在するを認め得らる。此小体は薄き沃度沃度加里液にては黃色に、醋酸カーミンに依りて煉瓦色に、Sudan III に依りて淡紅色に、ミロン氏指藥に依りて肉桂色に着色す。固定せられたる病葉のミクロトーム切片を檢するに、病細胞に於ては被害の程度に準じ、葉綠体崩壞して少數となり形も小さく、色素に染み難し。かかる細胞內には核に相接して一個稀に二個の小体存在す。その形多くは球形なるも時には不規則なる形をさることあり。大さ3-10×2.5-8 ミクロンにして細胞核より遙かに大なるもの多し。核と同じくヘトマキシリンによく染む。されどサフラニン及ゲンチアン紫にて染色すれば核はゲンチアン紫に染まるに反し小体はサフラニンにて赤く着色す、又細胞核內には仁及びクロマチン粒を認むるも小体內にはかくの如き物体存在せず單に多くの空胞を認め得るのみ。此小体は病斑の細胞內にのみ存在し他の組織及び健葉の組織中には發見せられず。その形狀性質より見るに諸種の動植物のウイルス病に冒されたる組織內に見出さるゝ intracellular bodies に著しく類似せり。

ZEHN NEUE CERAMBYCIDEN-ARTEN UND EINE NEUE GATTUNG AUS JAPAN

VON

MASAKI MATSUSHITA

(Mit 4 Textfiguren)

Die hier beschriebenen Arten sind meistens in meiner Sammlung, und teilweise in Sauter's Formosa-Sammlung, die dem zoologischen Museum zu Berlin gehört. Von den 10 Arten gehören die ersten 4 zur Subfamilie Cerambycinae und die übrigen zur Subfamilie Lamiinae.

Herrn Prof. KUNZEN am Zoologischen Museum zu Berlin, der mich in liebenswürdiger Weise bei der Arbeit unterstützte, indem er mir viel wertvolles Material zur Verfügnng stellte, spreche ich meinen herzlichsten Denk aus.

1. *Leptura (Vadonia) akitensis* n. sp.

Körper tiefschwarz, matt, mit schwarzen Härchen spärlich besetzt. Kopf auf dem Scheitel mehr oder weniger runzlig punktiert, auf der Stirn fein und dicht punktiert. Fühler beim Männchen fast so lang wie der Körper. Halsschild glockenförmig, auf der Oberseite gewölbt, grob und dicht punktiert. Schildchen trapezförmig. Flügeldecken mässig gewölbt, an der Seite fast parallel, ziemlich grob und dicht punktiert, Spitzen gerade abgestutzt mit abgerundeten Winkeln. Brust fein, stark und dicht punktiert.

Bauch schimmernd, sehr fein punktiert und fein behaart.

Länge: 13 mm.

Fundort: Honshu; Akita, VII. 1928, 1 ♂ (MATSUSHITA) in meiner Sammlug.

2. *Strangalia auratopilosa* n. sp.

Körper rotbraun, mit seidenartigen, gelben Härchen dicht besetzt. Flügeldecken mit 4 nach aussen erweiterten schwarzen Querbinden, 3. und 4. Binde am Seitenrande miteinander verbunden, die 4. hinten vom rötlich gefärbten

Spitzenteil nicht gut abgegrenzt, Schulter und Naht schmal schwarz gefärbt; Spitze der Decken schwach ausgerandet, und in ein kleines Dörnchen ausgezogen. Kopf dünn behaart, Stirn hat unten ein schwarzes dreieckiges Fleckchen. Halsschild an den Seiten mässig abgerundet, am Vorderrand stark verschmälert, an der Basis mit einer deutlichen Querfurche, Sheibe stark gewölbt. Schildchen lang, dreieckig, decht goldgelb behaart. Fühler sowie Beine rotbraun, dünn bräunlich behaart.

Länge: 20 mm.

Fundort: Formosa; Taihanroku, 1 ♀ (HIRAYAMA) in meiner Sammlung.

In gestalt und Flügeldeckenzeichnung *St. ochraceofasciata* MOTSCH. sehr ähnlich, unterscheidet sich aber von jener durch die stark glänzende Behaarung und schmälern schwarzen Binden der Flügeldecken.

3. *Xylotrechus ogasawarensis* n. sp.

Körper schwarz, Flügeldeckenflecken rötlichgelb, Beine rot, Fühler und Augen dunkelrot. Kopf mit Ausnahme der glänzenden Kiel sehr fein und dicht runzlig punktiert, matt, graugelb behaart. Scheitel hat einen Längskiel, der sich nach vorn in zwei kleine Kiele trennt; Stirn mit 4 Längskielen, zwei sind an den Seiten und biegen sich nach innen, die anderen sind in der Mitte und vereinigen sich unten, so dass sie einen dicken Mittelkiel auf dem Unterteil des Gesichts bilden. Halsschild so lang wie breit, an den Seiten abgerundet, hinter der Mitte am breitesten, dicht runzlig punktiert, seitlich am Vorderrand rot gefleckt. Schildchen halbkreisförmig, schwarz und glänzend. Flügeldecken schwarz und glänzend mit zwei rotgelben Flecken; ein grosser ▼-formigen Flecken ist in der Basalhälfte, dahinter liegt eine Querbinde, die an der Naht erweitert und mit dem letzteren verbunden ist; Spitze der Decken breit abgestutzt, Aussenwinkel in ein kurzes Dörnchen ausgezogen. Beine glänzend, rot, aber Schienen und Tarsen dunkel gefärbt.

Länge: 12 mm.

Fundort: Ogasawara-Insel, 1 ♂ (HIRAYAMA) in meiner Sammlung.

Durch die Färbung und Flügeldeckenzeichdung weicht diese Art von anderen verwandten Arten leicht ab.

4. *Chlorophorus mushanus* n. sp. (Fig. 1)

Oberseite des Körpers lehmfarbig dicht behaart mit schwarzen Makeln, Unterseite gelblichgrau behaart. Halsschild fast kuglig, so breit wie Flügeldecken, zwei ovale Makel stehen dicht hinter der Mitte, zwei Punkte sind seitlich in der Mitte. Flügeldecken mit je 5 Flecken, von denen 3 in der Basalhälfte gelegen sind (ein kleiner auf der Stulter, daneben ein dreieckiger, ein Punkt zwischen obigen Makeln und der Mitte der Decken), ein halbmondförmiger Fleck liegt in der Mitte, vom Seitenrand weit entfernt, ein rundlicher Makel zwischen Mitte und Spitze. Spitze der decken gerade abgeschnitten, beide Winkel mit je einem Zänchen.

Fig. 1. × $\frac{3}{2}$

Länge: 17 mm.

Fundort: Formosa; Musha, VII. 1925, 1 ♀ in meiner Sammlung.

5. *Mesosa latifasciata* n. sp.

Schwarz, mit gelbbraunen Härchen, welche zahlreiche Flecken von sehr verschiedener Grösse und Form bilden, sowie whisslichen Zeichnungen. Kopf hat auf dem Scheitel zwei schwarze Längslinien. Fühler schwarzbraun, das I. Glied gelblich gefleckt, die anderen mit je einem grauen Ring an der Basis. Halsschild breiter als lang, grob und spärlich punktiert. Flügeldecken verhältnismässig lang wie bei *Mesosa longipennis* BATES, an der Seite beinahe parallel, mit Häufung der weisslichen und gelbbraunen Zeichnungen in der Mitte, welche eine breite Binde bilden, neben dieser Binde eine andere schwarze gezackte Binde. Deckenspitzen gut abgerundet. Punktierung an der Basis dicht und sehr grob, an der Spitze feiner und spärlicher. Schienen in der Mitte breit, fahlgelblich gerirgelt.

Länge: 18 mm.

Fundort: Formosa, Hôzan, IV. 1910, 2 ♂ (Sauter) in Berliner Museum, Hori, 15. VII. 1926, ♀ (Kinoshita) in meiner Sammlung.

In der Gestalt ist diese Art *Mesosa longipennis* BATES sehr ähnlich, doch ist die Flügeldeckenzeichnung eine ganz verschiedene.

6. *Tmesisternus stolatus* n. sp. (Fig. 2)

Körper fast spindelförmig; ganzer Körper incl. Fühler und Beine schwarzbraun, glänzend, dünn grau behaart. Auf der Oberseite sind seitlich vom Kopf bis zur Deckenspitze zwei dicht weiss behaarte Längsbinden, die hinter der Mitte der Flügeldecken in zwei kleine Äste nach innen abweichen. Kopf hinter der Augen verengt, grob und spärlich punktiert, auf dem Scheitel hat er eine breite Längsfurche. Prothorax beinahe trapezförmig, sein Verderrand schwach nach hinten gebogen. Pronotum grob und spärlich punktiert, hat eine glatte Längslinie in der Mitte. Fühler überragen mit dem 7. Glied die Deckenspitze, das 3. Glied ist am längsten, doppelt so lang wie das erste, die Glieder 4 bis 11 nehmen in der Länge nach und nach ab. Flügeldecken an der Naht eingedrückt, an der Basis sehr grob, nach hinten feiner punktiert, an der Spitze breit und schief abgestutzt. Schienen und Tarsen mit gelben borstenartigen Haaren besetzt.

Fig. 2.

Länge: 18 mm.

Fundort: Formosa; Kotosho, 14. IV. 1920, (Hirayama) 1 ♂ in meiner Sammlung.

7. *Asaperada meridiana* n. sp.

In Färbung und Zeichnung ist diese Art *A. agapanthina* BATES sehr ähnlich, weicht aber durch dickeren Körperbau, gröbere Punktierung, und durch einen deutlichen Eindruck auf dem Scheitel ab. Körper schwarzbraun, mit grauen und dunkelbraunen Härchen. Kopf etwas grob und dicht punktiert, bräunlichgelb und teilweise grünlich behaart, Scheitel hat einen tiefen kegelförmigen Eindruck zwischen den Oberlappen der Augen. Fühler dunkelrotbraun, Glieder 3 bis 11 an der Basis gräulich beharrt. Halsschild bräunlichgelb und gräulich behaart, grob und dicht punktiert; Seitendornen kräftiger—viel kräftiger als bei *A. agapanthina*. Flügeldecken grünlichgrau mit zahlreichen braunen

Fleckchen, die Häufung der Fleckchen bildet eine undeutliche Querbinde hinter der Mitte. Unterseite gräulich dicht behaart. Beine rotbraun, Spitze der Schenkel und die Mitte der Schienen weisslich geringelt.

Länge: 8–10 mm.

Fundort: Formosa; Taihorin, Hôzan. IV. 1910, ♂, ♀ (Sauter) in Berliner Meseum, Hori, 28. IV. 1927, 1 ♀ (Kikuchi) in meiner Sammlung.

Neopothyne n. gen.

Diese Gattung steht der Gattung *Pothyne* sehr nahe, aber die Fühler sind zwölf gliedrig; das 1. Glied, welches kürzer als das 3. ist, reicht kaum bis zur Mitte des Halsschildes, das 4. und einige folgende Glieder an jeder Basis weiss geringelt; der Hinterschenkel reicht ein wenig über den Hinterrand des 1. Bauchsegments hinaus.

8. ***Neopothyne variegata*** n. sp. (Fig. 3)

Körper schwarz, Flügeldecken kastanienbraun, Fühler und Beine bräunlich schwarz. Oberseite mit gelbbraunen und grauen Härchen besetzt, welche Linien und zahlreiche Flecken bilden. Kopf hat zwei glatte Schwielen auf dem Scheitel, Stirn gelbbräunlich und gräulich gemischt behaart und Schwarz punktiert. Augen gelblich eingefasst. Fühler bein Weibchen die Deckenspitze mit dem 6. Glied überragend, das 3. Glied etwas länger als das 1., dann werden die Glieder bis zum 12. Glied nach und nach kürzer, die Glieder 1 bis 6 unten bewimpert, das 4. bis 10. Glied an der Basis weiss geringelt. Halsschild dünn grau behaart, mit sieben dicht gelbbräunlich behaarten Längslinien; Scheibe schwach quer gerunzelt, spärlich schwarz punktiert, hat in der Mitte eine glatte Schwiele. Schildchen gelbbräunlich und dicht behaart. Die gräulich und gelbbräunlich gefleckten Flügeldecken mit je 4 kurzen gelbbräunlichen Längslinien an jedem Basalteil; Nahtsäume und Aussenränder gleichfalls gelbbräunlich behaart, Spitzen gerade abgeschnitten. Unterseite des Körpers und die Beine grau behaart; Episternen,

Fig. 3.

Epimeren und Bauchseiten rotgelblich dicht behaart. Hinterschenkel ein wenig das 1. Hinterleibsegment überragend.

Länge: 19 mm.

Fundort: Formosa; Taihoku, 3. IV. 1927, 1 ♀ (Hirayama) in meimer Sammlung.

9. *Exocentrus testudineus* n. sp.

Schwarz, Fühler, Flügeldecken und Beine kastanienbraun. Kopf und Prothorax sehr fein punktiert, graugelb fein behaart, mit schwarzen Haaren spärlich besetzt. Vorder-und Hinterrand des Halsschildes rötlich gefärbt. Schildchen grau und dicht behaart. Flügeldecken verhältnismässig lang, 2½ mal so lang wie an der Basis breit, mit weiss beharrten Quer- und Längsbinden, welche die rautenförmigen Dorsalzeichnungen bilden; schwarz, abstehend, lang behaart, fein und mässig dicht punktiert Unterseite graugelblich, fein und dicht behaart.

Länge: 6–7 mm.

Fundort: Hokkaido; Daisetsu-Gebirge 10, VIII. 1927, 1 ♂, 1 ♀ (Matsushita) in meimer Sammlung.

10. *Oberea horiensis* n. sp. (Fig. 4)

Körper sehr schlank, linear. Kopf Prothorax und Vorderschenkel orangegelb, Füler, Flügeldecken, Mittel- und Hinterbeine kastanienbraun, Abdomen, Meso- und Metasternum schwarz. Füler länger als der Körper, das 3. Glied etwas kürzer als das 4. Kopf ziemlich dicht punktiert. Prothorax deutlich länger als breit, spärlich punktiert. Flügeldecken an der Basis gelbbraun gefärbt, grau und dünn behaart, grob und gereiht punktiert, mit je einigen deutlichen Rippen; an der Spitze schief abgestutzt, beide Winkel mit je einem scharfen Zähnchen. Brust und Bauch grau dünn behaart, der letztere an der Basis grob, nach hinten feiner punktiert.

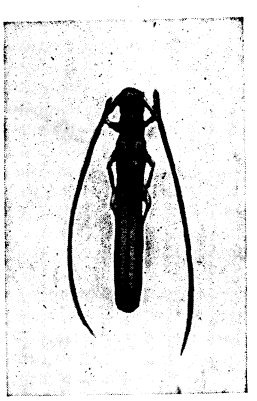

Fig. 4 × 5/3.

Länge: 17 mm. Breite: 2 mm.

Fundort: Formosa; Hori, V. 1926, 1♂ (Kikuchi) in meiner Sammlung.

Erinnert an *O. holoxantha*, doch ist der Körperbau viel schlanker.

摘　　要

本邦産天牛科の十新種と一新属

松　下　眞　幸

本編に記載せるは本邦産天牛科甲蟲の一新屬と十新種にして新種の和名は下記の如し。

Leptura akitensis MATSUSHITA (n. sp.)	ヤマトハナカミキリ。
Strangalia auratopilosa MATSUSHITA (n. sp.)	キンケハナカミキリ。
Xylotorechus ogasawarensis MATSUSHITA (n. sp.)	シマトラカミキリ。
Chlorophorus mushanus MATSUSHITA (n. sp.)	ムシヤトラカミキリ。
Mesosa latifasciata MATSUSHITA (n. sp.)	ヒロオビゴマフカミキリ。
Tmesisternus stolatus MATSUSHITA (n. sp.)	ケサガケカミキリ。
Asaperda meridiana MATSUSHITA (n. sp.)	タイワンクロフカミキリ。
Neopothyne variegata MATSUSHITA (n. sp.)	ゴマダラツツクビカミキリ。
Exocentrus testudineus MATSUSHITA (n. sp.)	キツコウチビカミキリ。
Oberea horiensis MATSUSHITA (n. sp.)	ホソツヽカミキリ。

NOTES ON THE HOKKAIDO BEAR *URSUS ARCTOS YESOENSIS* LYDEKKER LEAVING HIBERNATION AS REPORTED IN ETOROFU ISLAND OF THE KURILE GROUP.

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The Hokkaido bear *Ursus arctos yesoensis* Lydekker is at the present time found very frequently on the southern Kurile islands, Etorofu and Kunashiri. Shikotan to the south of these islands differs in several respects from the main Kuriles and the most striking difference in regard to fauna is the complete absence of the bear. For this reason the Ainu (Kurilsky) who were brought by the Japanese government from Paramushir in 1884 to Shikotan found existence extremely difficult. Cap. H. G. Snow a famous British Sea Otter hunter who visited the island a few years later 1891 was beseeched by the Kurilsky Ainu to be taken back to Paramushir so they could hunt the bear and seek out more profitable existence. Finally the Japanese government organized an excursion for these unfortunate people and gave them a vacation and bear hunt on Paramushir. Since the turn of the century living conditions for the Ainu have continued to become more and more difficult and the number of pure Kurilsky Ainu has decreased until today there are probably few more than eight or ten people left out of greater number that came from Paramushir.[1] The remaining thirty to forty Ainu there are Japanese-Ainu half breeds. These today maintain themselves by fishing during the summer months.

The size and frequency of the brown bear found in Kunashiri and Etorofu

1) Snow says the number of Shikotan Ainu in 1891 was fifty-nine. Landor who visited Shikotan in 1893 gives the number brought from Paramushir as ninety. He further says that only sixty were on Shikotan at that time as thirty had already died (p. 128)

[Transact. Sapporo Nat. Hist. Soc., Vol. XII, Pt. 1, 1931]

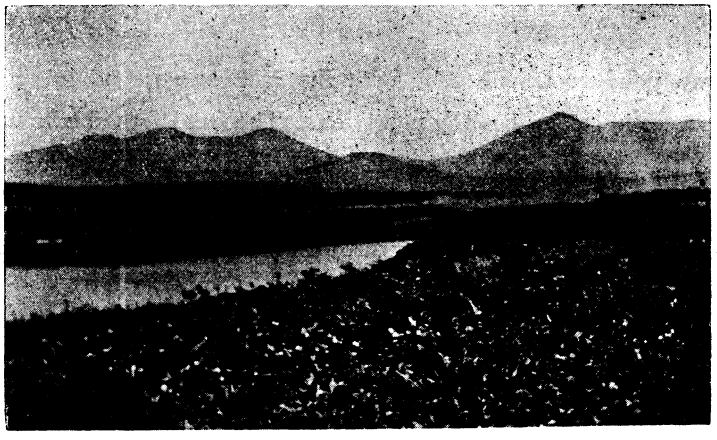
warrents no safety. At dusk or on a foggy day the danger of attack is great. It is quite common for the animal to come across the horse trails or to make wallows in the bamboo grass near the pathways. Near Toshimoe in Etorofu I saw a large area of this sort smashed down as effectively as if a roller had done the work. This was certainly testimonial to the great strength of the brute when one remembers the amount of energy required on the part of a man in clearing an area of the same size. Frequently people are killed or badly injured by the bear in the Kuriles. At Tomari on Kunashiri an Ainu was at the time of my visit to the Kuriles lying in the hospital of that village at the point of death due to wounds inflicted about the face by a savage attack of the bear.

The first snow fall in Etorofu is around the first or second week of October, depending upon the meteorological conditions. Along the east coast it seldom averages over a meter in depth, just sufficient to cover the bamboo grass. In the higher hills and mountains it may reach a much greater depth. Whereas the bear in Hokkaido enters hibernation towards the end of November the same animal finds cover in Etorofu around the first to the middle of October. This is due to the earlier approach of winter in the island.

November is probably the worst month of the year in the Kurile waters, whereas the latter part of the winter season is clear and bracingly cold. The bad reputation the Kuriles have for weather is probably enlarged upon somewhat due to the extermely unpleasant nature of the month of November. In the early days of exploration and colonization a great deal of Otter hunting was carried on during the early months of winter. Consequently bad weather met with at this season was remembered more than the extremely fine winter days of January and Feburary. During these two months there is very little if any snow at all. The snowfall is much lighter than central Hokkaido and the number of clear days greater. The snow begins to melt around the first of April and hunting of the bear is at its best during that season. Hunters use snow shoes or walk in fish skin boots on the firm crusted snow and secure the bear soon after it leaves hibernation.

This year (1931) three bears observed breaking hibernation were found in a den at an elevation of about 700 meters. The location was to the northwest

of Toshimoe on the east coast of Etorofu (Fig. 1.). The den itself was located about one mile from a stream valley at the foot of Mt. MARUYAMA. This vicinity is a favorite place for hunters to go on snow shoes during the latter weeks of March and the earlier part of April to secure the bears as soon as they leave hibernation. This den herewith described was discovered during the first week of April 1931, the exact day was not recorded.



Near Toshimoe on the east coast of Etorofu looking north. Mt. Maruyama (800 meters) in middle foreground.

The location of the den was first sighted at a distance of about three hundred yards. It was simply a hole in the snow with a diameter of about eighteen inches. Attention was attracted by a considerable amount of vapour rising from it; the breath of the animals beneath. As preparation was made to examine further, the snout of a bear appeared through the hole to be followed soon by the bear boldly throwing back the snow and jumping out onto the firm crust. Almost immediately there followed in the same manner two smaller animals, both two year old females.[2] The large female mother measured over seven feet in length and the cubs around five. She was strong and lean with no surplus fat of any sort, neither was she emaciated. Her actions were extremely quick and her responses in a physical way accounted for no type of sluggishness. She was in every respect normal during the few moments be-

2) Other reports show that sometimes they are one year old cubs. Occasionally only one cub is found with the mother during hibernation.

fore she met her death at the hands of the hunter. Observations made before by naturalists in North America, particularly in the Yellowstone district attests to the fact that the bear is active at the moment it leaves hibernation. It has been noted sometimes by these observers that physical reaction and emaciation sets in a few weeks after leaving hibernation. This can be accounted for in the fact that often times at such a season food is extremely difficult to obtain. Usually the bears eat whatever is avaiable as soon as possible after leaving hibernation.

The two younger female cubs with the mother were no less as active as she. Both were in strong healthy condition. The feet of the bears were normal as was also the fur, which is found at this season of the year in its best condition.

The den measurements were hard to estimate as the bear destroyed most of the prominent features of it upon leaving so hurridedly. Located on a hill side the bears had dug out a shelter or cave about six feet long and four to five feet deep, a sort of hollow in the hillside. This location avoided any trouble there might be from surface or snow water. The bear never makes or locates its hibernation den where there might be danger of being disturbed by water. After the snows had come and buried the animals to a depth of four to fiive feet, hibernation had been spent apparently unmolested. The hillside was sparsely wooded and only partly protected from the prevailing northwestern winds. The site of the den was made extremely unpleasant by the presence of a great amount of faeces.[3)]

Hunters in Etorofu very seldom find bears as reported above. Dens broken open are sometimes found but it is very rarely that the exit from the den is observed. The weather at the time was clear with slight frost; a little before the main snow melt took place in April of 1931.

Thanks are due to Mr. K. MUKASA of this University who helped in collecting the above data.

3) Hunetrs report concerning the bear found in Hokkaido, that the den is always free from faeces, entirely contradictory to the situation reported in Etorofu Island.

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摘　　要

エトロウ島の羆の冬眠末期に於ける一觀察

ピ　ー　ル

北海道に產する羆は南千島に於てはクナシリ及びエトロフの二島に產すれども色丹島の如きには全くこれを見ず、ために往年パラムシル島より移住せるアイヌの如き色丹島に生活するこさ能はざりし狀態なりき。エトロフ島の羆に就いて述べんに北海道產と等しく性狂暴にして屢々人畜をも襲ひ危險少なからず北海道本島に於ては羆の冬眠は十一月末なれども千島に於ては概れ十月中旬にしてこの時既に積雪を見冬期は一米を下らず一般に千島方面は一二月に天候好晴の日多く十一月を最惡とす、然し融雪は四月に初めて起り、この時季が羆の冬眠より覺る時なり。余の見聞せし一例はエトロフ島トシモへの市外を去る一哩の七百米の山腹に發見せられし冬眠中の羆の例なり、この附近には敢て樹木なく防風設備の如きを見ず。初め徑十八吋の穴を雪上に認めそれより羆の呼吸による水蒸氣を見たりと云ふ。この穴中には三頭の羆を見皆雌にして內二頭は二才仔なり、親羆は丈七呎に及べり。人の近くや猛然こ雪を蹴つて跳り出でその勢凄も夏期活動期に於けるものと異らず。その穴は高さ 四、五呎深さ六呎にして斜面に作られたれば雪水の浸入することなし。穴中は糞便多く不快な臭氣に滿てりと云へばこれ北海道產羆こ多少赴を異にす。後者に於ては冬眠の穴は概して極めて淸潔なり。

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