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English summary of papers which appeared in Nippon Kingakukai Kaiho Vol. 36 (1995)

Original paper: Hyphal interactions between a mycoparasite, *Pythium oligandrum*, and *P. ultimum*—Light microscopic observations of their interface in soil modeled for ecological study

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The modes of hyphal interaction between a mycoparasite, *Pythium oligandrum* (parasite), and phytopathogen, *P. ultimum* (host), in clay loam soil (pH 5.3-6.5; 30% water content by weight) were studied. The parasitic events were as follows. The hypha of the parasite made contact with that of the host and grew along it for some distance, and the host cell wall frequently broke at the point of contact. At the same time, the host hypha became granular in appearance. The parasite hypha then captured the host hypha by coiling or forming hooked branches and by forming an appressorium. After capture, septa were seen in host hyphae even when young. From the appressorium the parasite penetrated into the host and established an extended or enlarged hyphal system. Lysis and gradual loss of host protoplasm were observed. A portion of the parasite hypha emerged through the lateral wall of the host hypha. Sexual and asexual reproductive structures of the parasite developed inside and outside the host. Propagules from these reproductive structures repeated the same parasitic events. Later, sexual and asexual reproductive structures of the host developed, and the living portion of the hypha remained in part in the soil.

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Original paper: Production of *Cordyceps militaris* fruit body on artificially inoculated pupae of *Mamestra brassicae* in the laboratory

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A *Cordyceps* species arising from larvae of Lepidoptera was collected on 16 September 1994 in a plantation of Japanese larch at Ajigasawa town, Nishitsugaru-gun, Aomori Prefecture. Based on the morphological features, this fungus was identified as *C. militaris*.

Using this *Cordyceps* material and artificially grown pupae of *Mamestra brassicae* Linné, inoculation experiments to produce *Cordyceps* fruit body in the laboratory were performed as follows: ascospore suspension was prepared from the stroma of the fungus and the living pupae were immersed for a few minutes in this suspension. The pupae thus inoculated were placed on wet Sphagnum moss in deep Petri dishes and kept under diffuse sunlight in the laboratory (room temperature: 15-20°C). Fourty days after inoculation, fruit body initials began to appear from the pupae, which continued to grow and finally were found to contain perithecia with mature asci and ascospores. Similar inoculation experiments were repeated three more times at room temperature or in a growth chamber with controlled temperature and light conditions (7.5-25°C). In each experiment, mature fruit bodies were formed on the inoculated pupae at high rates (13.8-76.0%).

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Original paper: A new variety of *Exobasidium otanianum* isolated from *Rhododendron dilatatum* var. *satsumense*

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Exobasidium leaf blight symptoms of *Rhododendron dilatatum* var. *satsumense* were found in Kagoshima-shi in April, 1994, and a parasitic fungus was isolated from the lesions. Disease symptoms, morphological and cultural characters of the fungus, and the mode of spore germination were examined. The fungus differed from *E. otanianum* in the number of sterigma, the size of basidiospore and the number of septum of basidiospore. The fungus is described as a new taxon: *Exobasidium otanianum* var. *satsumense*.

Nippon Kingakukai Kaiho 36(3): 97-102(1995)

Original paper: A poisoning case by *Lepista graveolens* in Japan

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A case of poisoning by an agaric species was noticed in Aomori Prefecture, northern Japan, in September 1994. The fungus was identified as *Lepista graveolens*, previously known from Hokkaido, Japan. One hour after consumption of the cooked fruiting bodies with alcohol, the victim (a 68-year-old man) first experienced a twist in his tongue, then paralysis of the hands and feet and finally difficulty in walking, but returned to normal next day. The morphological characters of the fungus are fully described based on the Aomori materials.

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Original paper: A specific mycelial structure formed by *Rhizoctonia* and other fungi on cellulose membranes

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When grown on a cellulose membrane laid on Czapek agar without sugars (CCMA), *Rhizoctonia solani* formed a specific mycelial structure under the membrane. The structure was also formed by *Rhizoctonia* spp., *Sclerotium* spp., *Sclerotinia sclerotiorum, Corticium rolfsii, Nakataea sigmoideum* var. *irregulare* but not by other fungi tested. The structure was not formed on media containing such sugars as glucose, sucrose or galactose, but was formed on media with trehalose or mannitol. The structure was not formed under filter membranes of cellulosic fibriform or polycarbonate. When a double layer of different membranes was put on agar medium, the structure was produced only beneath the cellulose membrane. However, when a polycarbonate filter membrane was set on the cellulose membrane, the structure was produced between the two. Validamycin A, an antibiotic for *Rhizoctonia* disease control, prevented the formation of the structure at 0.01 μg/ml in CCMA.

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Original paper: Isolation and genetic analysis of auxotrophic mutants in *Flammulina velutipes*

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Uninucleate oidia from 8 wild-type homokaryons of *Flammulina velutipes* were UV-irradiated with a lethal dose of more than 98%. In total, 4,624 mutagenized oidial mycelia were isolated, 187 (4.0%) of which were auxotrophic mutants. During incubation on complete medium for 7～50 days, however, 106 (56.7%) of the mutants recovered from nutritional deficiency. In the present study, 19 adenineless, 12 methionineless, 6 *p*-aminobenzoic acidless, 4 argininеless, 2 nicotinamideless, 2 histidineless, 1 leucineless, 1 isoleucineless, 1 lysineless, 2 adenine-histidineless, and 1 adenine-methionineless auxotrophic mutants were isolated. Complementation test detected 5 genes (*ade 1-ade 5*) responsible for adenine biosynthesis, 4 genes (*met 1-met 4*) for methionine, 3 genes (*pab 1-pab 3*) for *p*-aminobenzoic acid, 3 genes (*arg 1-arg 3*) for arginine, 2 genes (*nic 1, nic 2*) for nicotinamide, and 2 genes (*his 1, his 2*) for histidine. Based on genetic analysis of *ade 1, ade 2, arg 1, pab 1*, and *c* (gene for compact morphology), tentative linkage map consisting of 3 linkage groups was established.

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Original paper: An empirical rule for breeding high-optimum-temperature strains of *Flammulina velutipes*

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An experiment was conducted to establish empirical genetic rules for breeding high-optimum-temperature hybrids of *Flammulina velutipes*. Optimum temperatures of monokaryotic stocks from commercial strains showed a normal distribution ranging between 20.0°C and 25.7°C with a mean of 22.5°C. Monokaryotic stocks having A2 incompatibility factor showed a higher optimum temperature than A1 factored stocks. Optimum temperatures of hybrids between compatible monokaryotic stocks also showed a normal distribution with a mean of 23.4°C, which was 0.9°C higher than the monokaryon's mean. When the monokaryons were classified into high-(H), medium-(M) and low-(L) optimum temperature groups, the results of H×H, H×M and H×L matings yielded high-optimum-temperature dikaryons at the rates of 64%, 58% and 42%, respectively. In the case of H×H mating, the A1B1×A2B2 hybridization produced more than 80% high-optimum-temperature dikaryons, but the A1B2×A2B1 hybridization produced only 50% high-optimum-temperature dikaryons. The rate of high-optimum-temperature hybrids between reciprocal dikaryon isolates of A1B1×A2B2 and A2B2×A1B1 showed no significant difference in temperature characteristic. However, a difference in the rate of high-optimum-temperature stock production was recognized between A2B1×A1B2 and A1B2×A2B1 reciprocal isolates. As a result of this work, a dikaryon with an optimum temperature of 25.9°C was produced.

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Short Communication: Productivity of ochratoxin A of *Aspergillus carbonarius* in *Aspergillus* section *Nigri*

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In order to establish their ability to produce the ochratoxin A (OCTA), seven species and three varieties of *Aspergillus* section *Nigri* were examined using malt-yeast extract agar (MYA) and rice cultures at 25°C for 21 days. MYA cultures and moldy rice were extracted with $CHCl_3$, and OCTA in the extracts was confirmed by HPLC and TLC. Only one strain of *Aspergillus carbonarius* was positive for OCTA. The levels of OCTA produced were 6.78 μg per ml of MYA and 0.4 μg per g of rice, respectively. This is first report of production of OCTA by *Aspergillus carbonarius*.

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Review: Rotational behavior in fungi—How and why do fungal sporangiophores rotate?—

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The sporangiophore of the fungus *Phycomyces* rotates in the clockwise direction as viewed from above when the sporangiophore is actively elongating and in the counterclockwise direction when the sporangiophore starts elongation in the newly-established growth-zone beneath the sporangium. The rotation of the piloboloid-mutant sporangiophore, the growth of which is characterized by a gradual cessation of elongation and by a gradual increase in radial expansion in the growth zone, reverses its direction from clockwise to counterclockwise during the period of increased radial expansion. The rotation of these sporangiophores can be explained by the reorientation of the microfibrils in the growth zone. The sporangiophore of a closely-related fungus *Pilobolus*, which also expands at the subsporangial vesicle, rotates in the clockwise direction when elongation recommenced in the newly-established growth zone just beneath the subsporangial vesicle. The rotation of this fungus may also be interpreted in terms of behavior of microfibrils. The methods for measurement and terminological expression of rotational behavior were also proposed.

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