

Studies on Taiwanese Aquatic Fungi II. *Allomyces*  
*arbuscula* and *Allomyces moniliformis*

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Abstract

*Allomyces arbuscula* and *Allomyces moniliformis* are identified and illustrated. The former species representing Eu-*Allomyces* type and the latter species representing *Cystogenes* type of their life cycles are examined. Both species were found only from paddy soils in Tau-Yuan, and listed here are new to Taiwan.

INTRODUCTION

Recently, we are successful to isolate two species of *Allomyces*, i.e., *Allomyces arbuscula* and *Allomyces moniliformis* by the use of hempseeds technique. This report will be continued to deal with their description and occurrence to the last paper (Chien, 1974).

DESCRIPTION

*Allomyces arbuscula* Butler, Ann. Bot. 25: 1027, figs. 1-18, 1911. Coker, Saprolegniaceae 182, pl. 61, 1923, Emend. Hatch, J. Elisha Mitchell Sci. Soc. 49: 163, 1933 & Ann. Bot. 49: 623-649, 33 figs., 1935 & Ann. Bot. n.s. 2: 583-614, pls. 18-22, 1938. Coker & Matthew, North American Flora 2(1): 4, 1937. Wolf, Mycologia 31: 380, figs. 2, 3, 4A, 1939.

*Blastocladia strangulata* Barrett, Bot. Gaz. 54: 353-371, pls. 18-20, 1912.

*Allomyces strangulata* (Barrett) Minden, Falck's Mykolog. Untersuch. Berichte 2(2): 214, 1916.

*Septocladia dichotoma* Coker et Grant, J. Elisha Mitchell Sci. Soc. 37: 180, pl. 32, 1922.

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*Allomyces arbuscula* forma *dichotoma* Kanouse, Amer. J. Bot. 14: 303, 1927.

*Allomyces kniepii* Sörgel, Zeitschr. Bot. 31: 402, figs. 2-10, 1937.

*Allomyces arbuscula* var. *arbuscula* Emerson, Lloydia 4: 136, 1941.

*Allomyces arbuscula* var. *minor* Emerson, Lloydia 4: 136, 1941.

Vegetative structures resembling *A. macrogynus*, dichotomously branched; zoosporangia single or catenulate, broadly subglobose or ovoid, with rounded apex ends, 22-30 X 35-60  $\mu\text{m}$ , forming 1-3 discharge papillae; zoospores ovoid, 6-9  $\mu\text{m}$ , gametangia particularly on young hyphae, regular in shape and arrangement, the primary and often the secondary ones very regularly paired with the female always terminal; female gametangia strikingly larger than the male, often nearly subglobose, colorless, 38-49  $\mu\text{m}$  in diam.; male gametangia barrel shaped, 18-35  $\mu\text{m}$  in diam., with orange-red contents; female gametes colorless, ovoid, 10-12  $\mu\text{m}$ ; male gametes ovoid or nearly spherical, 6-8  $\mu\text{m}$  in diam.; resting sporangia abundant, ovoid, with rounded apex and truncate base, 41-60 X 34-43  $\mu\text{m}$ , thick-walled, brown, minute punctate; planozygote biflagellate, germinating after encyst a moment, finally becoming sporophyte.

Habitat: — in paddy soil

Specimen: — No. 361. Collected from Pref. Tau-Yuan: Tau-Yuan (April 12, 1975 by C. Y. Chien)

Distribution: — India, U.S.A., Philippines, Bali, Mexico, South America, Europe, Africa, Ceylon, Burma, Japan, China and Taiwan

Remarks: — 1) *Allomyces arbuscula* is distinguished mostly readily by having gametangia when first formed in pairs, with the female usually terminal position.

2) This fungus most closely resembles to *Allomyces macrogynus* with a life cycle of *Eu-Allomyces* type.

*Allomyces moniliformis* Coker et Braxton, J. Elisha Mitchell Sci. Soc. 42: 139, pl. 10, 1926. Coker l.c. 42: 222, 1927 & North Amer. Fl. 2(1): 5, 1937; Emend. Emerson, Mycologia 30: 127, 1938; Wolf, Mycologia 31: 381, figs. 2-4C, 1939.

Vegetative structures dichotomously branched and anchored by rhizoids to substratum, the hyphae with pseudoseptate, 18-42  $\mu\text{m}$  in diam; primary zoosporangia cylindrical, 26-38 X 58-121  $\mu\text{m}$ , with an apical papilla, secondary sporangia form beneath the primary one, forming long, usually much chains, with the younger ones becoming ovoid to more nearly spherical with truncate ends, at first content slightly pink, later becoming browner as the zoospores approach maturity; zoospores ovoid, 10-15 X 8-9  $\mu\text{m}$ , with a long posterior flagellum, monoplanetic, when swimming, amoeboid before encysting; resting spores (resistant sporangia or Chlamydocysts) with conspicuous pits, ovoid, with truncate base and pronounced apical beak, cytoplasm often pigmented, usually 34-42 X 66-78  $\mu\text{m}$ , escaping from the thin clasping hyphal membrane; resistant sporangial zoospores discharge after a rest, exospore thick-walled, dark orange-brown with widely spaced pits, germination of the Cystogenes type, mostly bearing two posterior flagella, 9-12  $\mu\text{m}$  in diam, quickly encysting, secondary resistant sporangial zoospores (the cyst flagellate gametes) 8-10  $\mu\text{m}$  in diam, which fuse in pairs, the resultant zygote producing upon germination the sporophyte plant.

Habitat: — in paddy soil

Specimen: — No. 360, collected from Pref. Tau-Yuan: Nei Ri (內壠)  
(April 5, 1975 by C. Y. Chien)

Distribution: — U.S.A., Mexico, Cuba, Puerto Rico?, Trinidad, Bolivia and Taiwan

Remarks: — 1) The characteristics of *Allomyces moniliformis* conform most closely to *A. moniliformis* Indoh with Cystogenes type, a life cycle differing from Eu-*Allomyces*.  
2) *A. moniliformis* is distinguished mostly readily by having a truncate base and pronounced apical beak of its resting spores, i.e., resistant sporangia.

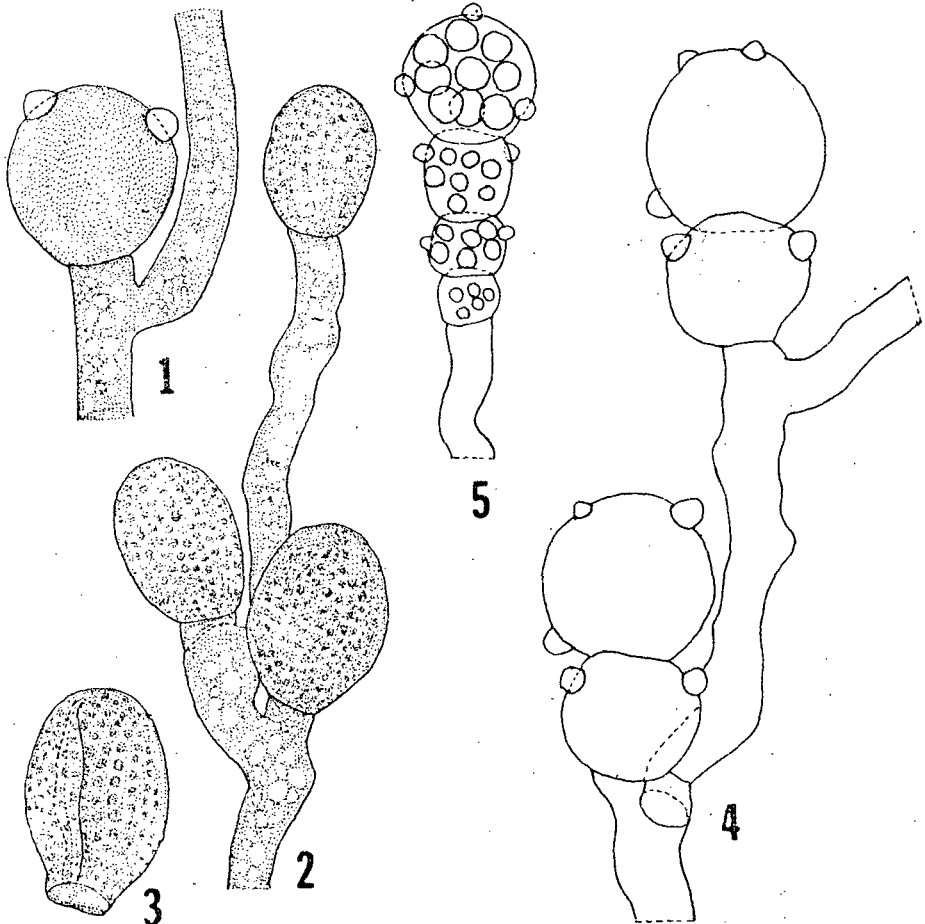
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Figs. 1-5.

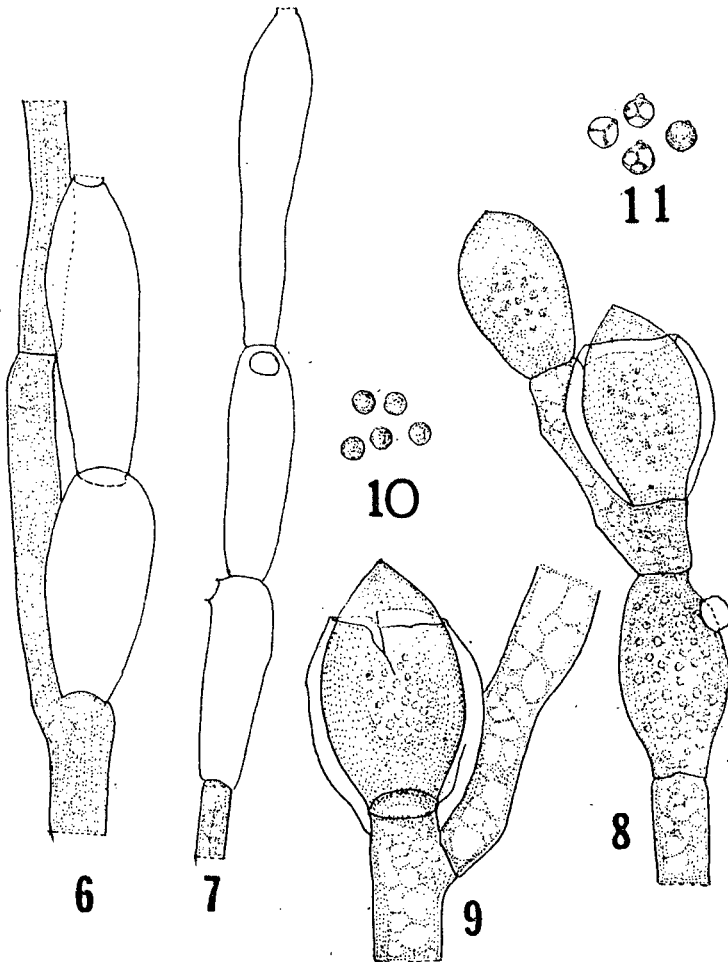
Figs. 1-5. *Allomyces arbuscula* Butler (all X 400)

1. A young zoosporangium with two papillae.
2. Asexual mycelia with chlamydospores (resistant sporangia).
3. A chlamydospore with wall split of membrane.
4. Sexual mycelia with gametangia showing developed in pairs, the female terminal and the male usually subterminal.
5. Sexual mycelium with four gametangia in chain, and developing in pairs.



Figs. 6-11. *Allomyces moniliformis* Coker et Braxton (all X 400)

- 6-7. The asexual mycelia with chained zoosporangia, showing the empty zoosporangia and discharging pores.
8. Asexual mycelia with two terminal chlamydocysts and an intercalary zoosporangium with a papilla.
9. Hyphal membrane inclosing a chlamydocyst.
10. Zoospores emerging from a zoosporangium.
11. A resistant sporangial zoospore and the emergence of 3 quartet of secondary sporangial zoospores.



### LITERATURE CITED

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## 臺灣水生菌之研究 II，兩種厚膜囊水生菌

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### 中文摘要

兩種厚膜囊水生菌 (*Allomyces arbuscula* and *A. moniliformis*) 已被鑑定和例證。其生活史分別認定前者為真厚膜囊水生菌型 (Eu-*Allomyces* type) 而後者為休眠孢子型 (*Cystogenes* type)。兩者均為臺灣徽菌之新記錄種，係由桃園稻田乾土壤中所被發現的。