The formation of an additional wall layer was reported by Ekundayo[4] in *R. arrhizus* but this appears to be a common feature in the majority of fungi[9, 10]. As opposed to multinucleate condition in mesophilic species of *Rhizopus* only single nucleus was seen in *R. rhizopodiformis*; the distribution of other organelles was, however, closely similar. There was copious amount of endogenous reserves which could be lipoidal in nature; vegetative hyphae of thermophilic *Humicola* have been shown to possess similar lipoidal bodies[11]. Hyphae tips of fungi exhibit a wide array of vesicle arrangement. While studying *Gilbertella persicaria*, Bracker[9] showed that germ tubes contained only few apical vesicles at the growing tip; they increased in number with ensuing growth. Though the present study was limited to 6 hr germ tube growth, none or very few vesicles were present at the tip. This limited study suggests that the ability to grow at elevated temperatures is coupled with more endogenous reserves, less vacuolation and disproportionate stretching of the cell wall. Whether this generalization applies to the thermophiles as a whole could be ascertained by a study on other thermophilic fungi.

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1. Brock, T. D., *Thermophilic microorganisms and life at high temperatures*, New York, Springer Verlag, 1978, 465.
2. Johri, B. N. and Pandey, A., *2nd Int. Mycol. Congr.*, Tampa, USA, 1977, Abstract No. 526.
3. Pandey, A. and Johri, B. N., *Acta. Bot. Indica.*, 1980, **8**, 67.
4. Ekundayo, J., *J. Gen. Microbiol.*, 1966, **42**, 283.
5. Hawker, L. E. and Abbott, Mc.V.P., 1963, **32**, 295.
6. Hess, W. M. and Weber, D. J., *Protoplasma*, 1973, **77**, 15.
7. Necas, O. and Gabriel, M., *Folia Microbiol.*, 1980, **25**, 228.
8. Thakre, R. P. and Johri, B. N., *Curr. Sci.*, 1976, **45**, 241.
9. Bracker, C. E., *Protoplasma*, 1971, **72**, 381.
10. Buckley, P. M., Sommer, N. F. and Matsumoto, T. T., *J. Bacteriol.*, 1968, **95**, 2365.
11. Millner, P. D., Motta, J. J. and Lentz, P. L., *Mycologia*, 1977, **69**, 720.

ACHAETOMIUM THERMOPHILUM SP. NOV., A NEW THERMOPHILLIC SPECIES OF GENUS *ACHAETOMIUM* FROM INDIA

MONICA BASU
Department of Botany, University of Allahabad, Allahabad 211 002, India.

DURING studies on thermophilic fungi, an interesting ascomycetous fungus belonging to genus *Achaetomium* was isolated from a sample of leaf litter in December 1977. This genus was established by Rai *et al*[1] and at present it includes 10 species, all reported from Indian soil[2-6]. This paper describes a new thermophilic species.

Achaetomium thermophilum sp. nov.

Coloniae in agar farinae avenae crescentes celeriter in 45° C, floccosae, primo albae, flavescentes ad maturitatem quando primum excultae, sed remanent quasi albae in culturis subsequentibus; pars aversa incolor; ascocarpi pulle nigri, subglobosi vel elongati, circumdati hyphis longis, brunneis, septatis, asperis, flexuosis, cum pariete clare definito, usque 350 μm diametro, ostiolati, superficiales; asci in fasciculis, clavati, evanescentes, habentes 8 ascosporas, 40–68 μm × 13–20 μm, aporati; ascosporae ellipsiformes, magnae, primum hyalinae, vertentes rave brunneae ad maturitatem, pleraeque cum una guttula magna olei, interdum cum pluribus guttulis, 19–20 μm × 9–11 μm, cum duobus foraminibus germinalibus distinctis. Forma conidialis ignota.

Lectus e stramento foliarum mense Decembri 1977 a Bhatni, U.P., India. Cultura posita in Department of Botany, Allahabad University.

Fungus thermophilus cuius temperatura optima est 45° C, maxima 50–55° C et minima 20° C.

Colonies on oat meal agar growing rapidly at 45° C, floccose, at first white, turning to yellowish at maturity when freshly isolated but after subsequent culturing mature colonies remain white; reverse uncoloured; ascocarps dispersed, sometimes in small groups, grayish black, subglobose to elongated, surrounded by long, brown, septate, rough, flexuous hyphae, with well defined wall, upto 350 μm in diameter, ostiolate, superficial; asci in fascicles, clavate, evanescent, having 8 ascospores, 40–68 μm by 13–20 μm, aporate; ascospores elliptical, greyish-brown, apicultate at both the ends, mostly with one large oil drop, sometimes more, 19–20 μm by 9–11 μm, with two distinct polar germ pores. No conidial stage was observed.

Isolated from leaf litter in December 1977 from Bhatni, U.P., India. Culture deposited in the Department of Botany, Allahabad University.

A thermophilic fungus having optimum temperature at 45° C, maximum 50–55° C and minimum 20° C.

The present species differs from other known species of the genus *Achaetomium*. However, it comes somewhat closer to *A. macrosporum* Rai *et al*[2], especially in size range of ascocarps and shape and size of ascospores but mainly differs in shape of ascocarps which is subglobose to elongated instead of flask shaped; much smaller size of asci, ranging from 40–68 μm × 13–20 μm instead of 53–96 μm × 16–17 m; slight difference in length of the ascospore size which ranges from 19–20 μm instead of 16–19 μm and with two distinct polar germ pores in each asco-

Figures 1–4 *Achaetomium thermophilum* sp. nov. **1.** A ruptured ascocarp releasing ascospores, × 140. **2.** Young clavate asci in fascicle, × 585. **3.** A mature acus, × 968. **4.** Ascospores showing two distinct polar germ pores, × 840.

spore whereas *A. macrosporum* has only one[5]. Besides the above characteristics, the present isolate is a strongly thermophilic fungus, having optimum temperature for both growth and fructification at 45° C, maximum at 55° C and minimum at 20° C but no ascocarps were observed below 30° C. Hence it is hereby described as a new species, *Achaetomium thermophilum* sp. nov. owing to its thermophilic nature.

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1. Rai, J. N., Tewari, J. P. and Mukerji, K. G., *Can. J. Bot.*, 1964, **42**, 693.
2. Rai, J. N., Wadhwani, K. and Tewari, J. P., *Indian Phytopathol.*, 1970, **23**, 54.
3. Rai, J. N. and Chowdhery, H. J., *Curr. Sci.*, 1971, **40**, 412.
4. Rai, J. N. and Chowdhery, H. J., *J. Indian Bot. Soc.*, 1973, **52**, 309.
5. Rai, J. N. and Chowdhery, H. J., *Kavaka*, 1973, **1**, 29.
6. Rai, J. N. and Chowdhery, H. J., *Curr. Sci.*, 1978, **47**, 23.

OBTURATOR IN THE CYPERACEAE

K. H. MAKDE
Department of Botany, Nagpur University,
Nagpur 440 010, India.

THE Cyperaceae are unique because of their peculiar mode of pollen and embryo development. Schnarf[1], Maheshwari[2] and Davis[3] have reviewed earlier literature on the family. Padhye[4] reported obturator to be a characteristic and uniform feature of the family. The present study covers development of obturator in 14 species under 12 genera* belonging to tribes Cypereae, Scirpeae, Sclereae and Cariceae of Koyama[10] An attempt is made to classify different taxa of the family on the basis of the nature and the extent of development of obturator.

A group of superficial cells situated at the base of the funiculus enlarge during megasporogenesis and become conspicuous (figures 1, 6, 7, 9). These protrude and divide repeatedly to form tubular filamentous structure in the vicinity of micropyle (figures 2, 3, 8, 10). This is referred to as obturator. It consists of elongated, closely packed uninucleate cells with dense protoplasmic contents (figures 2, 3, 8, 10).

Normally, the development of obturator is initiated at the megaspore mother cell stage (figures 1, 6, 7, 9) and it is fully formed at the mature embryo sac stage. However, in *Kyllinga brevifolia*[5] obturator is well developed at megaspore tetrad stage.

In *L. sphacelata* the constituent cells are short, loosely packed, and interwined (figure 8). A similar situation exists in *Eriophorum comosum, Lipocarpha argentea* and *R. maritima*. In *P. pumilus, C. alternifolius, E. atropurpurea, F. ciliaris* and *S. lithosperma*, cells of the obturator grow beyond the micropyle to reach outer integument (figures 2, 3, 10). The situation in *Fimbristylis* is rather different where development of obturator initiated during

* *Pycreus pumilus* Nees., *Cyperus alternifolius* Willd., *Mariscus paniceus* Vahl., *Eleocharis atropurpurea* Kunth., *Fimbristylis cymosa* R. Br., *F. quinquangularis* Kunth., *Scirpus supinus* Linn., *Eriophorum comosum* Wall., *Fuirena ciliaris* Kunth., *Lipocarpha sphacelata* Kunth., *L. argentea* R. Br., *Remirea maritima* Aubl., *Scleria lithosperma* Roxb., and *Carex filicina* Nees.