

A SURVEY OF FUNGI ASSOCIATED WITH THE LOVEBUG, *PLECIA NEARCTICA*, IN FLORIDA¹LESLIE P. KISH², GEORGE E. ALLEN², JAMES W. KIMBROUGH³,
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ABSTRACT

Populations of *Plecia nearctica* Hardy were surveyed during the spring and fall of 1973 to monitor adult flights which usually occur in May and September. The May adult flight was noticeably smaller. A large flight was observed in September. During early spring, 5 species of fungi were isolated and identified from dead and moribund lovebug larvae collected in the Gainesville area. In the fall, 2 additional fungal species were isolated, 1 from adults during the September flight and 1 from laboratory reared larvae.

Each year, large numbers of adult lovebugs, *Plecia nearctica* Hardy, emerge from grass litter in central and north Florida. According to Hetrick (1970), the adults emerge in 2 yearly flights of about 4 weeks duration in May and September. They are a safety hazard to drivers as dead adult insects may cover auto windshields, impairing driver vision.

In the spring of 1973, there was a noticeable decrease in the lovebug larva population, resulting in a reduced adult flight in May. Field observations demonstrated a high percentage of late larval instars apparently killed by fungi. The usually dense covering of bright colored, fungal hyphae made their mummified bodies readily observable. A survey was conducted to determine the identity of the fungi involved.

MATERIALS AND METHODS

Field collections in pastures and on road banks were made at weekly intervals from April to September. Collection sites were selected based on good drainage and proximity to lakes, ditches, and roadside pools. Dead and moribund larvae were collected and transported to the laboratory for examination. Cadavers were placed in a moist chamber and held at 26° C until fungal sporulation occurred. No surface sterilization was used.

RESULTS AND DISCUSSION

Five species of fungi were routinely isolated from larvae collected during April and May. These isolates included *Beauveria bassiana* (Bals.) Vuill., *Metarrhizium anisopliae* (Metsch.) Sorok., *Eupenicillium brefeldianum* (Dodge) Stolk & Scott, *Tolypocladium cylindrosporum* W. Gams, and *Apiosordaria verruculosa* (Jensen) von Arx and W. Gams. The 2 fungi isolated in the fall included *Conidiobolus coronatus* (Cost.) Batko identified from adults during the September flight, and *Arthrobotrys oligospora* Fres., from field collected, laboratory reared larvae.

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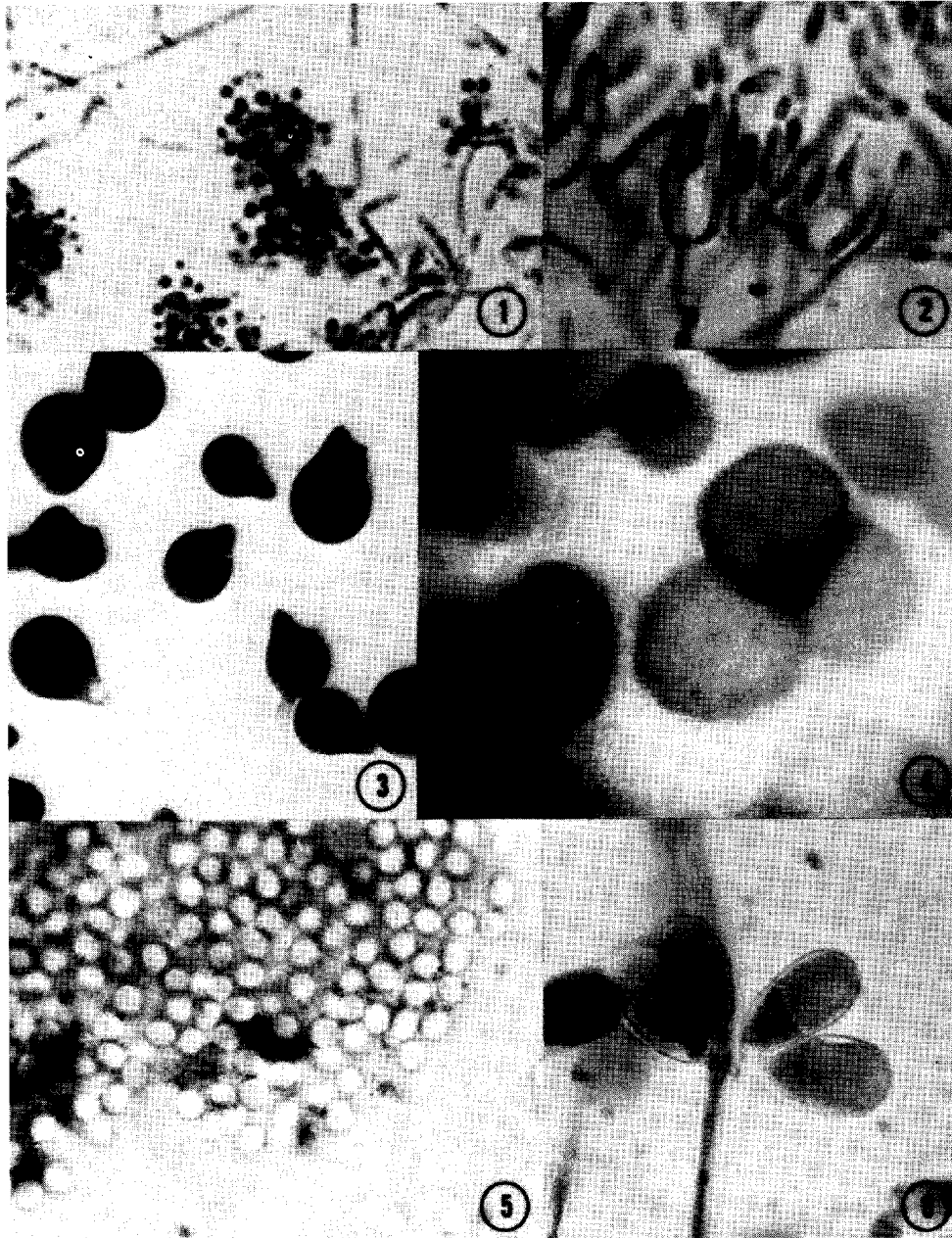


Fig. 1. *Beauveria bassiana*. Conidiogenous cells with abundant conidia. \times 675. Fig. 2. *Metarrhizium anisopliae*. Conidiophores, phialides, and conidia. \times 675. Fig. 3. *Conidiobolus coronatus*. Spores. \times 275. Fig. 4. *Eupenicillium brefeldianum*. Superficial cleistothecia on agar. \times 675. Fig. 5. *Eupenicillium brefeldianum*. Spores. \times 675. Fig. 6. *Arthrobotrya oligospora*. Conidiophore showing septate conidia. \times 675.

Beauveria bassiana (Fig. 1), *M. anisopliae* (Fig. 2), and *Conidiobolus coronatus* (Fig. 3) are well known entomopathogenic fungi (Steinhaus and Marsh 1962, Madelin 1966). All of these genera infect a wide range of insect

hosts (Charles 1941, Leatherdale 1958, Madelin 1966, MacLeod and Müller-Kögler 1973).

Eupenicillium brefeldianum (Fig. 4,5) was first described from a human alimentary tract as *Penicillium brefeldianum* (Dodge 1933). After continuous propagation in the laboratory, it rapidly lost its ability to form conidia. It now forms abundant cleistothecia (Fig. 4), but even these abort development before spores are formed.

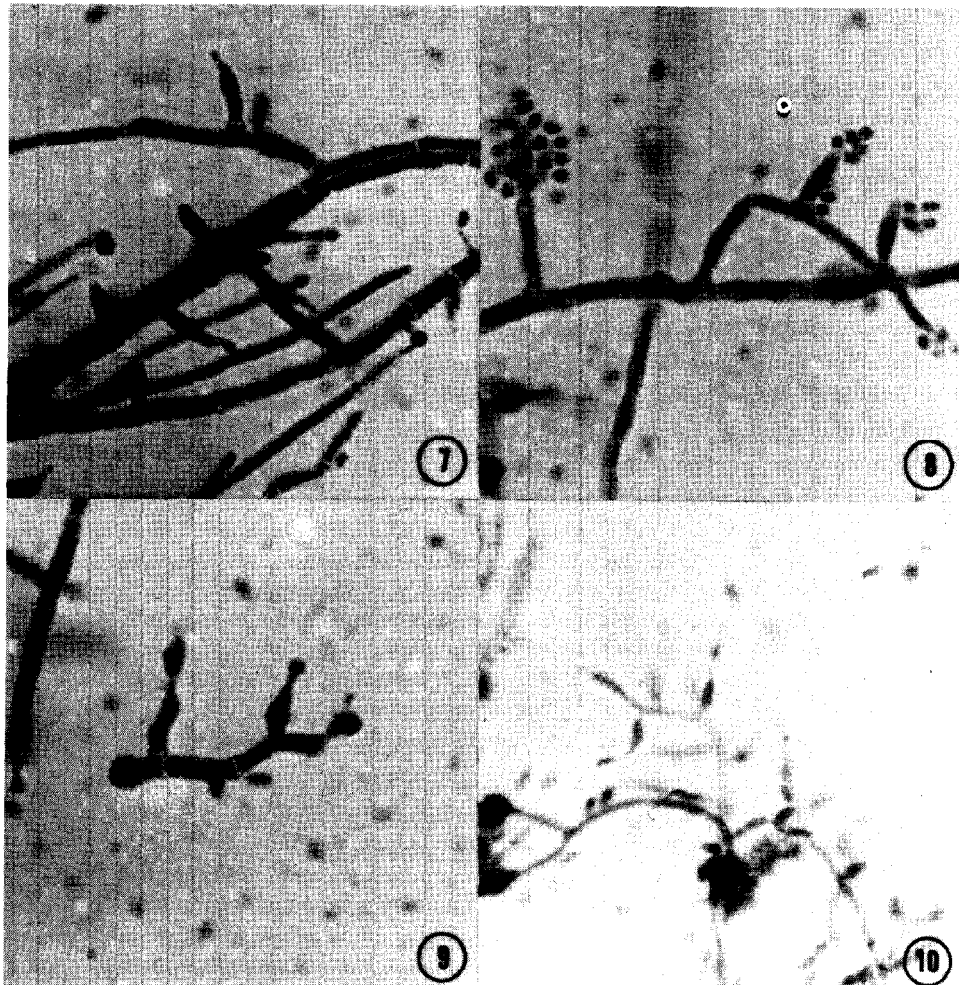


Fig. 7,8,9. *Cladorrhinum* state of *Apiosordaria verruculosa*. Phialides and spores. $\times 675$. Fig. 10. *Tolypocladium cylindrosporum*. Phialide habit. $\times 675$.

Arthrotrys oligospora (Fig. 6) is a predaceous fungus known to attack soil nematodes (Dreschler 1937). It is easily maintained in the laboratory, and forms abundant conidia. An attempt was made to rear approximately 25 larvae, hatched from field collected eggs, on moist filter paper. The fungus entangled the young larvae, usually trapping 1 or 2 at a time, and rendered them immobile. Individual hyphae were attached firmly to the integument. Death occurred within 3 days after entrapment. The cycle continued for 2 weeks, until all larvae succumbed.

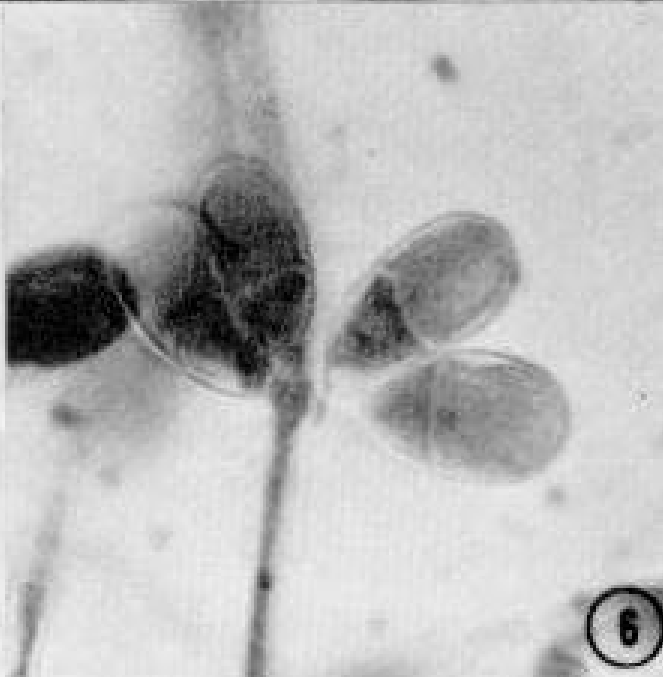
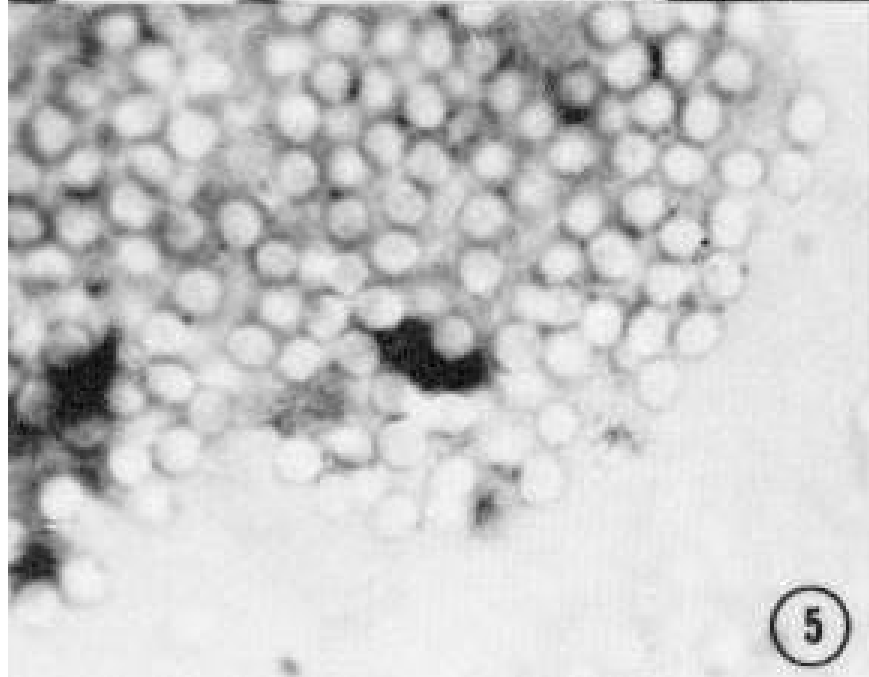
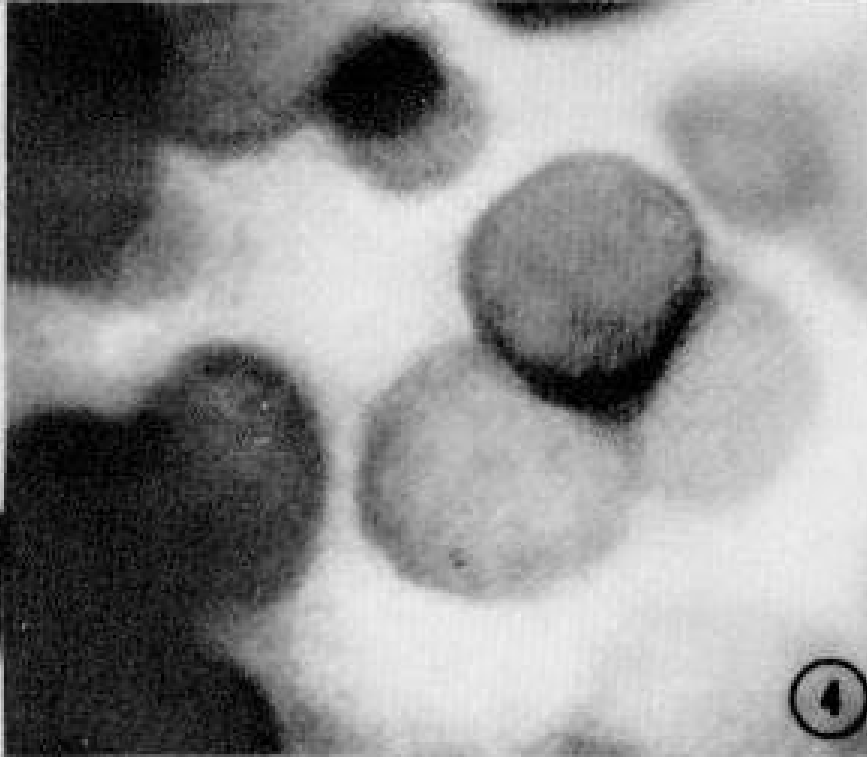
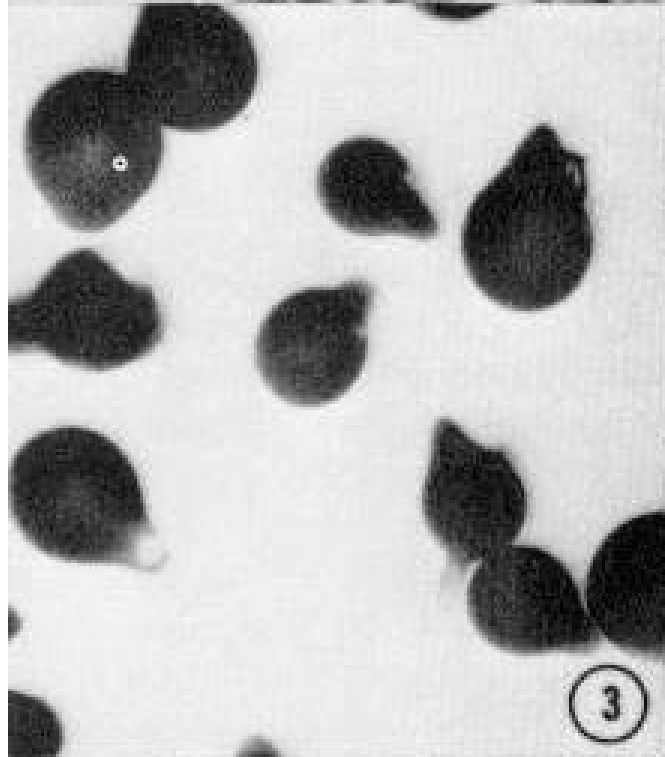
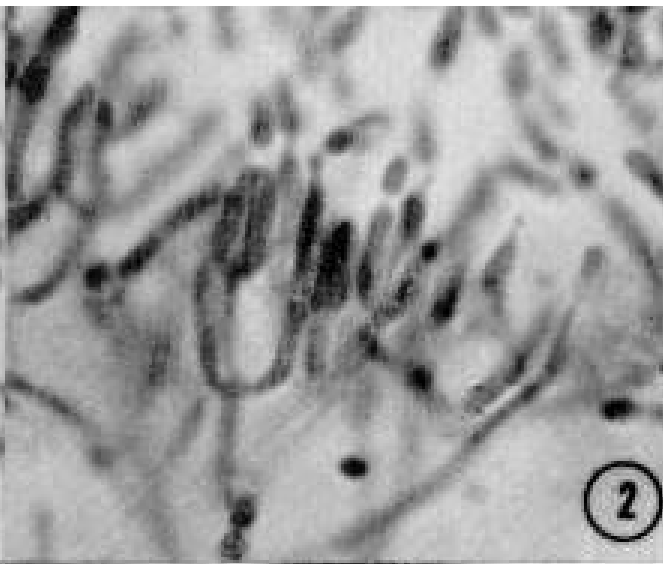
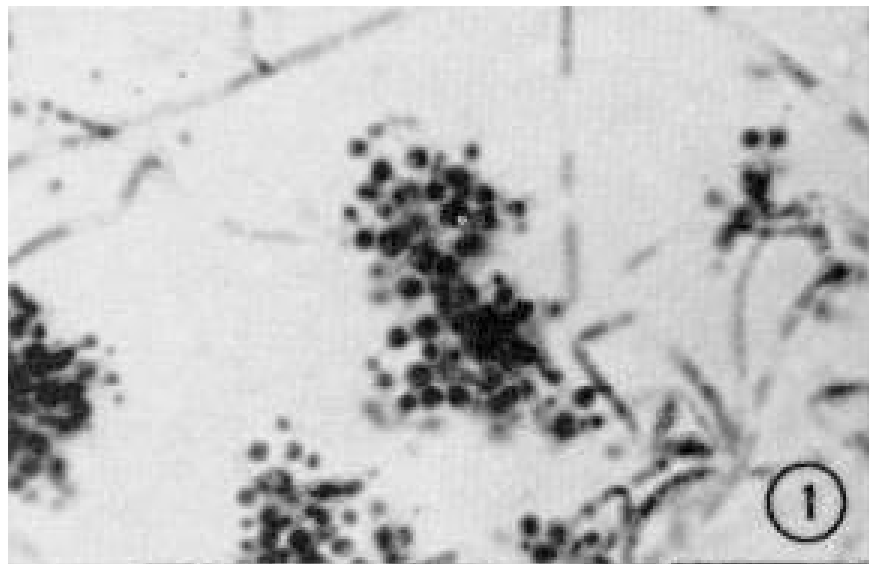
Apiosordaria verruculosa is a heterothallic soil inhabitant with a *Cladorrhinum* imperfect state (Fig. 7,8,9) (von Arx and Gams 1966).

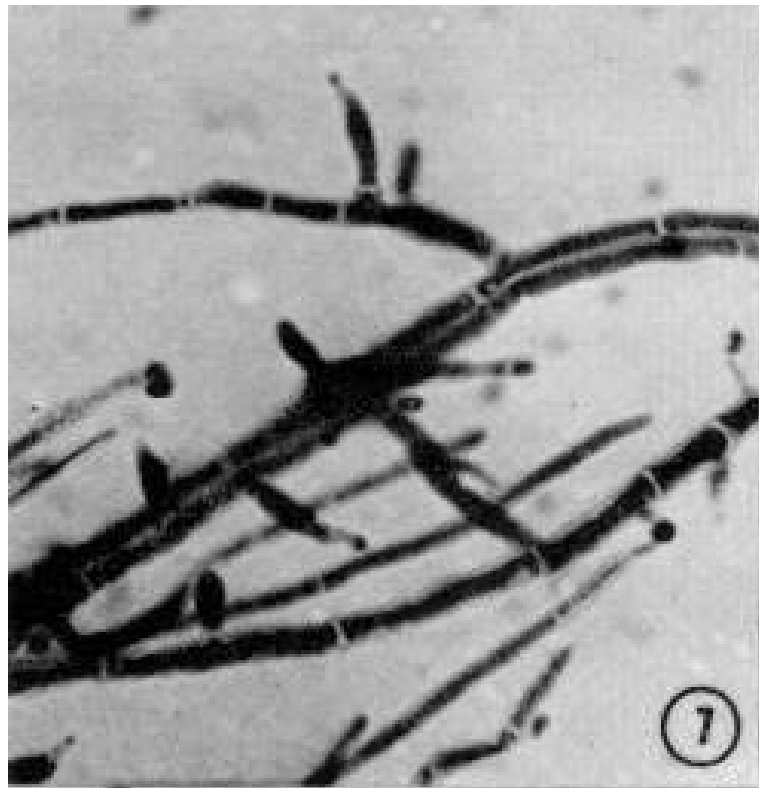
Tolypocladium cylindrosporum is known only as a soil saphrophyte (Gams 1971). It is similar to the entomogenous genus *Beauveria* Vuill.; however, *Beauveria* forms conidia sympodially, while *Tolypocladium* is a phialide producer. A sister species, *T. inflatum* Gams, was isolated by E. Müller-Kögler from *Aradus cinnamomeus*. Although *T. cylindrosporum* is not known to be pathogenic, it is the organism most frequently isolated from lovebug larvae.

Preliminary indications are that the failure of a lovebug flight to develop in the spring of 1973 was associated with the activity of all, or some, of these fungi. Re-infectivity studies will determine the pathogenicity of all 8 fungus species and the parameters required for their development. Further research will be conducted to determine the role of these fungus species as natural control agents of the lovebug.

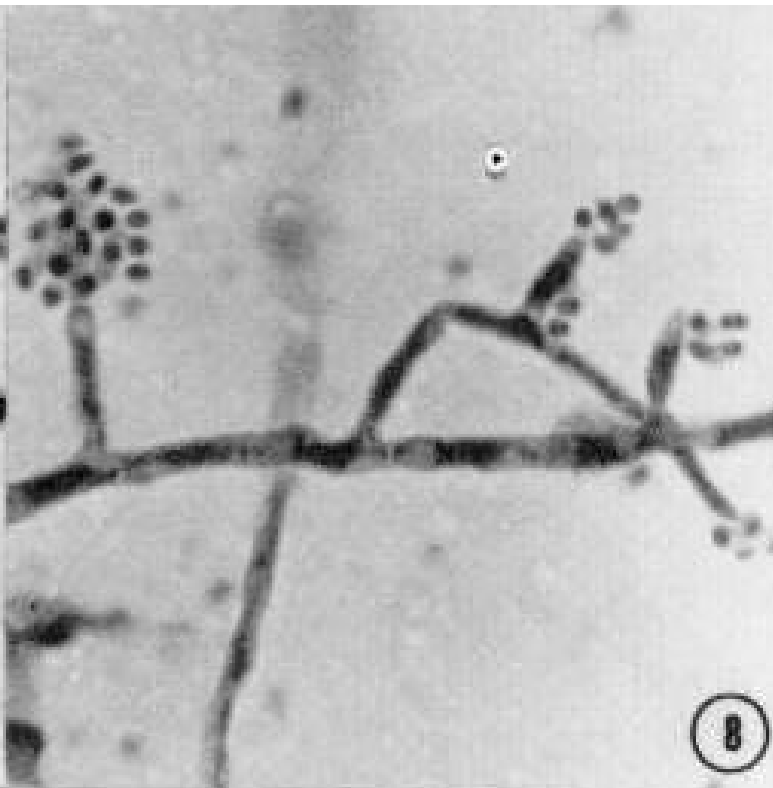
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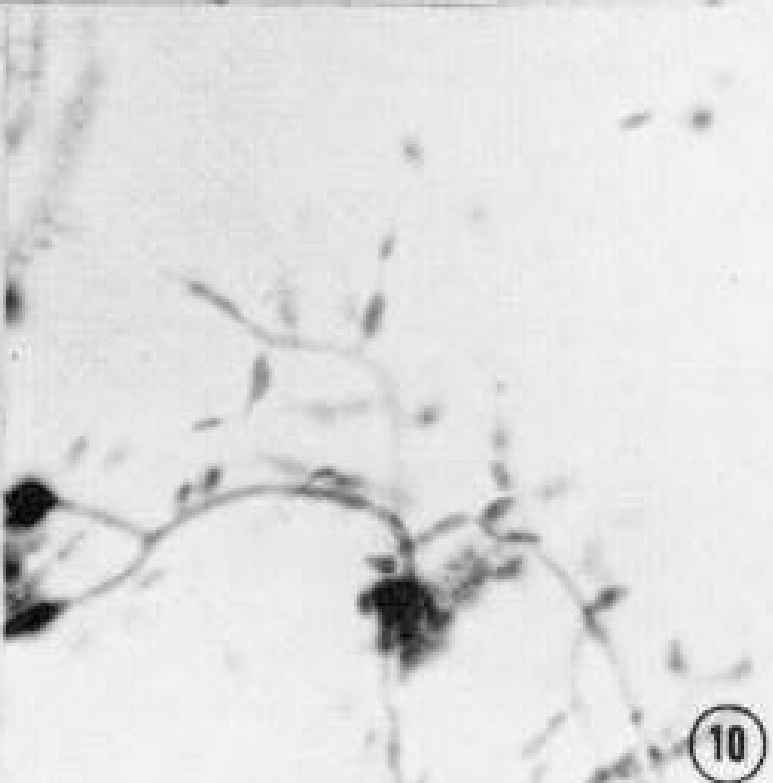
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