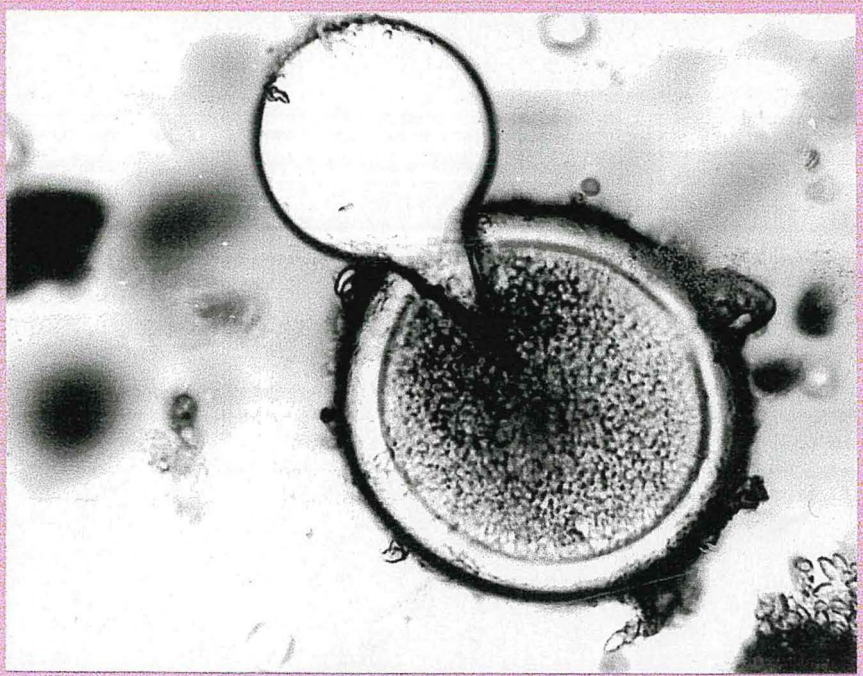
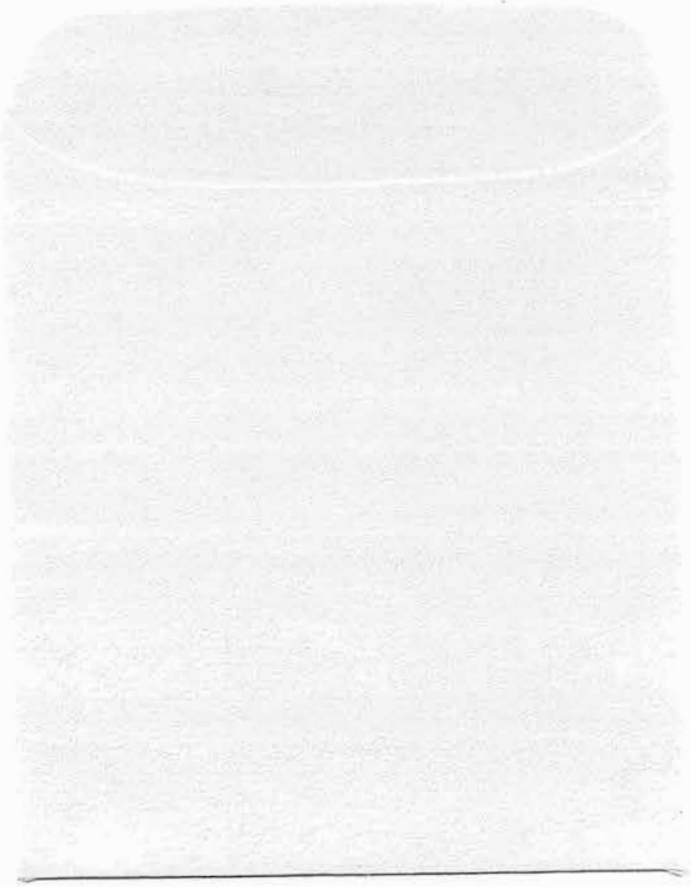
The Identification of Hypogean Fungi



THE IDENTIFICATION OF HYPOGEAN FUNGI



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CONTENTS

INTRODUCTION

Scats from woylies (Bettongia penicillata), were collected at normal trapping sessions over a number of years in the Perup River Fauna Priority Area and is till continuing. Also collected were a large number of hypogean fungi. These formed the basis from which assorted descriptions, drawings and photographs were assembled and a identification key was compiled.

Hypogean Fungi

The actual sporocarp is found underground (approx. 2 - 5cm) and appears like a small gravel stone (fig.1), which is easily dug up by fungi eating animals .
Types of hypogean fungi identified from the examined collections included some species of Gasteromycetes e.g. Mesophellia sabulosa (fig.12).

The Woylie's Diet of Fungi

A major portion of the woylie's diet consists of fungi.
The fungus spores pass through the digestive system unharmed, losing none of their identifiable characteristics.
Some of the photos taken are from the scat samples collected.

Method

Scat samples were prepared for examination and identification under the light microscope as follows: 0.3g oven dried scats were thoroughly macerated in 10ml distilled water with 0.5ml formulin (40%). With a pipette this mixture was placed on a slide, then a coverslip was placed over it.

FIG. 2: Sporocarps of Mesophellia sp.
The transverse section shows:

a. Outer peridium
b. Spore-bearing layer (hymenium)
c. Central edible sterile columella

The sample was then viewed under the microscope. Other animals which eat fungi are potoroos (Potorous tridactylus), bandicoots (Isoodon obesulus), southern bush rat (Rattus fuscipes), and quokkas (Setonix brachyurus).

Viewing Fungus Spores

There are a few different treatments for viewing spores. The technique which was used was the preserved treatment in lactophenol, in which the stain, cotton blue, was incorporated. It's a very simple process to execute, though it is a temporary treatment if not sealed with a cement.

Technique

One drop of lactophenol is placed on a slide. With the use of a sharp pointed instrument, the spore bearing layer of hymenium from the sporocarp is scraped over the lactophenol. Finally a coverslip is placed over the solution. The cotton blue stain is an advantage to observe the spores clearly.

SUMMARY

Hypogean fungi is a major proportion of the woylie's diet. The analysis of scat samples has showed this.
The spores were examined and classified for identification according to their morphological characteristics. These are stated as follows: 1. shape
2. surface markings
3. size
and 4. colour
Permanent mounting of spores is preferable for long term handling.

PHOTOGRAPHY

All the photographs were taken under a light microscope, with the magnification of 15 x 40.

ACKNOWLEDGEMENTS

I wish to thank Dr. P. Christensen for his assistance and T. Leftwich for taking the photographs.

IDENTIFICATION OF SPORES

The *fungus* spores were identified by Dr. J.M. Trappe (U.S. Department of Agriculture), and R. Hilton (Botany Department, University of Western Australia.)

MYCOLOGY KEY

The un-named fungus spores (which are stated with a number or letter), were found in woylie scat samples, and have not as yet been officially identified.

The spores were measured in microns (μ).

Legend

* Diagram of the spore (no photograph).

There are photographs for all the other spore types mentioned in the key.

MYCOLOGY KEY

1. SPHERICAL

A. SURFACE WITHOUT MARKINGS

a. SIZES UP TO 10μ IN DIAMETER

(i) Hyaline

(ii) Colour

Mean: 9
Range: 7.5 to 10 - Dark (brown), thick walled. — Spore 37 Fig. 2

b. SIZES >10μ IN DIAMETER

(i) Hyaline

Mean: 16
Range: 12.5 to 25 - Very thick walled. * Spore 48 Fig. 23

(ii) Colour

Size: 45 - Dark brown, very thick walled (can be up to 5μ thick). — Spore 39 Fig. 3

B. SURFACE WITH MARKINGS

a. SIZES UP TO 10μ IN DIAMETER

(i) Hyaline

Mean: 7
Range: 6 to 8 - Knobbly surface. — Martellia sp. #2 Fig. 4

Mean: 7
Range: 5 to 9 - Thick walled. * Spore (e) Fig. 24

(ii) Colour

b. SIZES >10μ IN DIAMETER

(i) Hyaline

Mean: 11.5
Range: 9 to 15 - Has well pronounced flanges. — Martellia sp. #1 Fig. 5

(ii) Colour

Mean: 13
Range: 10 to 15 - Brown with rugged surface. — Spore 1 Fig. 6

Size: 16 - Dark, spikey surface. * Spore 44 Fig. 25

Mean: 20
Range: 17.5 to 25 - Dark brown, very thick walled and bumpy surface. — Spore 38 Fig. 7 Labyrinthomyces varius (Rodw.) Trappe comb. ined. Fig. 8

Mean: 23
Range: 20 to 25 - Dark, thick walled and marked like a golf ball.

2. OVAL

A. SURFACE WITHOUT MARKINGS

a. SIZES UP TO 10μ IN LENGTH

(i) Hyaline

Mean: 3 x 1
Range: 2.5 to 3 x 1 — Spore 41 (a) Fig. 9

Mean: 7.5 x 2.5
Range: 6 to 8 x 1.5 to 3 - Larger version of 41 (a). — Spore 41 (b) Fig. 10

Mean: 7.5 x 5
Range: 5 to 10 x 5 - Elliptical. — Mesophellia arenaria Berk. Fig. 11

Mean: 9 x 5
Range: 5 to 10 x 5 - Elliptical, similar to M. arenaria but larger. — Mesophellia sabulosa (Cooke & Massee Lloyd) Fig. 12

Mean: 9 x 6.5
Range: 8 to 10 x 6 to 7 - Elliptical, thick walled. * Mesophellia sp. (New genus) Fig. 26

(ii) Colour

Mean: 9.5 x 4.5
Range: 9 to 10 x 4 to 5 - Elliptical, golden brown, thick walled. — Hymenogastraceae sp. (New genus) Fig. 13

Size: 10 x 5 - Yellow brown, thick walled, reniform shaped. — Spore 40 Fig. 14

b. SIZES >10μ IN LENGTH

(i) Hyaline

Mean: 11.5 x 5.5
Range: 9 to 13 x 5 to 6 - Elliptical, knobbly spore. — Mesophellia sp. (b) Fig. 15

Mean: 16 x 7.5
Range: 15 to 17.5 x 6.5 to 10 - Irregular shaped with double inclusions. * Spore (j) Fig. 27

i) Colour

Mean: 32.5 x 18
Range: 30 to 37 x 15 to 25 - Dark brown to black, rhomboidal shaped. Wakefielda sp. Fig. 16

URFACE WITH MARKINGS

IZES UP TO 15μ IN LENGTH

i) Hyaline

Mean: 8 x 6.5
Range: 7 to 10 x 4 to 6 - Ovate spore with attachment scar at one end. Mesophellia pachythrix (Cooke & Massee Lloyd) Fig. 17

Mean: 11.5 x 4.5
Range: 10 to 12 x 4 to 5 - Elliptical, attachment scars at both ends but not always obvious. Hysterangium affine Mass & Rodw Fig. 18

) Colour

Mean: 14 x 6
Range: 12 to 16 x 5 to 7.5 - Yellow brown, ovate, thick walled. Spore 42 Fig. 19

IZES >15μ IN LENGTH

) Hyaline

Size: 20 x 10 - Knobbly. Spore 45 Fig. 20

Mean: 16 x 9
Range: 15 to 18 x 8 to 10 - Yellow brown, knobbly. Spore 46 Fig. 21

Mean: 16 x 9.5
Range: 12 to 18 x 8 to 12 - Brown yellow, longitudinal flanges, twisted. Australasia chlorospora Stewart & Trappe Fig. 22

Mean: 17.5 x 9
Range: 15 to 20 x 8 to 10 - Brown, thick walled. * Spore 28 Fig. 28

FIG. 2 Spore 37

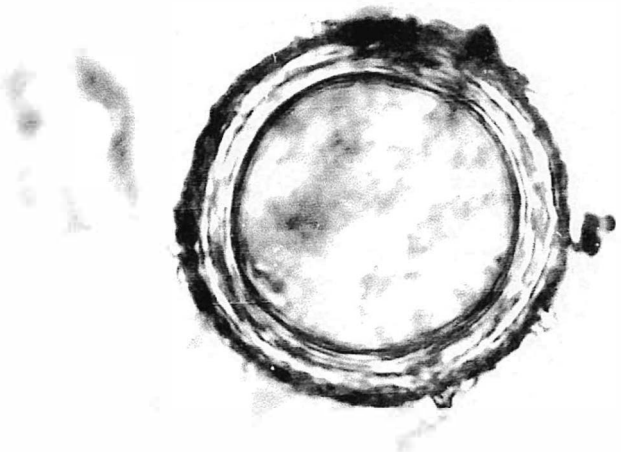

FIG. 3 Spore 39

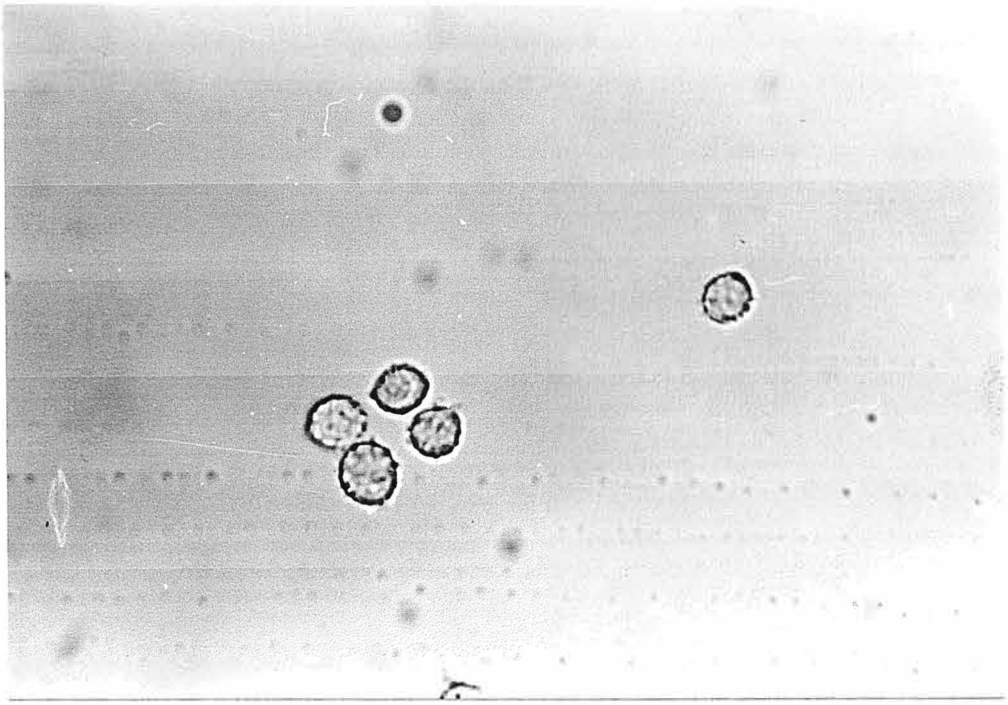

FIG. 4 Martellia sp. #2

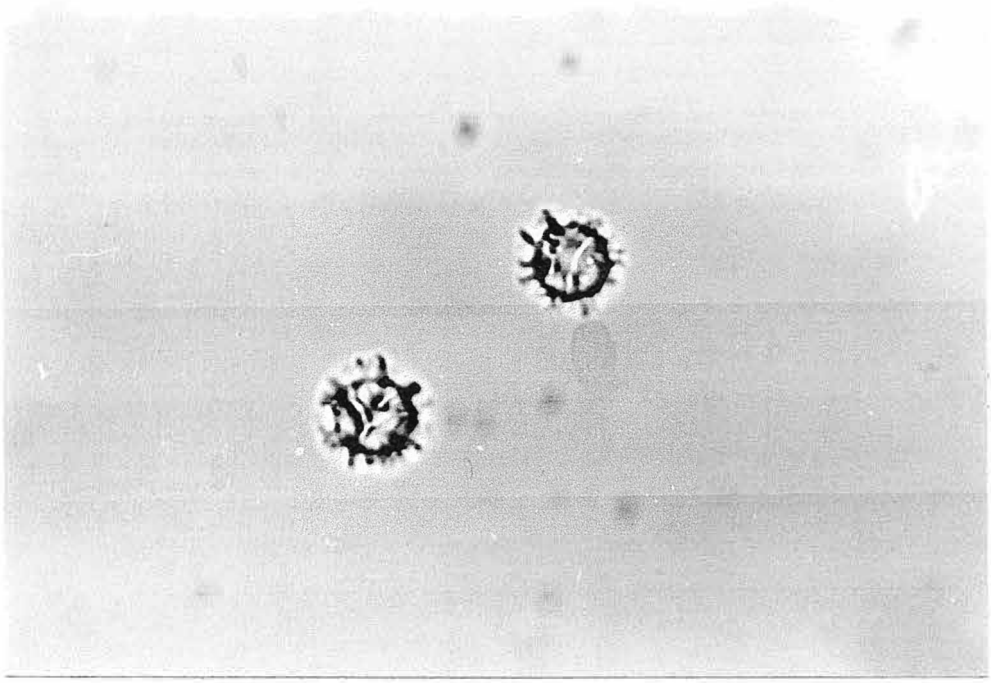

FIG. 5 Martellia sp. #1

FIG. 6 Spore 1

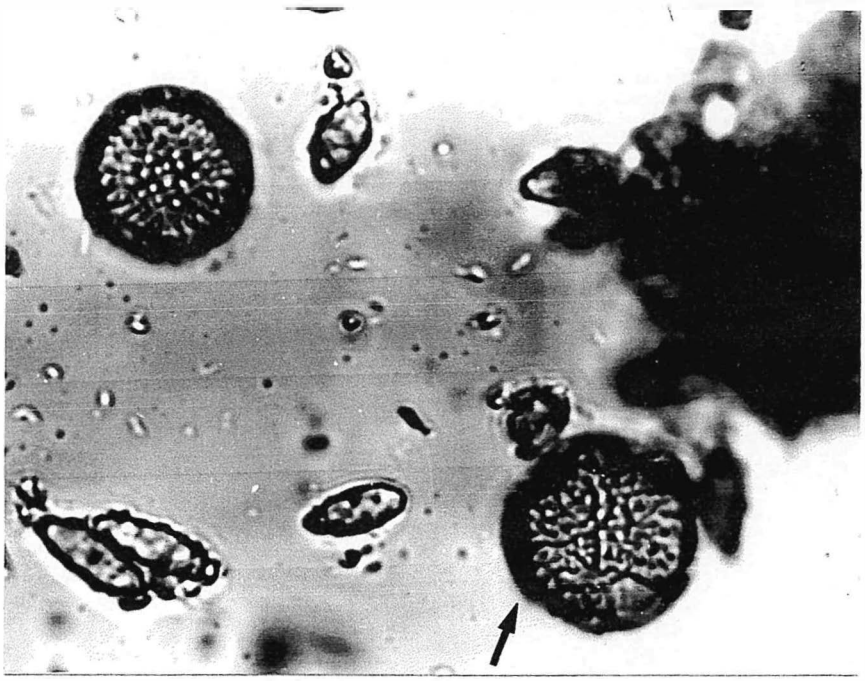

FIG. 7 Spore 38

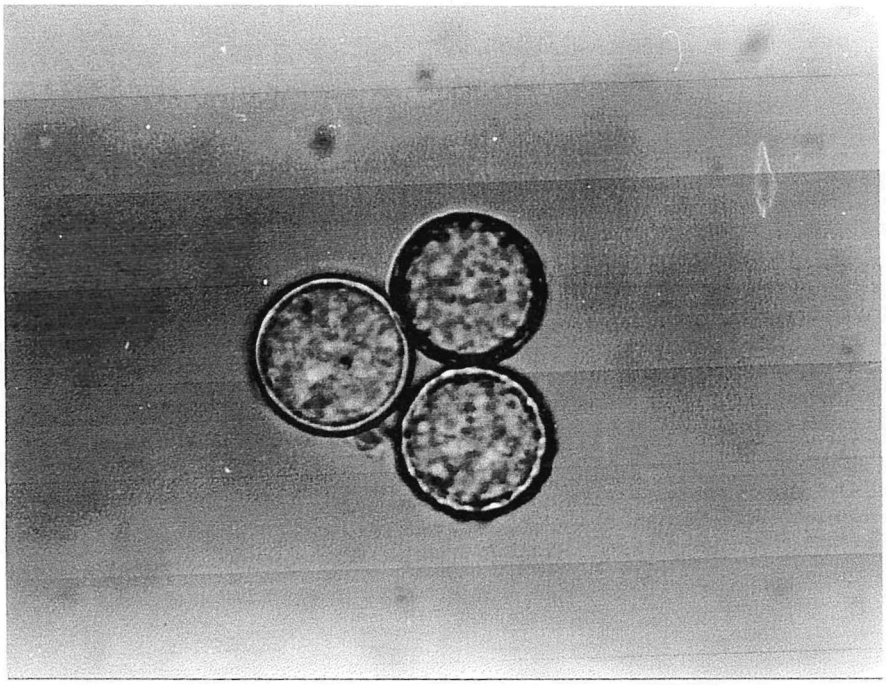

FIG. 8 Labyrinthomyces varius

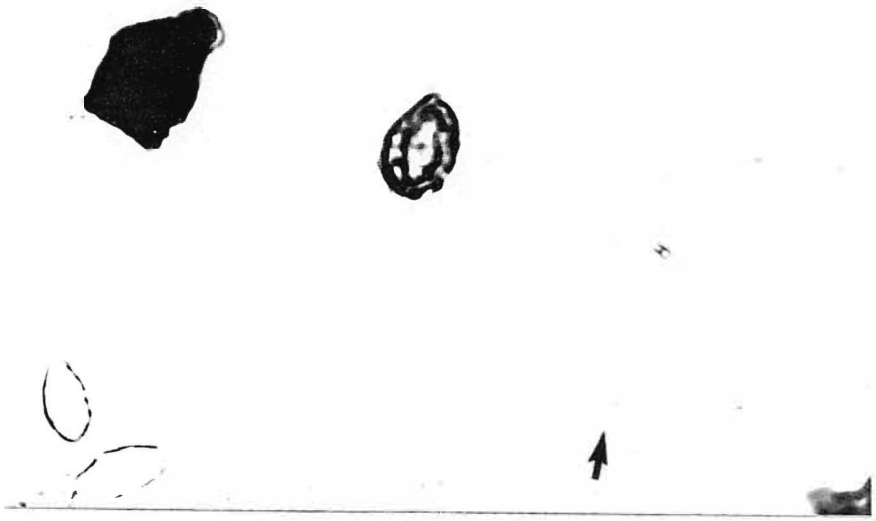

FIG. 9 Spore 41 (a)

FIG. 10 Spore 41 (b)

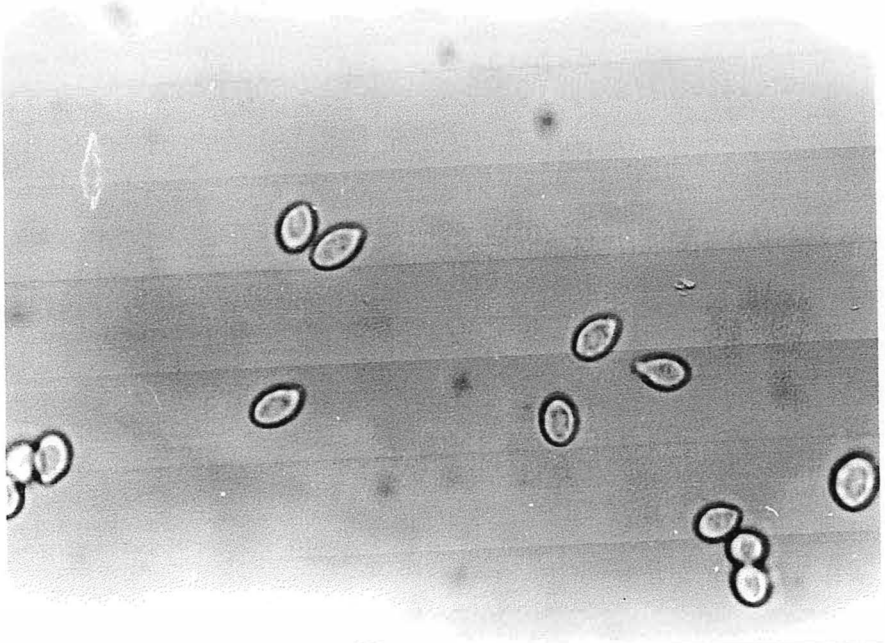

FIG. 11 Mesophellia arenaria

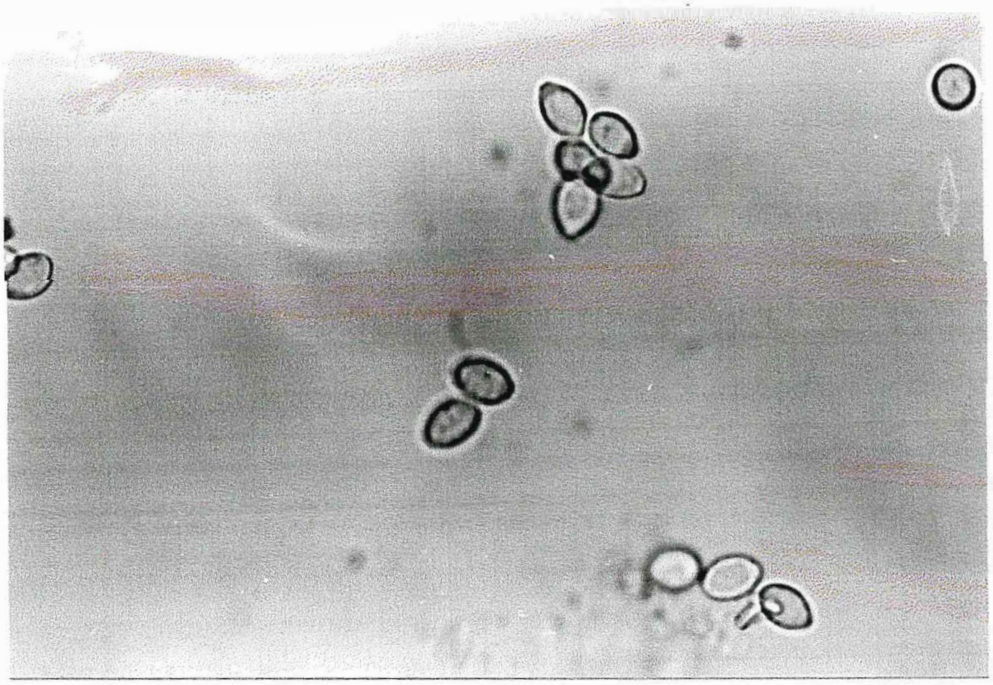

FIG. 12 Mesophellia sabulosa

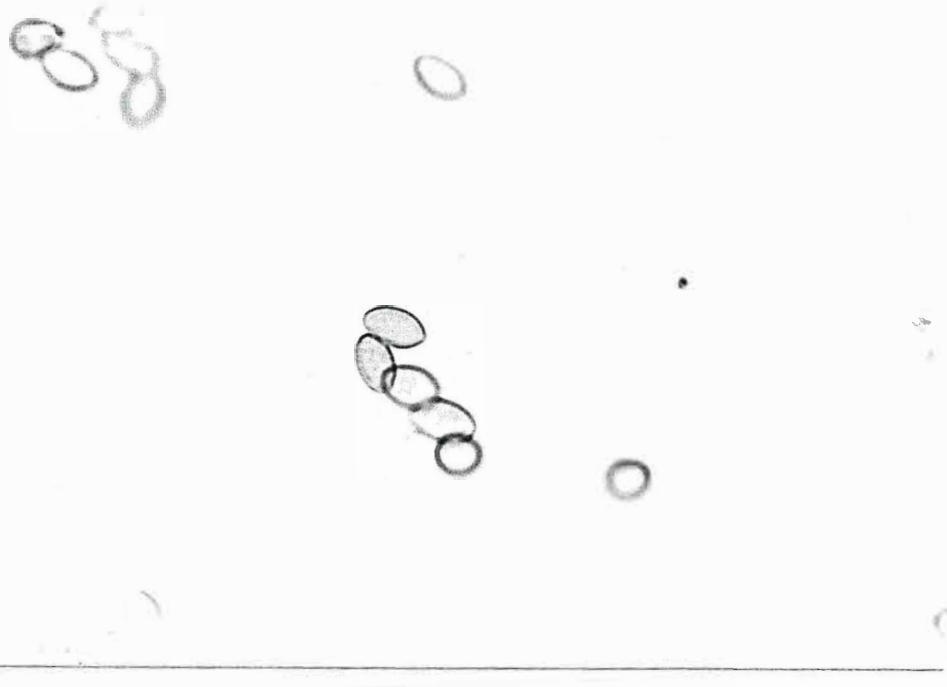

FIG. 13 Hymenogastraceae sp.

FIG. 14 Spore 40

FIG. 15 Mesophellia sp. (b)

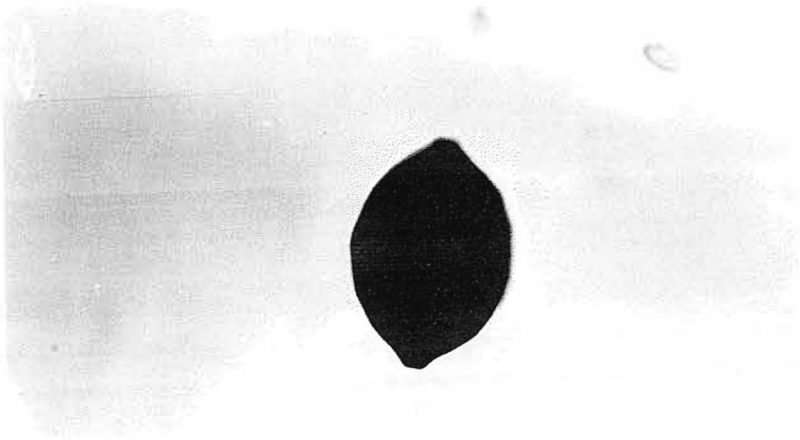

FIG. 16 Wakefielda sp.

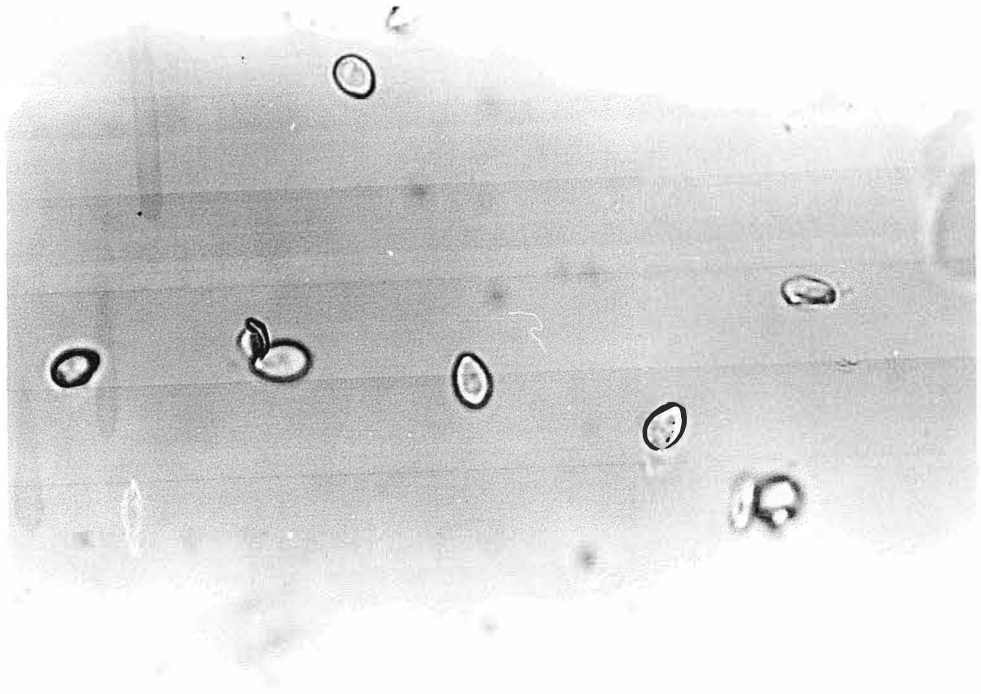

FIG. 17 Mesophellia pachythrix

FIG. 18 Hysterangium affine

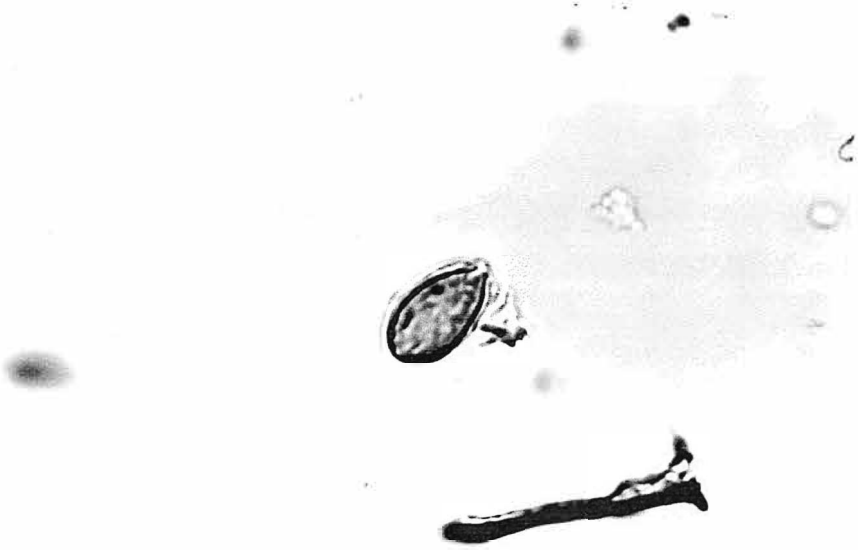

FIG. 19 Spore 42

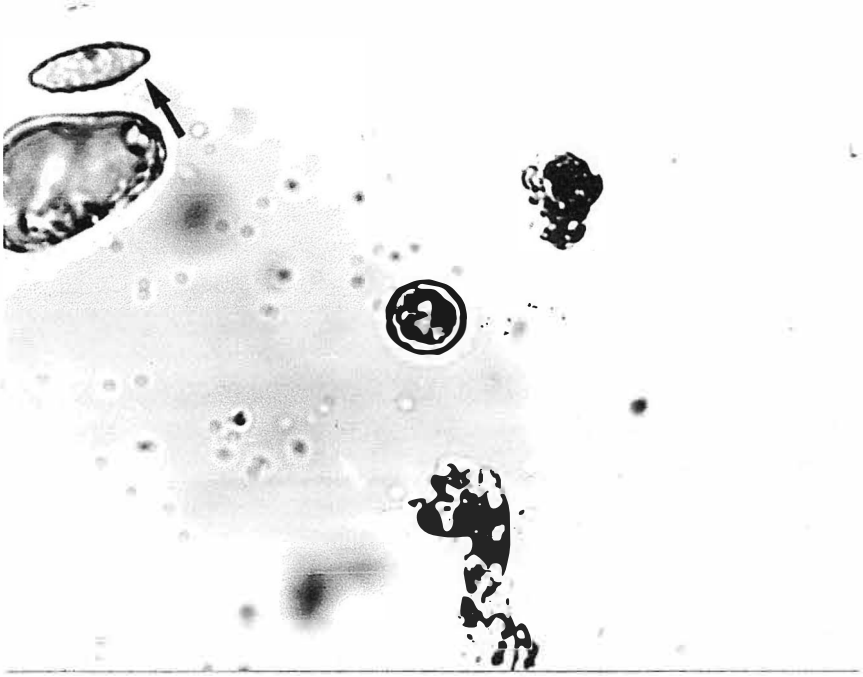

FIG. 20 Spore 45

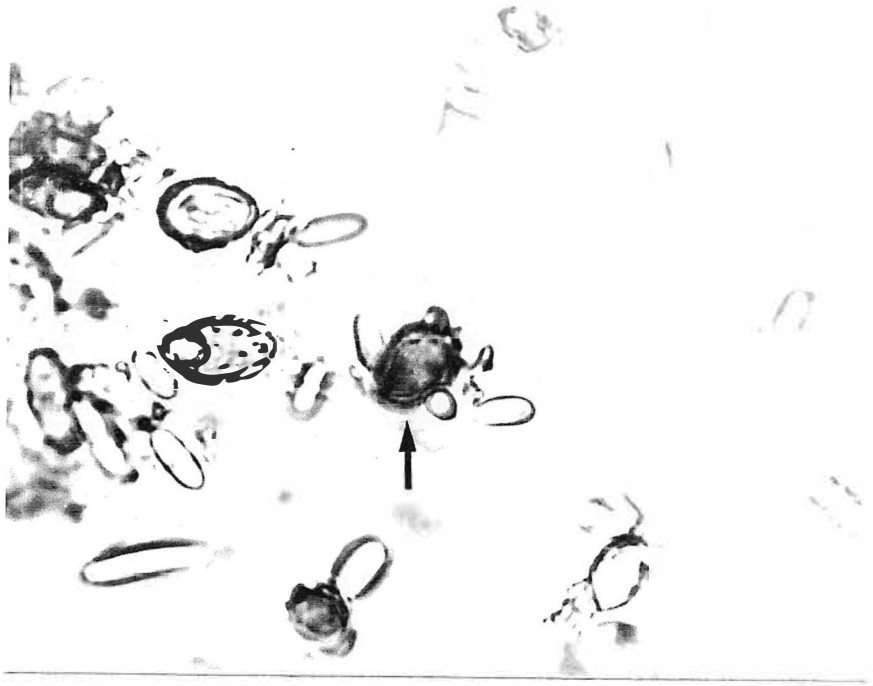

FIG. 21 Spore 46

FIG. 22 Australasia chlorospora