CANADIAN THESES ON MICROFICHE

I.S.B.N.

THESES CANADIENNES SUR MICROFICHE

National Library of Canada
Collections Development Branch

Canadian Theses on
Microfiche Service

Ottawa, Canada
K1A 0N4

Bibliothèque nationale du Canada
Direction du développement des collections

Service des thèses canadiennes
sur microfiche

NOTICE

The quality of this microfiche is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us a poor photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this film is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30. Please read the authorization forms which accompany this thesis.

THIS DISSERTATION HAS BEEN MICROFILMED EXACTLY AS RECEIVED

AVIS

La qualité de cette microfiche dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de mauvaise qualité.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30. Veuillez prendre connaissance des formules d'autorisation qui accompagnent cette thèse.

LA THÈSE A ÉTÉ MICROFILMÉE TELLE QUE NOUS L'AVONS REÇUE

NL-339 (r. 82/08)

Canada

National Library of Canada | Bibliothèque nationale du Canada

Canadian Theses Division | Division des thèses canadiennes

Ottawa, Canada
K1A 0N4

0-315-06070-0

53990

PERMISSION TO MICROFILM — AUTORISATION DE MICROFILMER

• Please print or type — Écrire en lettres moulées ou dactylographier

Full Name of Author — Nom complet de l'auteur

Valerie Mary Mann

Date of Birth — Date de naissance

July 6, 1956

Country of Birth — Lieu de naissance

Canada

Permanent Address — Résidence fixe

P.O. Box 696
Rothesay N.B.
E0G 2W0

Title of Thesis — Titre de la thèse

Taxonomy of Petriellidium

University — Université

University of Alberta

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée

Master of Science

Year this degree conferred — Année d'obtention de ce grade

1981

Name of Supervisor — Nom du directeur de thèse

Dr J. W. Carmichael

Permission is hereby granted to the NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

L'autorisation est, par la présente, accordée à la BIBLIOTHÈQUE NATIONALE DU CANADA de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans l'autorisation écrite de l'auteur.

Date

June 16/81

Signature

Valerie M. Mann

NL-91 (4/77)

THE UNIVERSITY OF ALBERTA

Taxonomy of *Petriellidium*

by

© Valerie M. Mann

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF Master of Science

IN

Mycology

Department of Medical Bacteriology

EDMONTON, ALBERTA

Fall 1981

THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR Valerie M. Mann

TITLE OF THESIS Taxonomy of *Petriellidium*

DEGREE FOR WHICH THESIS WAS PRESENTED Master of Science

YEAR THIS DEGREE GRANTED Fall 1981

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(SIGNED) Valerie M. Mann

PERMANENT ADDRESS:

P.O. Box 696

Rothesay, N.B.

E0G 2W0

DATED June 14 1981

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Taxonomy of *Petriellidium* submitted by Valerie Mann in partial fulfilment of the requirements for the degree of Master of Science in Mycology.

J. W. C. Cain Campbell

Supervisor

Fred L. Cook

Lorne L. Kennedy

K. A. Harrison

Date: May 29/1981

To my parents with love.

Abstract

Strains representing all species of *Petriellidium* plus representative strains of the Microascaceae and Pithoascaceae and *Thielavia* were examined in culture. Characters based on the ascospores, conidia and vegetative growth were recorded and used as attributes for both intuitive and quantitative "TAXMAP" (Carmichael 1980) comparisons.

Benny and Kimbrough's (1980) reclassification of the families Microascaceae and Pithoascaceae was supported by this study. Part of von Arx's (1973, 1978) classification of the genus *Petriellidium* was found to be unsatisfactory. A new key is proposed for the five species accepted in *Petriellidium*; (*P. africanum*, *P. angustum*, *P. boydii*, *P. desertorum* and *P. fimeti*). *P. ellipsoideum* and *P. fusoideum* are reduced to synonyms of *P. boydii* and *P. angustum* respectively. Composite descriptions are given for *P. angustum* and *P. boydii*. These two species were found to have identical *Scedosporium* states, but differed in ascospore size and shape. A discussion of the nomenclature of *P. boydii* is included.

The *P. boydii* strains examined did not reflect the wide variation in ascospore size recorded in the literature, but exhibited the moderate intra- and inter-strain variation one would expect in a single species.

Acknowledgements

The author wishes to express her appreciation to Dr. J. W. Carmichael for his support and counsel during the course of this study.

The author would also like to express her gratitude to the Department of Medical Bacteriology with special thanks to Richard Sherburne for his assistance with the electron microscopy and photography.

Table of Contents

List of Tables

List of Figures

Abbreviations

BBL	Baltimore Biological Laboratory
°C	degrees centigrade
CBS	Centraalbureau voor Schimmelcultures
Cer.	Cereal agar
cm	centimeter
mins	minutes
ml	milliliter
mm	millimeter
Oat.	Oatmeal agar
PYE	Phytone Yeast Extract agar
Sab.	Sabouraud Dextrose agar
SEM	Scanning Electron Microscopy
UAMH	University of Alberta Mold Herbarium
µm	micrometer

I. Introduction

A. Occurrence and Nature of *Petriellidium boydii*

Petriellidium boydii is a widely distributed fungus that has been studied primarily because of its pathogenicity for man and animals. In man, *P. boydii* causes mycetoma, disseminated infections (Walker et al. 1978), brain abcesses (Winston et al. 1978), otomycosis, parotitis (Rippon and Carmichael 1976), keratomycosis (Bakerspigel 1971), sinusitis (Gluckman et al. 1977), pulmonary infections (Louria et al. 1966, Rippon 1981) and prostatitis (Meyer and Herrod 1961). In animals, *P. boydii* causes mycotic abortion in cattle and mycetoma in dogs and horses (Ainsworth and Austwick 1973).

Rippon (1974) gives a complete description of mycetoma, its pathology and the etiologic agents. Mycetoma usually occurs on a hand or foot, following implantation of the fungus into the tissue via injury. There may be an extended time period before clinical manifestations occur (Shear 1922). The resultant infection consists of localized swollen lesions with draining sinuses and grains. These three characters collectively define "mycetoma". *P. boydii* produces a white grain mycetoma. Rippon defines a grain to be composed of "microcolonies" of fungus.

P. boydii has been recovered numerous times from soil. Ajello (1952) first reported its isolation from Tennessee farm soil. Since then many isolates of *P. boydii* from soil

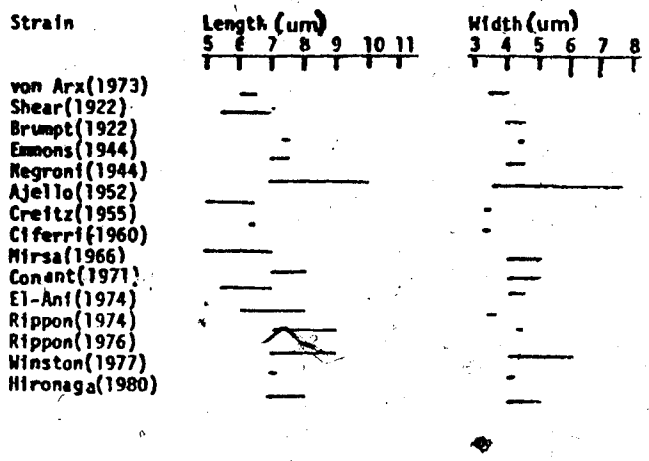
have been reported worldwide (Rippon 1974). Bell (1976) surveyed Alberta cattle feedlots for the occurrence of *P. boydii* in cattle manure. A number of *P. boydii* strains were recovered. He suggested that the fungus passed through the intestinal tract with the feed and was not a post excretion contaminant. Austwick (1976) isolated *P. boydii* from hay, grass and soil. He assumed it to be a main, high-temperature decomposer of organic matter. *P. boydii* has also been reported from marine environments (Pawar et al. 1965, Kink 1967).

In culture *P. boydii* produces a "brownish mouse fur - grey" colony (Rippon 1974). Clavate hyaline to dilute yellow-brown conidia are produced on annellated conidiogenous cells either diffusely (the *Scedosporium* state of *P. boydii*) or on synnemata (the *Graphium* state of *P. boydii*). The ascogenous state, when produced, consists of brown cleistothecia containing evanescent asci with eight ascospores.

Variation in the ascospore size of clinical isolates, as reported in the literature, was found to be larger than expected (Table 1), ranging from 3.4 x 5-6.5 *um* (Ajello 1952) to 3.5-7.5 x 7-10 *um* (Negroni and Fischer 1944). This variation leads to the question: is *P. boydii* two or more species, or is this intra-specific variation? The primary objective of this study was to answer this question. In addition, the relationship of *P. boydii* to other described *Petriellidium* species and the relationship of *Petriellidium*

to the other genera of the Microascaceae were reviewed.

Table 1. Reported ascospore sizes for isolates referred to as *Petriellidium boydii*



The first author and date of the reference in which the *Petriellidium boydii* ascospore size is cited are included in Table 1.

B. History of the Classification of *P. boydii*

The diffuse conidial state was first described as *Monosporium apiospermum* by Saccardo (1911) based on Tarozzi's isolate from a mycetoma. At this time, Saccardo also suggested the generic name *Scedosporium*, but did not validate it. The generic name *Monosporium* is now regarded as a *nomen illegitimum* because its original species included the types of three earlier generic names, *Montospora*, *Peronospora* and *Streptothrix* (Hughes 1958). Castellani and Chalmers (1919) validated the generic name *Scedosporium* and published the combination *Scedosprium apiospermum*; however, most other investigators did not begin to use this name

until the 1970's.

The synnematous conidial state is now referred to the form-genus *Graphium*. The history of *Graphium* was detailed by Crane and Schoknecht (1973). According to Siebenmann (1889), Harz and Bezold in 1889 described *Verticillium graphii*, isolated a number of times from ear infections, which was probably the *Graphium* state of *P. boydii*. Mason (1941) discussed Vuillemin's transfer of this species to *Glenospora* in 1912. Shear (1922) described the *Graphium* state of his *Allescheria boydii* as *Dendrostilbella boydii*. *Dendrostilbella* is now regarded as having a phialidic form of conidial development whereas the *Graphium* state of *P. boydii* has annellidic conidiogenesis. (Carmichael et al. 1980)

The sexual state of *P. boydii* was first described by Shear (1922) based on Boyd and Crutchfield's clinical isolate from an ankle mycetoma. Shear referred the isolate to Saccardo and Sydow's genus *Allescheria*. He proposed names for the three states of the fungus; *Allescheria boydii* for the ascogenous state, *Cephalosporium boydii* for the diffuse conidial state and *Dendrostilbella boydii* for the synnematous state. He did not realize that the conidial states had been previously described.

The relationship between *Allescheria boydii* and *Scedosporium apiospermum* was not discovered until several years later. Jones and Alden (1931) described a *Monosporium apiospermum* mycetoma isolate and its production of black

sclerotium-like bodies, which they thought were probably perithecia, although they did not see asci.

Emmons (1944) discovered *Allescheria boydii* to be the ascogenous state of *Monosporium apiospermum* when an Alberta mycetoma isolate (Dowding 1935), which for six years in his collection had yielded only the conidial state, began producing ascocarps.

Negroni and Fischer (1944) described a fungus isolated from a knee paramycetoma, naming it *Pseudallescheria shearii*. They claimed it differed from *Allescheria boydii* in ascus shape and conidial morphology. However, MacKinnon (1951) regarded it as *Allescheria boydii*, and the name *Pseudallescheria* never came into common use.

MacKinnon (1951) questioned the relationship of *Allescheria boydii* as the sexual state of *Monosporium apiospermum* claiming that the conidial state of *Allescheria boydii* was not of the *Monosporium* type, but rather a *Cephalosporium*. In 1954 he refuted his observation attributing the discrepancy to a contaminated culture.

Malloch (1970) transferred *Allescheria boydii* to his newly proposed genus *Petriellidium*, because in his opinion its characters did not fit the genus *Allescheria*. Malloch was not aware of Negroni and Fischer's publication of *Pseudallescheria*.

C. Nomenclator of *P. boydii*

Petriellidium boydii (Shear) Malloch 1970

=*Allescheria boydii* Shear 1922

=*Pseudallescheria shearii* Negroni et Fischer 1944

Scedosporium state of *P. boydii*

=*Monosporium apiospermum* Saccardo 1911

=*Scedosporium apiospermum* (Sacc.) Castellani et Chalmers 1919

=*Cephalosporium boydii* Shear 1922

Cferri (1960) lists other probable synonyms of *Scedosporium apiospermum.*

Graphium state of *P. boydii*

?=*Verticillium graphi* Harz et Bezold 1889

=*Glenospora graphii* (Harz et Bezold) Vuillemin 1912

=*Dendrostilbella boydii* Shear 1922

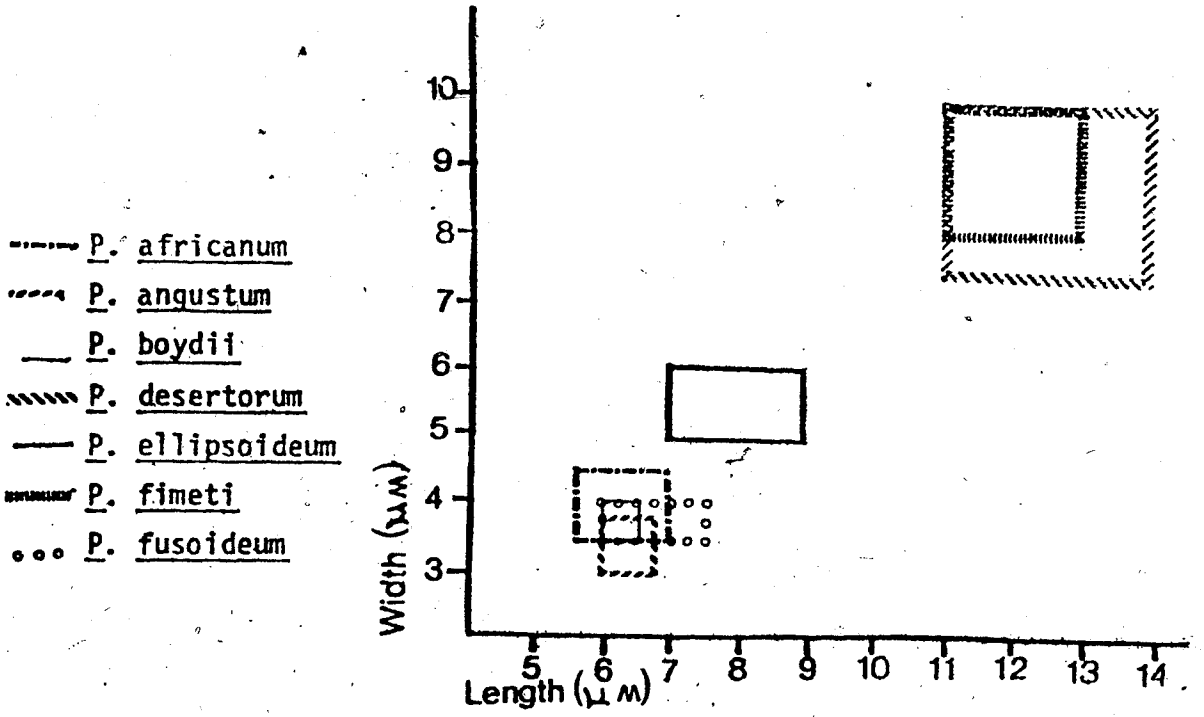
=*Glenospora boydii* (Shear) Poll. et Nannizzi 1929

D. Other species described in *Petriellidium*

Malloch and Cain (1972) added *P. angustum*, isolated from a sewage half digestion tank. Von Arx (1973) revised *Petriellidium* to add four species; *P. africanum, P. ellipsoideum, P. fusoideum and P. desertorum.* He also included a key to the genus *Petriellidium.* In 1978, von Arx added a seventh species to the genus, *P. fimeti*. All species

with the exception of *P. boydii* were isolated from soil and dung. Von Arx differentiated the *Petriellidium* species mainly on the basis of ascospore size and shape. As shown in Fig. 1, his ascospore measurements for some of the species overlap. Three clusters are evident; the first consists of four species, *P. africanum, P. angustum, P. boydii and P. fusoideum*, the second cluster consists of a single member *P. ellipsoideum* and the third cluster consists of *P. desertorum* and *P. fimeti*. The overlaping of the ascospore sizes raises the question of the validity of some of the species.

Fig. 1 Ascospore size in ranges of length and width according to von Arx (1973,1978)



The ascospore sizes in ranges of length and width are represented by the boxes.

E. *Petriellidium* and its relationship to the Microascaceae

Luttrell in 1951 proposed the family Microascaceae (class Plectomycetes) to accommodate the genus *Microascus*. *Microascus* was formerly placed in the Ophiostomataceae, but differed in centrum structure. *Petriella* was later included in the Microascaceae by Corlett (1966). Malloch (1970) further revised the family to include *Kernia*, *Lophotrichus* and *Petriellidium* along with *Petriella* and *Microascus*. Von Arx (1973) enlarged the Microascaceae to include *Pithoascus*. Also in 1973, Udagawa and Furuya included *Leuconeurospora* in the Microascaceae. The genus *Faurelina* was included by Locquin-Linard (1975) and in 1977 she also included *Enterocarpus*. Von Arx (1978) updated the key to the Microascaceae and questioned the position of some genera. Benny and Kimbrough (1980) made major revisions to the orders and families of the Plectomycetes. They included a detailed taxonomic history of the orders and families of the Plectomycetes, plus keys to the genera. The Microascales was defined to include three families; Microascaceae, Pithoasaceae and Chadefaudiellaceae. The family Microascaceae was redefined to include six genera; *Petriella*, *Petriellidium*, *Enterocarpus*, *Microascus*, *Kernia* and *Lophotrichus*. *Pithoascus* and *Faurelina* were transferred to a new family, the Pithoascaceae. A new family, the Chadefaudiellaceae with one genus *Chadefaudiella* was proposed.

F. Descriptions of the genera of the Microascaceae

Enterocarpus Locquin-Linard 1977

Type species: *E. unisporus* Locquin-Linard 1977. *Enterocarpus* was described as having non-ostiolate, dark brown to black ascocarps with long tufts of hair-like appendages. The reddish ascospores are oval and surrounded by a hyphal capillitium. No conidial state is known.

Kernia Nieuwland 1916

Type species: *K. nitida* (Saccardo) Nieuwland 1916. *Kernia* was described by Malloch and Cain (1971) as having thick-walled, non-ostiolate, dark brown to black ascocarps with fascicles of hair-like appendages. The reddish brown to brown ascospores are ellipsoidal to reniform. The conidial state when present is *Scopulariopsis* or *Graphium* or an arthrospore state.

Lophotrichus Benjamin 1949

Type species: *L. ampullus* Benjamin 1949. *Lophotrichus* was described by Malloch (1970) as having ostiolate, dark brown ascocarps with a neck. The golden ascospores are ellipsoidal to slightly asymmetrical. No conidial state is known.

Microascus Zukal 1885

Type species: *M. longirostris* Zukal 1885. *Microascus* was described by Barron et al. (1961) as having ostiolate, dark, carbonaceous, perithecium-like ascocarps with necks. The ascospores extrude from the mouth of the neck in a long red-brown cirrhus and occur in a variety of forms; oval, concavo-convex, plano-convex or triangular. The conidial state is *Scopulariopsis, Wardomyces* or *Wardomycopsis*, or in one species lacking.

Petriella Curzi 1930

Type species: *P. sordida* (Zukal) Barron et al. 1961. *Petriella* was described by Barron et al. (1961) as having an ostiolate, black, carbonaceous, perithecium-like, necked ascocarp. The red-brown asymmetrical to ellipsoidal ascospores are extruded in a cirrhus. The conidial states belong to *Sporothrix* and/or *Graphium*.

Petriellidium Malloch 1970

Type: *P. boydii* (Shear) Malloch 1970. *Petriellidium* was described by von Arx (1973) as having non-ostiolate, brown, ascocarps. The ascospores are golden, symmetrical and ellipsoidal. The conidial states belong to *Scedosporium* and/or *Graphium*.

II. Materials and Methods

A. Strains

At the beginning of this study, the University of Alberta Mold Herbarium and Culture Collection (UAMH) contained a number of strains identified as *P. boydii*. Additional isolates of *P. boydii* were obtained from J. Kane, Ontario Ministry of Health and by soil sampling of Edmonton area pastures. Type strains of the other *Petriellidium* species and other members of the Microascaceae were used whenever possible. Details of the source of each strain and its original identification are given as part of the description of the individual strains.

Table 2 lists the strains examined according to their identification at the start of the study. The authors and places of publication of the names are given here for convenience. The strains examined included; 35 isolates previously identified as *P. boydii* (or one of its conidial states); 6 isolates identified as other *Petriellidium* species, and 21 strains representing species of related genera, *Kernia*, *Lophotrichus*, *Microascus* and *Petriella*. Strains of *Pithoascus*, *Faurelina* and *Thielavia*, were also included because of their similarity with the Microascaceae.

Table 2 Strains examined

Microascaceae

Petriellidium

P. boydii (Shear) Malloch Mycologia 62:738 1970 38 strains

P. africanum v. Arx & Franz Persoonia 7:370 1973 UAMH 4000

P. angustum Malloch & Cain Can. J. Bot. 50:66 1972 UAMH 3984

P. desertorum v. Arx & Moustafa Persoonia 7:371 1973 UAMH 3993

P. ellipsoideum v. Arx & Fassatiova Persoonia 7:370 1973 UAMH 3987

P. fimeti v. Arx, Mukerji & Singh Persoonia 10:26 1978 UAMH 4257

P. fusoideum v. Arx Persoonia 7:371 1973 UAMH 3997

Kernia

K. nitida (Sacc) Nieuwland Amer. Mid. Nat 4:379 1916 UAMH 3060

Lophotrichus

L. ampullus Benjamin Mycologia 41:347 1949 UAMH 1762

Microascus

M. desmosporus (Lechmere) Curzi Boll. Staz. Pet. veg. Roma. 11:60 1931 UAMH 966

M. intermedius Emmons and Dodge Mycologia 23:324 1931 UAMH 2469

M. longirostris Zukal Verh. zool-bot Ges Wien 35:339

Table 2 (continued)

1885 UAMH 408

M. manginii (Loub.) Curzi Boll. Staz. Pat. veg. Roma. 11:60 1931 UAMH 2642

M. singularis (Sacc.) Malloch & Cain Can.J.Bot. 49:859 1971 UAMH 2637

M. trigonosporus Emmons & Dodge Mycologia 23:317 1931 UAMH 655

Petriella

P. guttulata Barron & Cain Can. J. Bot. 39:841 1961 UAMH 3996

P. lindforsii Curzi Boll. Staz. Pat. veg. Roma. 11:380-423 1931 UAMH 3999

P. musispora Malloch Mycologia 62:728-731 1970 UAMH 3986

P. setifera (Schmidt) Curzi Boll. Regia. Staz. Patol. Veg. 10:382 UAMH 805 1662 1924 2702

P. sordida (Zukal) Barron & Gilman Can. J. Bot. 39:839 1961 UAMH 1410 3983 3985

Pithoascaceae

Faurelina

F. elongata (Udawaga & Furaya) v. Arx Persoonia 10:27-28 1978 UAMH 4232

Pithoascus

P. langeronii v. Arx Proc. K. Ned. Akad. Wet. (C) 76:295 1973 UAMH 4234

Table 2 (continued)

Chaetomiaceae

Thielavia

T. terricola (Gilman & Abbot) Emmons Bul. Torry Bot. Club. 57:124 1930 UAMH 1918

B. Media

The following media were employed in this study.

1. Oatmeal agar

Magnesium sulfate	1 g
Potassium dihydrogen phosphate	1.5g
Sodium nitrate	1g
Oatmeal	10g
Agar	18g
Water	1000ml

2. Cereal agar

Pablum Mixed Cereal, (Mead Johnson)	100g
Agar	15g
Water	1000ml

3. Phytone Yeast Extract agar (BBL)

Dextrose	40g
Phytone	10g
Yeast extract	5g
Streptomycin	.03g
Chloramphenicol	.05g
Agar	17g

Water	1000ml

4. Sabauraud's Dextrose agar (Difco)

Dextrose	40g
Neopeptone	10g
Agar	15g
Water	1000ml

5. Rose Bengal medium

Czapek Solution agar (Difco)	49g
Rose Bengal dye (Matheson, Coleman and Bell)	.675g
Streptomycin (Allen and Hanbury)	.03g
Water	1000ml

All media were sterilized by autoclaving at 121°C at 15 pounds steam pressure for 15 minutes. Approximately 35 mls of the medium was transferred to a 90 mm plastic petri plate and allowed to cool.

C. Standard Culture Conditions

Transfers and inocula

Working stock cultures on cereal slants were prepared from the frozen or lyophilized UAMH collection and incubated at 25°C for 1 - 2 weeks until most of the agar surface was covered by mycelial mat. The stock cultures were then kept at 4°C.

A small piece of the stock culture mycelial mat was transferred to the center of agar plates for growth. Each strain was inoculated to Oat., Cer., PYE and Sab. agar plates at three separate times for the *Petriellidium* strains

and one to two times for the other genera and incubated at 25°C.

Temperature

Oat. plates of the *Petriellidium* strains contained in the culture collection at the beginning of the study were incubated at 18°C, 25°C and 30°C for 31, 63 and 100 days. Oat. plates for all the *Petriellidium* species, and the remaining genera of the Microascaceae, *Faurelina*, *Pithoascus* and *Thielavia* were incubated at 37°C, 40°C, 45°C and 50°C until the maximum growth temperature had been determined. The plates were sealed with tape to retard drying.

All other plates were incubated at 25°C unless otherwise stated.

Incubation

Cultures were incubated in the inverted position unless otherwise stated. Cultures were examined for one month (31 days) then held for at least two months with daily fluorescent room light for examination for cleistothecial production. If the culture was to be held for an extended period of time e.g. five months it was placed in a plastic bag.

Descriptions

Each colony on Oat., Cer., PYE and Sab. agar was examined every four days for growth characteristics and production of the ascosporic and synnematous states. After 31 days, mounts were made for microscopic examination.

Cleistothecium production

Several methods were tried to induce non-cleistothecium producing strains of *Petriellidium* to produce cleistothecia.

1. Cultures were incubated over extended time periods, up to five months at 25°C.
2. Cultures were incubated at 18°C and 30°C for 100 days in plastic bags.
3. Cultures were incubated at 25°C for four months, then at 4°C for two months.
4. Cultures were incubated at 25°C for one month then traumatized by slicing the mycelial mat with an inoculating needle and re-incubated for at least one month.
5. Cultures were inoculated on PYE slants, incubated for two weeks, placed in a freezer at -20°C for two weeks, then incubated at 25°C for three months.
6. Crossing experiments with non-cleistothecium producing strains were performed by L. Sigler. The strains examined included UAMH 0800, 3230, 3873, 3904 and 3905. All possible pairs of strains were streaked side by side on Cer. plates and incubated at 25°C for 55 days. The colonies were examined at various times for cleistothecia.

Ascospore germination studies

Mature cleistothecia of *Petriellidium* and *Petriella* species were removed from approximately two month old Oat. plates (Cer., if no cleistothecia were found on the Oat.

plate) and washed in a drop of sterile distilled water in a welled slide. A cleistothecium was then transferred to a test tube with 10 drops of sterile water. The cleistothecium was crushed and the suspension mixed thoroughly. Two drops of the suspension were placed on a PYE slide culture and allowed to dry. A coverslip was placed over the modified slide culture. Slide cultures were prepared according to the Mycologist's Handbook (Hawksworth 1974) except that the bent glass rod was replaced with two sterile applicator sticks. Two drops of molten PYE agar were dropped onto the slide and allowed to cool. The sterile filter paper was not moistened unless after five days of incubation at 25°C the ascospores had not germinated. The slide was examined daily for germination of the ascospores. Pictures of germinating ascospores were taken.

Scanning Electron Microscopy

Cultures were examined for the presence of mature cleistothecia (as judged by color and size). Cleistothecia of Oat. cultures were mostly submerged within the agar, while those found on other media were within the mycelial mat.

Blocks of agar or mycelial mat approximately 3x3x1 mm containing mature cleistothecia were cut from the sporulating colonies, placed in 1% osmium tetroxide in Sorenson's buffer and left overnight. The blocks were washed three times with Sorenson's buffer then dehydrated in an alcohol series (30%, 50%, 70%, 80%, 90% and 95%) for 30

minutes at each step. After dehydration the agar block was placed on a round coverglass. The cleistothecia were removed from the agar block and crushed open, liberating the ascospores. An intact cleistothecium was also dried on the coverglass. The coverglass with ascospores was allowed to dry overnight. If the specimen could not be examined immediately it was placed in a desiccator. The dried coverglass holding the specimen was glued to an aluminum stub, gold plated by the sputter technique and examined with a Cambridge Stereoscan S150 Scanning Electron Microscope.

Light microscopy and photography

Microscope preparations from colonies or slide cultures were made in glycerine jelly (Ainsworth 1971) mounting medium. The preparations were examined under a Zeiss phase microscope.

Photographs were taken with a 35mm camera with Kodak Panatomic X film. Photographs of colonies after 4 days incubation were taken with the same camera but attached to a stereomicroscope. Photographs of colonies after 21 days incubation were taken with a 35mm camera attached to a copy stand.

D. Pasture soil samples

28 soil samples were taken in the summer of 1980 from the superfical layer of pastures in the Edmonton area. In most cases hay and manure were present in the sample. One sample consisted only of manure and three others contained

chicken litter. Samples were placed in plastic bags and stored at room temperature until processed by two different procedures.

Padhye and Thirumalachar (1968) Method

Approximately one gram of soil was suspended in 30 ml of sterile antibiotic water containing 5000 units/ml sodium penicillin and 1000 units/ml streptomycin sulfate. The mixture was shaken and allowed to stand for one hour, after which one ml of supernatant was pipetted to PYE agar plates, spread with a glass spreader and incubated at 37°C. The majority of saprophytes are inhibited by the high temperature. The plates were incubated in the upright position for the first 24 hours to dry, then inverted. They were examined daily until overgrown with *Rhizopus* species, usually in about 3 days. Separate recognizable colonies were transferred to PYE agar plates at 37°C for subsequent identification.

Bell (1976) dilution method

Approximately one gram of soil was suspended in antibiotic water prepared as in the previous procedure; then serial dilutions were made in distilled water. One ml of the original and the 1:100 and 1:1000 dilutions were spread onto Rose Bengal agar plates and incubated at 37°C in the dark. A control plate was inoculated with *P. boydii* to check that growth conditions were suitable. The plates were examined after 4 days and every two days thereafter until no new colonies were evident.

Mounts of colonies to be identified were made in lactofuchsin. Identifications of the Hyphomycetes to generic level were made with the assistance of "The Genera of Hyphomycetes" (Carmichael et al. 1980) and to the species level using the specified references.

E. Wood samples

37 samples of wood soaked in sea water were collected during the summer of 1980 from the estuary of the Shediac River in N. B., wrapped in foil and placed in plastic bags. The samples were stored at room temperature until processed two weeks later.

Small (approximately 1cm x 5 mm x 1mm) chips were removed with a sterile scalpel and placed in five ml of sterile water, mixed and allowed to stand. A one ml sample was transferred to a Rose Bengal agar plate and spread with a sterile glass spreader. The plates were incubated in plastic bags at 37°C as noted with the soil samples. The plates were examined after four days and every two days thereafter for 14 days. Any colonies found were transferred to a PYE plate for identification. The wood samples were also placed in Petri dishes on top of a moistened filter paper and incubated at 37°C for two months then transferred to 25°C for five months. The wood samples were examined under a stereomicroscope and mounts were prepared in lactofuchsin from any sporulating growth on the wood. Cultures with different salt concentrations were not

attempted.

F. Transmission EM studies for viruses

The *P. boydii* strain UAMH 2324 was atypical and exhibited "poor growth". It did not produce aerial hyphae and at times the transfers failed to grow. Electron microscopic studies were performed in the hope of determining if a viral infection was present.

A block of hyphal mat, approximately 3x3x1 mm was cut from a culture growing on Cer. agar at 25°C. UAMH 2 was used as a control. The mycelial mats were fixed as previously described for SEM. A final rinse of absolute alcohol, followed by two rinses in propylene oxide were included. The samples were embedded in epon and heated to 60°C overnight.

The samples were cut and sectioned by a Richert OMU 2 sectioner, placed on a copper grid, stained with uranyl acetate for 10 mins, rinsed in methanol followed by a water rinse then further stained with lead citrate for 6 mins, rinsed and allowed to dry. A Philips EM 300 transmission electron microscope was used to examine the sections for the presence of viral particles and photographs of the sections were taken.

G. Quantitative analysis

Data obtained from observations on the studied strains were analysed by the "TAXMAP" computer classification program (Carmichael 1980) The program classifies the strains

into clusters of related strains by performing a series of statistical evaluations on the data (attribute values) and provides a taxometric map illustrating the inter-cluster relationships.

The analysis is performed with either differentially or equally weighted attributes. In the differential analysis, the attribute weight is calculated as the base 2 log of the number of classes over the range of the attribute (a class being one confidence interval wide) allowing good attributes to be stressed. In the equally weighted analysis the weight of every attribute is set at one.

The relative difference between pairs of strains or Operational Taxonomic Units (OTU's) is computed for each attribute, then the average difference between the pairs of OTU's for all attributes is determined. Clusters are defined by four criteria; (1) the single linkage criterion ("the single link compared to the average of the preceding single links") (2) the average linkage criterion ("a measure of closeness to all the members of the cluster") (3) the ratio criterion ("the minimum similarity between any pair of points in the cluster divided by the minimum similarity between the point being considered for admission and any point in the cluster") and (4) exclusion of points contained within another cluster (Carmichael et al. 1968).

Strains analysed

All strains listed in Table 2 were included in the quantitative analysis and two additional strains; a *Microascus desmosporus* and *Thielavia basicola* UAMH 4305.

Attributes

The attributes used in the quantitative analysis are listed in Table 3.

Table 3 Attributes used in the quantitative analysis

```
KEY TO ATTRIBUTE TYPES - BY WEIGHTING PROCEDURE
     0  = DELETE, WEIGHT =0.
     1  = SET WEIGHT TO 1.0.
     2  = WEIGHT AS LOG2 OF NO. OF CONFIDENCE INTERVAL CLASSES IN RANGE.
     3-N= MATCH WEIGHT = LOG2 N; NO-MATCH WEIGHT = 1.0.

ATTRIBUTE NO  TYPE  NAME AND STATES (0/1/2/ETC)                                  95% CONFIDENCE INTERVAL

          1    2  ASCOMATA DIA. MICRONS MIN.                                          66.25
          2    2  ASCOMATA DIA. MICRONS MAX.                                          66.25
          3    2  ASCOSPORE LENGTH MICRONS MIN.                                        2.12
          4    2  ASCOSPORE LENGTH MICRONS MAX.                                        2.12
          5    2  ASCOSPORE WIDTH MICRONS MIN.                                         1.80
          6    2  ASCOSPORE WIDTH MICRONS MAX.                                         1.80
          7    2  DIFFUSE CONIDIA LENGTH MICRONS MIN.                                  3.25
          8    2  DIFFUSE CONIDIA LENGTH MICRONS MAX.                                  3.25
          9    2  DIFFUSE CONIDIA WIDTH MICRONS MIN.                                   2.20
         10    2  DIFFUSE CONIDIA WIDTH MICRONS MAX.                                   2.20
         11    2  GRAPH. CONIDIA LENGTH MICRONS MIN.                                   3.75
         12    2  GRAPH. CONIDIA LENGTH MICRONS MAX.                                   3.75
         13    2  GRAPH. CONIDIA WIDTH MICRONS MIN.                                    1.52
         14    2  GRAPH. CONIDIA WIDTH MICRONS MAX.                                    1.52
         15    2  CHLAMYDO LENGTH MICRON MIN                                           4.58
         16    2  CHLAMYDO LENGTH MICRON MAX                                           4.58
         17    2  CHLAMYDO WIDTH MICRON MIN                                            4.25
         18    2  CHLAMYDO WIDTH MICRON MAX                                            4.25
         19    3  COLONY COLOR                                                         4.00
         20    3  REVERSE COLOR(LIGHT 1  MOD DARK 2  DARK 3)                           1.00
         21    2  ORANGE PIGMENT PRESENT/ABSENT                                        1.00
         22    2  GROWTH AFTER 28 DAYS ON OATMEAL AGAR                                 4.00
         23    2  TYPE OF GROWTH (0-NOT FURRY 1-FURRY)                                 1.00
         24    2  CLEIST. OSTIOLE PRESENT/ABSENT                                       1.00
         25    2  CLEIST. HAIR PRESENT/ABSENT                                          1.00
         26    2  CLEIST. PRESENT/ABSENT                                               1.00
         27    5  ASCOSPORE (ELLIP 1  HEART 2  ALLA 3  TRI 4  OTH 5  ABSENT 0)        1.00
         28    5  DIFFUSE CONIDIA STATE (SCEDO 1  SPORO 2  SCOP 3  ARTH 4  ABSENT 0)  1.00
         29    2  GRAPH. CONIDIA PRESENT/ABSENT                                        1.00
         30    2  BROWN CHLAMYDO PRESENT/ABSENT                                        1.00
         31    2  MAX GROWTH TEMP (BELOW 37 -1  37 -2  40 -3  45 -4  ABOVE 45 -5)     1.00
         32    2  CLEIST.DIA. MICRONS AVERAGE                                         66.25
         33    2  ASCOSPORE LENGTH MICRONS AVERAGE                                     2.12
         34    2  ASCOSPORE WIDTH MICRONS AVERAGE                                      1.80
         35    2  DIFFUSE CONIDIA LENGTH MICRONS AVERAGE                               3.25
         36    2  DIFFUSE CONIDIA WIDTH MICRONS AVERAGE                                2.20
         37    2  GRAPH  CONIDIA LENGTH MICRONS AVERAGE                                3.75
         38    2  GRAPH. CONIDIA WIDTH MICRONS AVERAGE                                 1.52
         39    2  CHLAMDO LENGTH MICRON AVERAGE                                        4.58
         40    2  CHLAMYDO WIDTH MICRON AVERAGE                                        4.25
```

Measurements of the ascospores and conidia were made from camera lucida drawings of 25 conidia or ascospores from slides from the standard media set or slide cultures and slides contained within the UAMH slide collection. Ten ascomata were measured with an ocular scale. The mean and standard deviation were calculated for each data set. The maximum, minium and average of the measurements were used as attribute values.

The ascomata were scored as 1-present, 0-absent. The presence or absence of an ostiole and external hair were also scored.

Ascospore shape was coded by six non-ordered classes; 1-ellipsoidal, 2-heart shaped, 3-allantoid, 4-triangular, 5-other, and 6-absent.

The diffuse conidial state was coded by five non-ordered states describing the type of conidium development; 1-*Scedosporium*, 2-*Sporothrix*, 3-*Scopulariopsis*, 4-Arthroconidia and 5-absent. The presence or absence of the *Graphium* conidial state and brown chlamydospores were coded as 1-present , 0-absent.

The type of hyphal mat was coded as being furry that is similar to rabbit's fur, - 1 or not - 0.

The maximum growth temperature on Oat. after 21 days incubation was coded as five ordered classes; 1-below 37°C, 2-37°C, 3-40°C, 4-45°C, and 5-above 45°C.

The vegetative colony color on Oat. after 28 days incubation at 25°C was coded as 18 ordered classes ranging

from clear to deep olive green. Empty classes were left between colours that were especially distinct. The colours were not based on a colour code standard such as Ridgway 1912 (Hawksworth 1974) because the descriptions become meaningless if the code is not available.

Clear	1
Off white	3
Light camel	4
Light mouse brown	5
Moderate mouse brown	6
Moderate mouse brown grey	7
Dark mouse brown	8
Light grey	10
Moderate silver grey	11
Dark grey	12
Light grey green	14
Deep grey green	15
Moderate olive green	17
Dark olive green	18

Reverse color on Oat. agar after 28 days incubation at 25°C was coded as three ordered classes; 1-light, 2-moderately dark or with dark patches or 3-dark.

The colony size on Oat. after 28 days incubation at 25°C was coded as the diameter in mm, or 90 mm if filling the petri plate.

Characters in which the variation within the strain was as large as the variation between the strains were not used, i.e., ascus size and shape.

When data were unavailable a value of 999 was assigned and assessed as missing data by the TAXMAP program.

III. Results and Discussion

A. Preliminary and miscellaneous investigations

Pasture soil and wood survey

The pasture soil survey of 28 samples from pasture areas around Edmonton, Alberta yielded the following fungi;

Species present	No.of samples
Rhizopus species	23
Phoma species	1
Aspergillus fumigatus	22
Aspergillus nidulans	1
Aspergillus niger	1
Aspergillus ustus	3
Scopulariopsis brevicaulis	8
Scopulariopsis konigii	3
Chrysosporium luteum	2
Chrysosporium parvum	1
Fusarium oxysporum	1
Penicillium species	1
Thielavia basicola	1
Petriellidium boydii	2

Of the three *P. boydii* strains isolated, UAMH 4408 produced the *Petriellidium* and *Graphium* states, the other two strains UAMH 4409 and UAMH 4410 both produced only the *Graphium* and *Scedosporium* states. Because the soil samples contained bits of hay and manure, it is not certain, whether the *P. boydii* isolates came from these substances or from

the other soil components.

An interesting isolate from the soil survey proved to be *Thielavia basicola* UAMH 4305. *Thielavia* produces ascospores similiar in size and shape to *Petriellidium*, but differs in ascospore colour, conidial state and hyphal mat. Malloch and Cain (1973) previously reported the isolation of *Thielavia basicola* from soil.

The survey of 28 wood samples from estuary of the Shediac River, N. B. yielded the following results;

Species present	No. of samples
Aspergillus fumigatus	4
Chrysosporium tropicum	1
Culcitalna achraspora	16
Microascus desmosporus	1

The wood survey did not yield *Petriellidium boydii*. Kirk (1967) isolated *P. boydii* from wood baits in an estuary in North Carolina. Pawar et al. (1965) isolated the *Scedosporium* state of *P. boydii* from saline mangrove flats. A member of the Microascaceae was isolated, *Microascus desmosporus*.

B. Effects of media, time and temperature on *P. boydii* ascospore and conidial sizes

Comparisons of ascospores and conidia using a representative sample of five *P. boydii* strains (UAMH 0002, 0153, 1265, 1865, and 2217) producing both the ascogenous state and diffuse conidial state were made to determine if

medium, time or temperature affected ascospore or conidial size. The conditions tested were:

1. Four media; Oat., Cer., PYE and Sab. after 31 days incubation at 25°C.
2. Oat. agar after seven and 14 days incubation at 25°C.
3. Oat. agar after 31 days incubation at 18, 25 and 30°C.
4. Oat. agar after 63 days incubation at 18, 25 and 30°C.
5. Oat. agar after 100 days incubation at 18, 25 and 30°C.

The results are shown in Figs. 2-10. The ascospore and conidium measurements, two standard deviations and the mean are represented by a line. The blank space in its middle represents the mean. The dots at either end of the line represent two standard deviations from the mean. Since no consistent differences were evident, it was concluded that comparisons of ascospores and conidia could be made with slides made from cultures grown for different times, or at different temperatures or on different media, within the limits of the test conditions.

The rate of ascospore maturation varied with the medium used. A mature ascospore was defined to be golden in brightfield microscopy. Plate 1 shows immature ascospores (UAMH 2217) contained within asci after one month incubation on PYE agar at 25°C. A mature ascospore is shown for comparison in the lower right photograph. There is considerable size variation among the immature ascospores,

Fig. 2 Conidial measurements from cultures on the four media after 31 days incubation at 25°C.

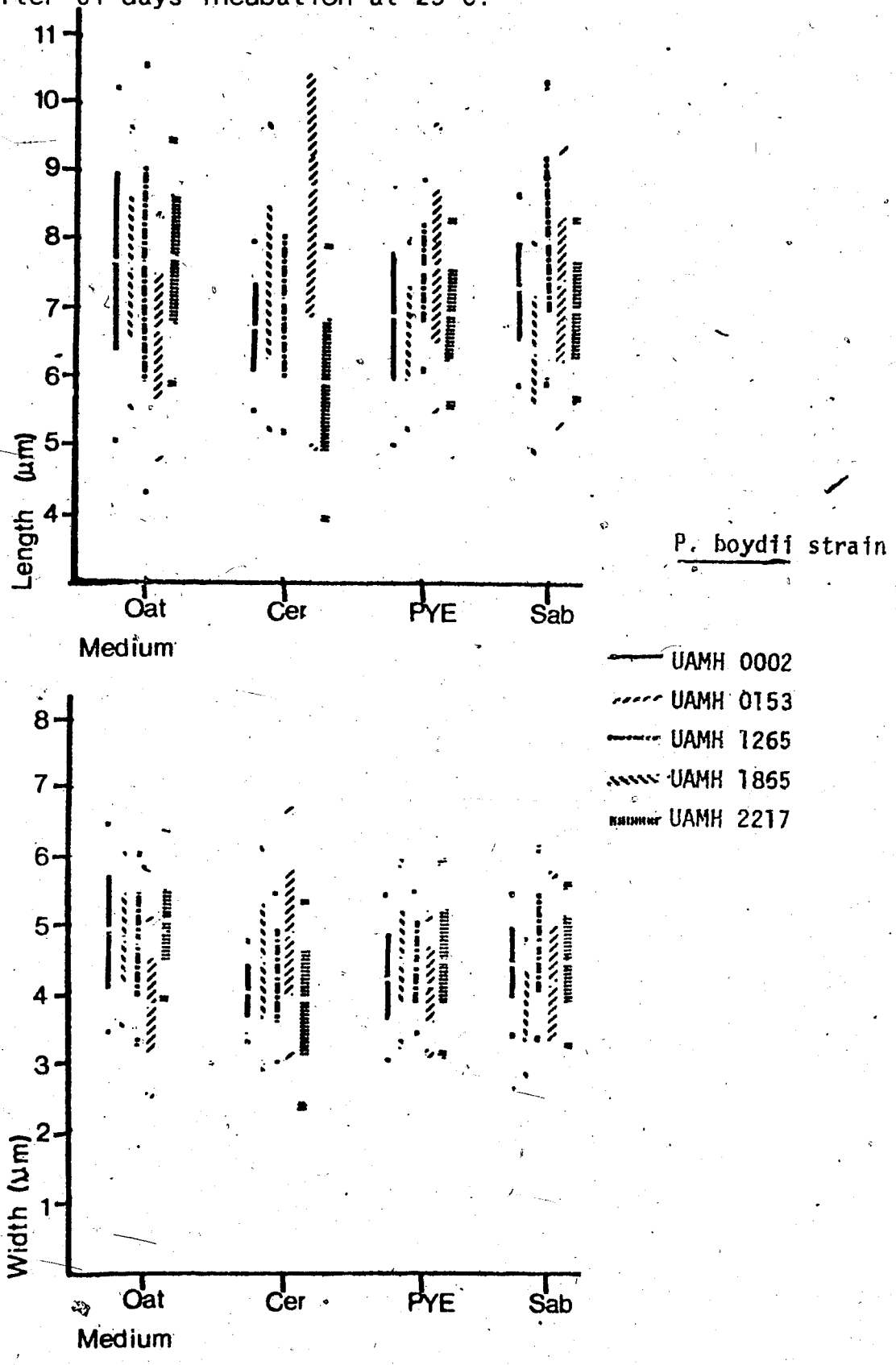


Fig. 3 Ascospore measurements from cultures on the four media after 31 days incubation at 25°C.

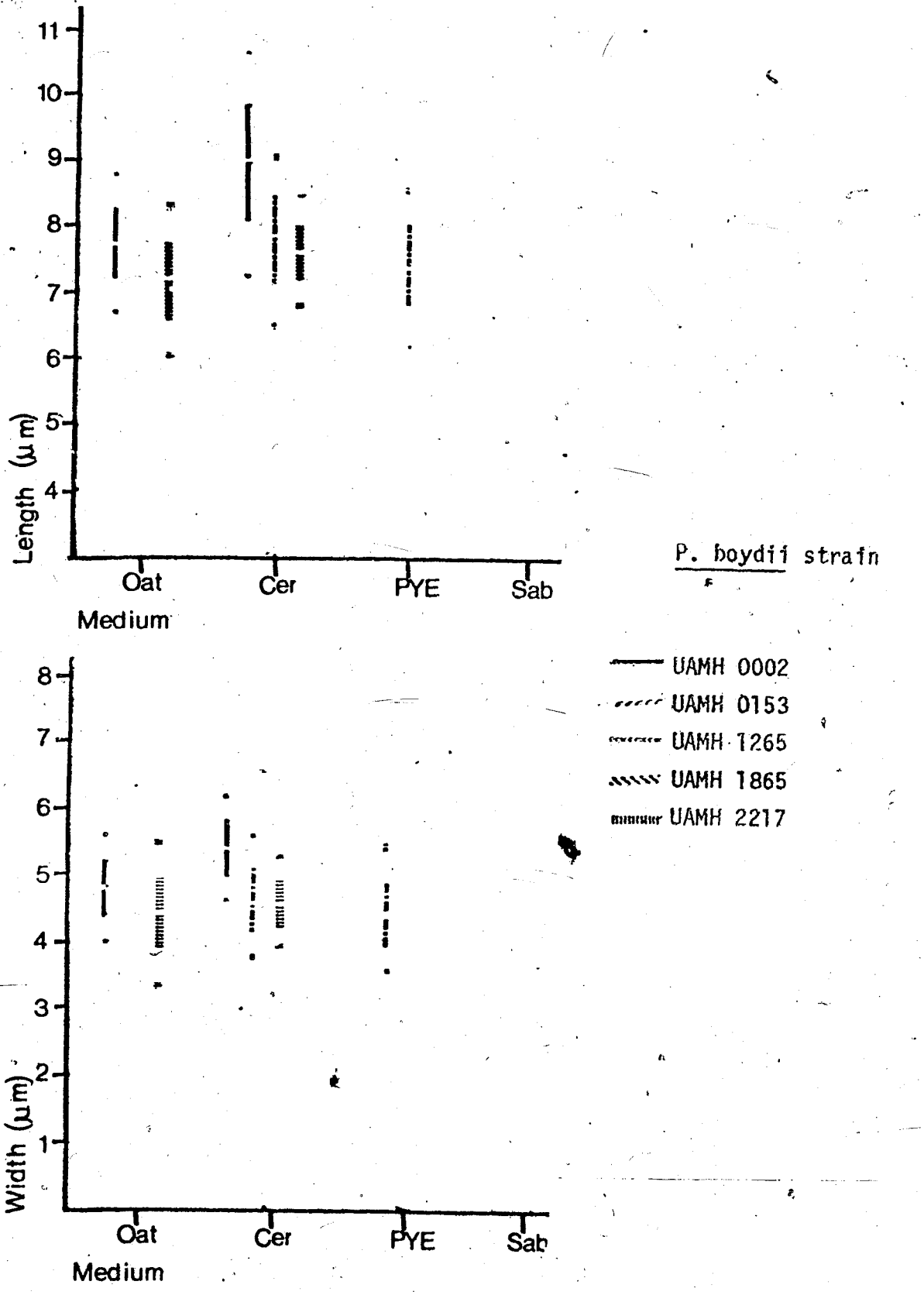


Fig. 4 Conidial measurements after 7 and 14 days incubation on Oat. at 25°C.

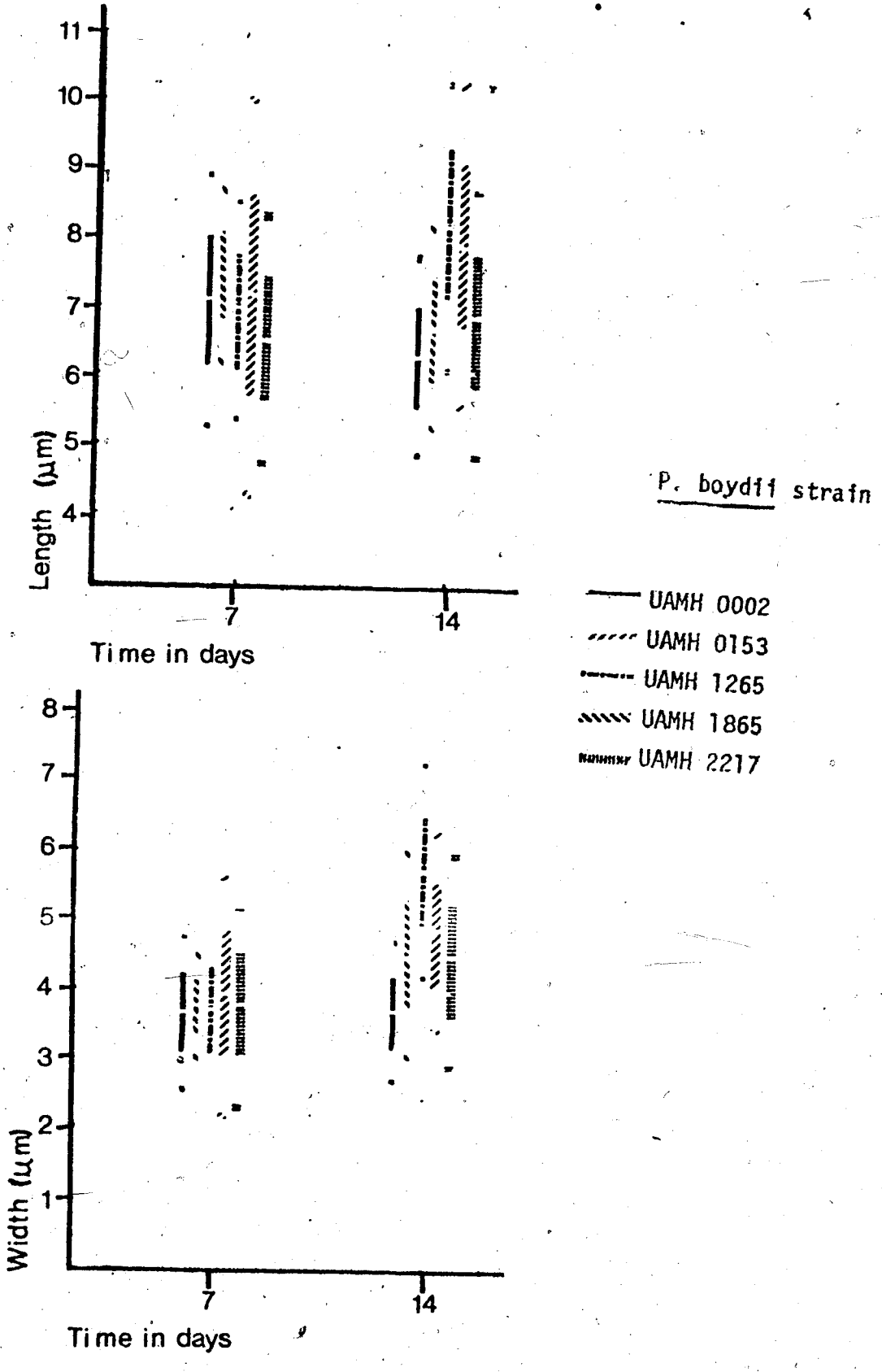


Fig. 5 Conidial measurements after 31 days incubation on Oat. at 18°C, 25°C and 30°C.

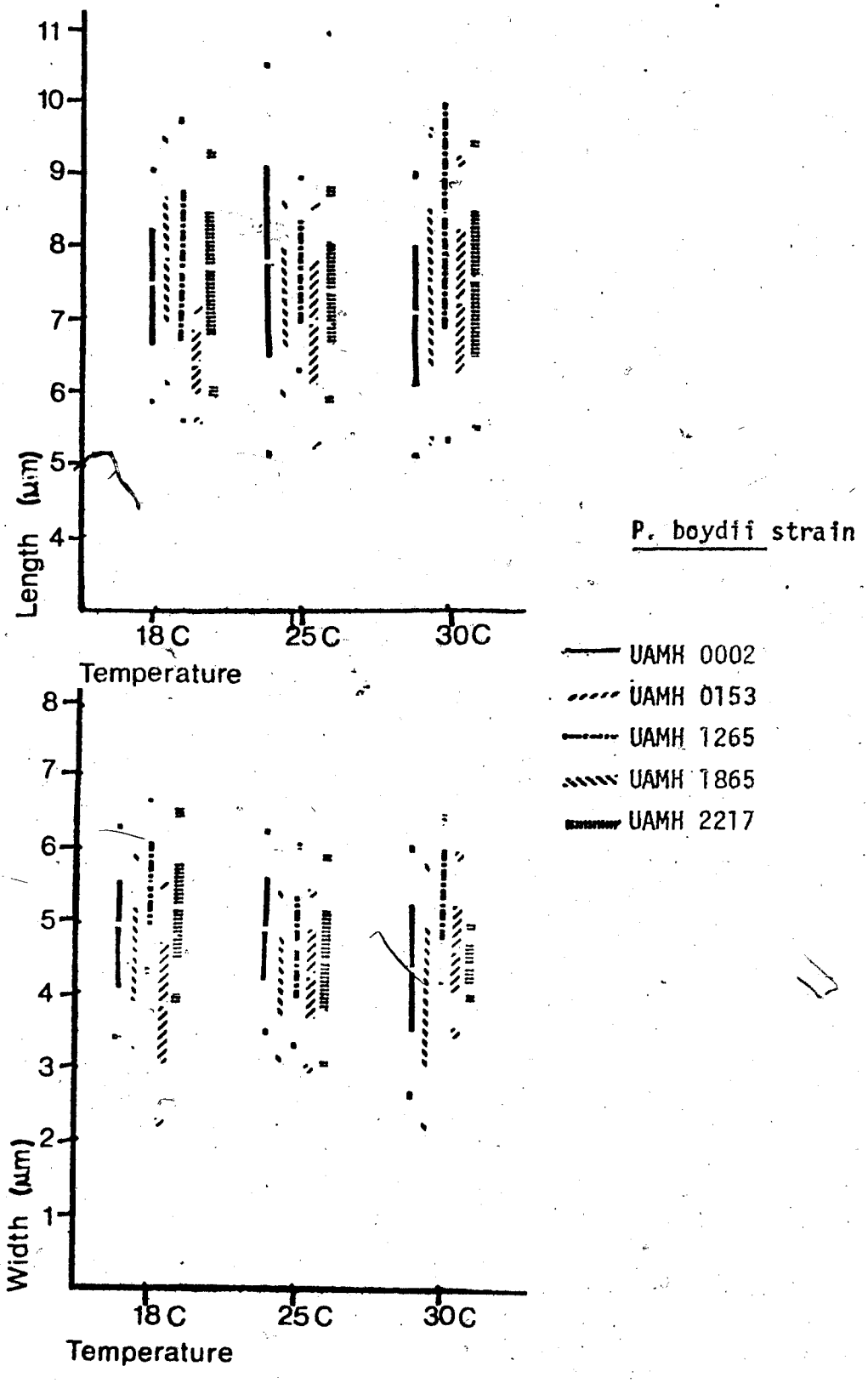


Fig. 6 Ascospore measurements after 31 days incubation on Oat. at 18°C, 25°C and 30°C.

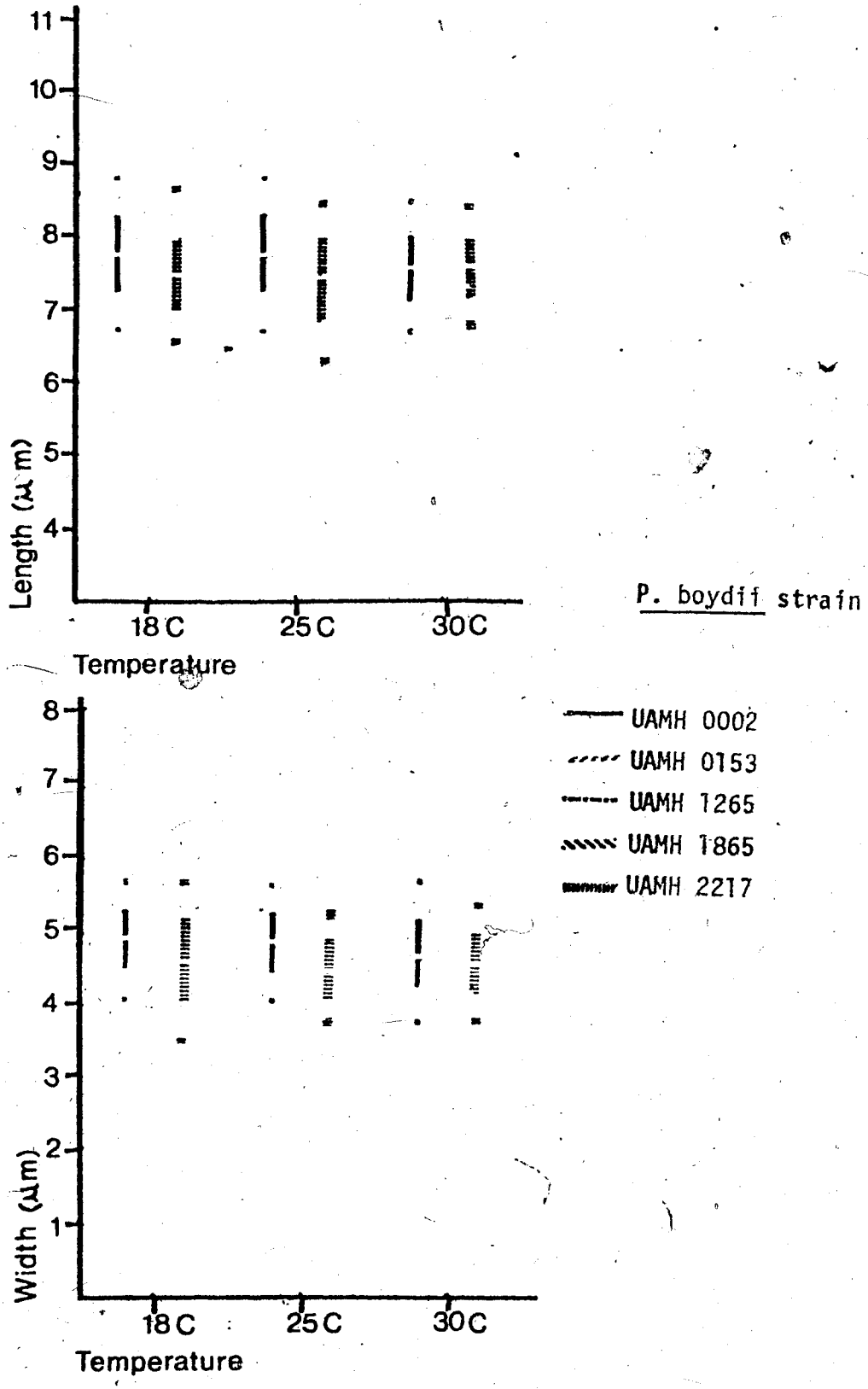


Fig. 7 Conidial measurements after two months incubation on Oat. at 18°C, 25°C and 30°C.

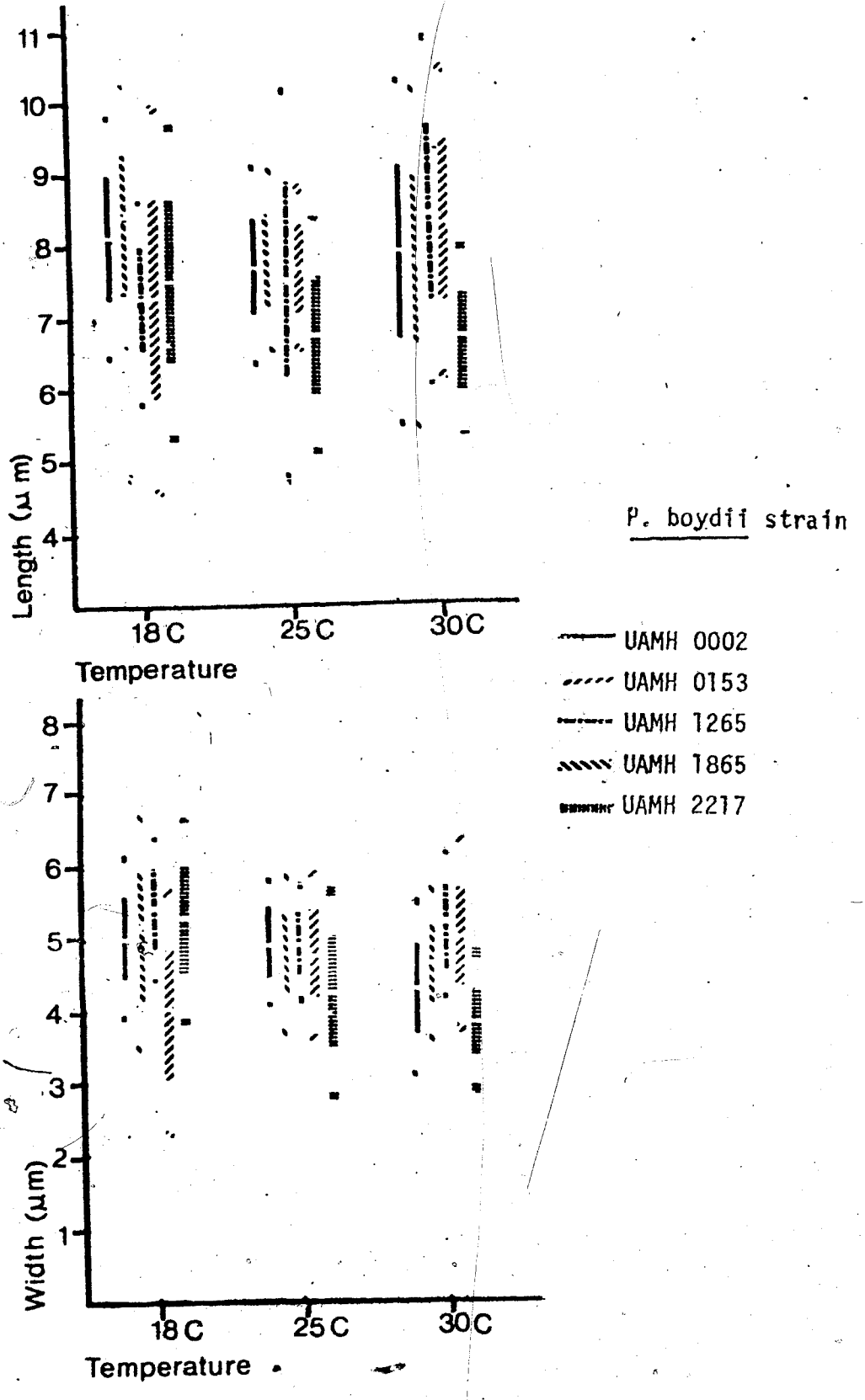


Fig. 8 Ascospore measurements after two months incubation on Oat. at 18°C, 25°C and 30°C.

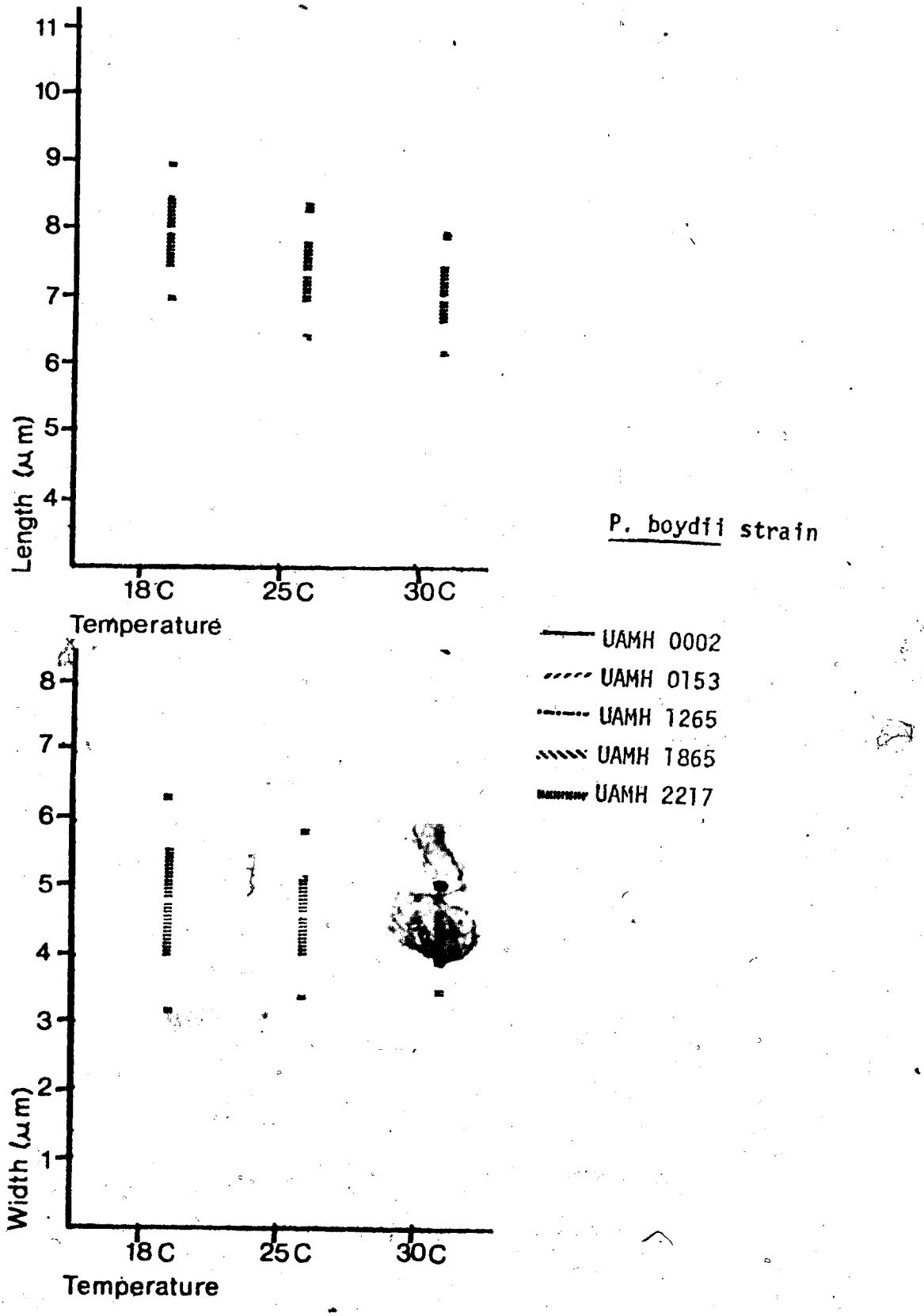


Fig. 9 Conidial measurements after 100 days incubation on Oat. at 18°C, 25°C and 30°C.

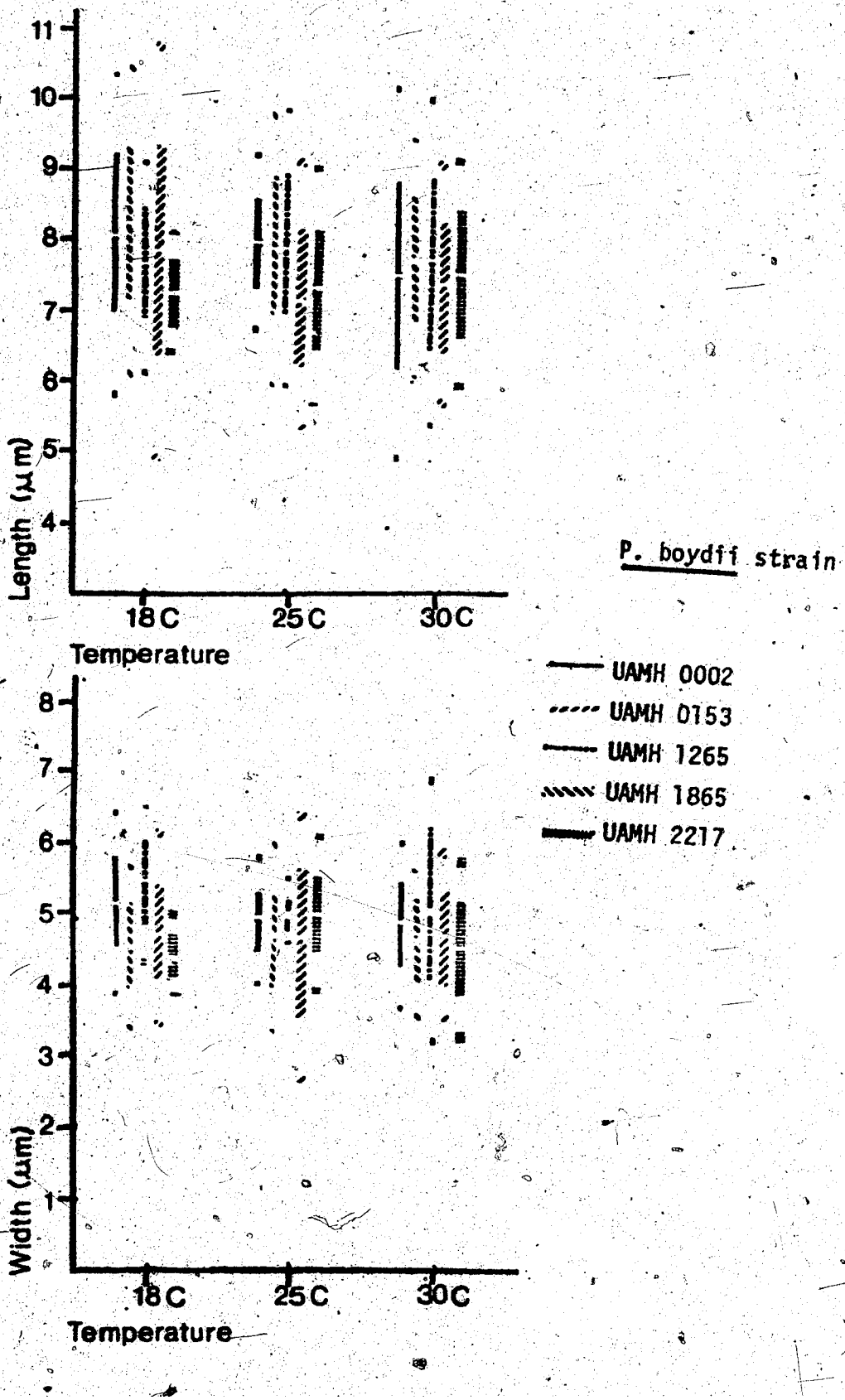
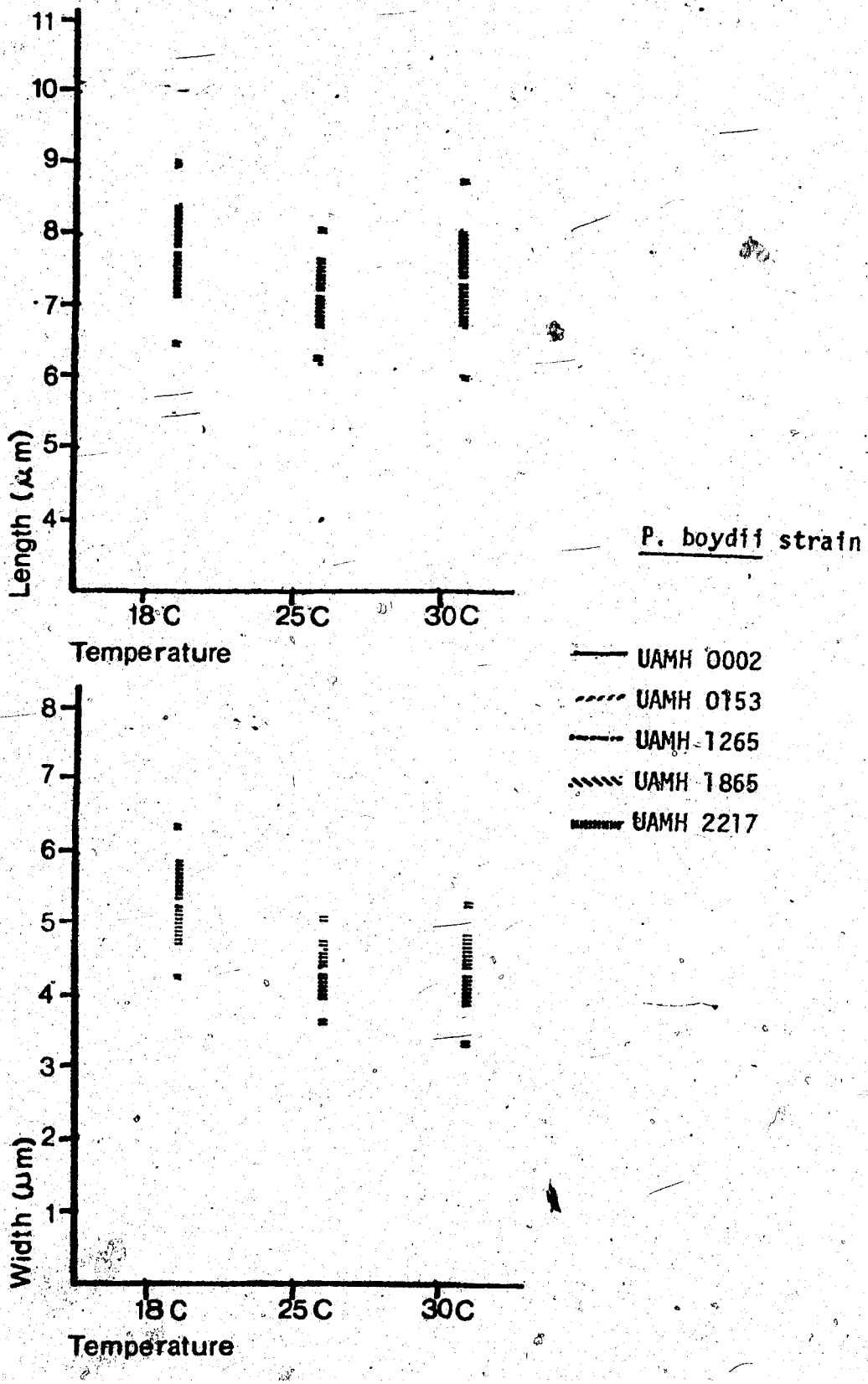


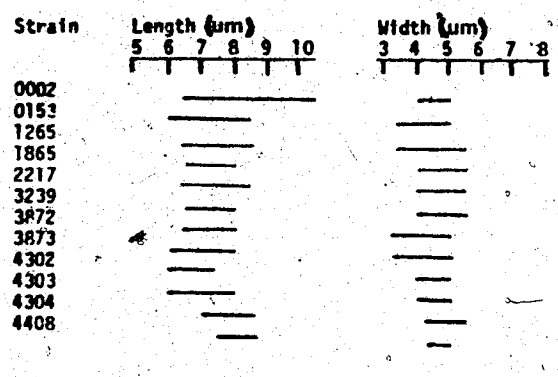
Fig. 10 Ascospore measurements after 100 days incubation on Oat. at 18°C, 25°C and 30°C.



which are not always contained within asci. This may account for part of the variation in ascospore size reported in the literature. Most investigators do not mention the number of ascospores examined to determine size range. Thus inadequate sample size is another possibility for the variation in reported ascospore size. In this study, measurements obtained from scanning electron micrographs were used to confirm the measurements obtained from camera lucida drawings.

As seen in Table 4, both the means and the ranges are quite uniform for all strains except UAMH 0002. In UAMH 0002, the length varied by 4 um. The intra-strain range is approximately 1 to 1.5 um in width and 2 um in length.

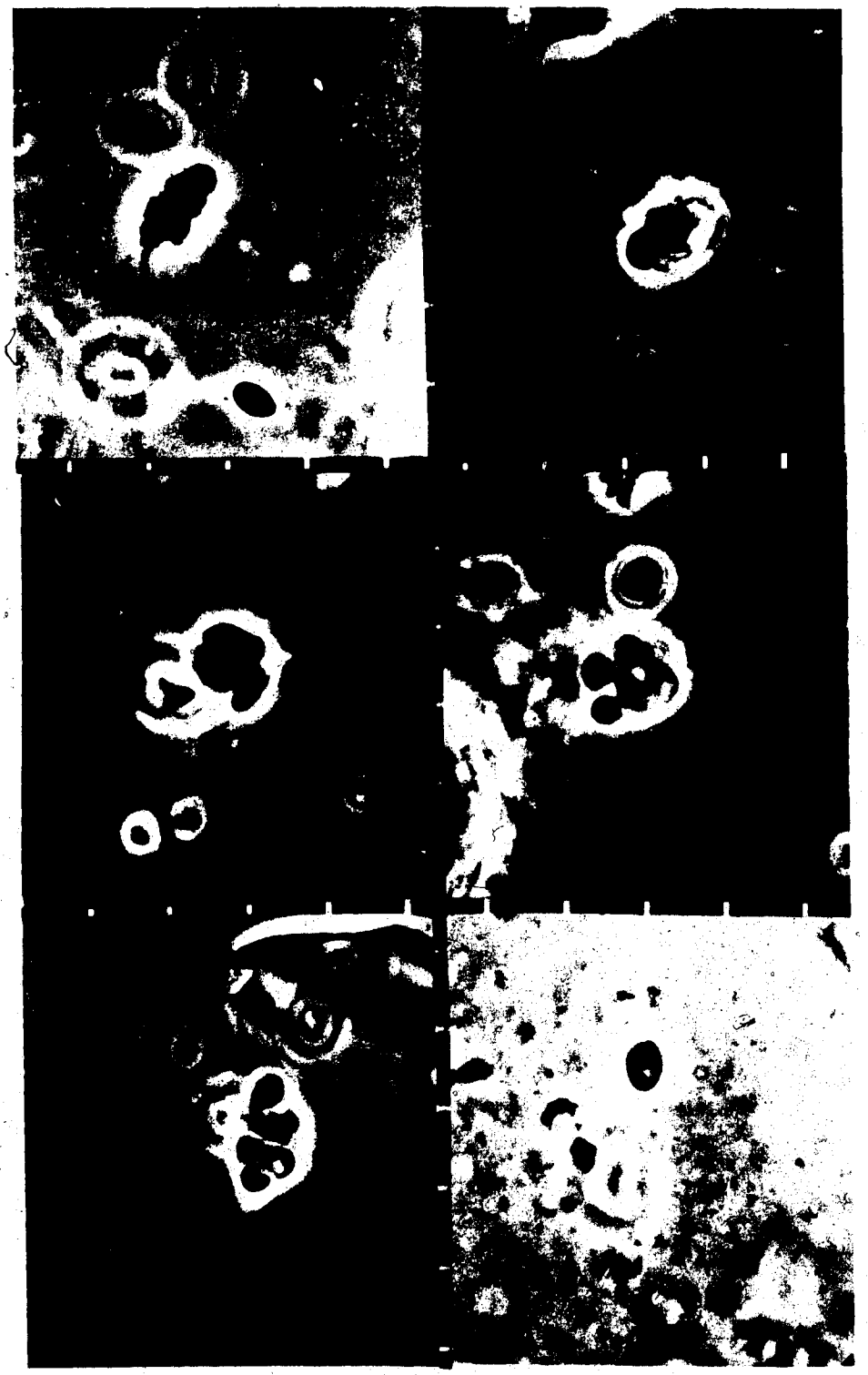
Table 4 Ascospore sizes obtained in this study



The ascospore size ranges are composites for all media employed.

Plate #1: Immature ascospores

Plate 1 consists of photographs of immature ascospores contained within asci (UAMH 2217). A solitary mature ascospore is shown in the lower right photograph.
(Magnification 1000x)



C. Effects of growth conditions on morphology and spore production

Many investigators have studied nutritional and temperature effects on *P. boydii* (Cazin and Decker 1964, Conti-Diaz 1965) . As Rippon (1974) states in his medical mycology text "Morphology, color, spore production and so forth are all affected by the particular media on which the organism is growing as well as other environmental factors" and he refers to Sabouraud agar as the traditional standard in medical mycology. Therefore Sabouraud medium was included in this study, even though it consistently gave the poorest results. Growth was slow; cleistothecia and coremia were seldom produced, and conidial production for some strains was scant or absent. Oatmeal agar was found to be the best medium for production of the three states. The descriptions of cultural characteristics from four media employed provided a set of standard descriptions on which comparisons could be made.

The culture medium has been shown to affect cleistothecium production (Gordon 1957). This was reflected in this study. Cleistothecium abundance and position, (i. e. submerged in the agar, within the hyphal mat or in the upper layer of hyphae) were seen to vary with the medium used. The most abundant cleistothecium production was found with PYE agar. However the cleistothecia were within the hyphal mat and could not be detected unless the mat was cut to expose the cleistothecia. Also the ascospore maturation rate was

considerably slower on this medium, so intact asci were evident for longer periods of time than with the other media.

Temperature was also seen to affect cleistothecium production. On Oatmeal agar, cleistothecia were not produced when incubation was at temperatures of 37°C or higher. The optimum temperature for cleistothecium production ranged from 25°C to 30°C.

All attempts to induce non-cleistothecium producing strains to produce ascocarps failed. (See Materials and Methods for procedures used.)

D. Results of ascospore germination studies

The *Petriellidium* and *Petriella* ascospores germinated from only one end of the ascospore. *Petriellidium fimeti* was the only exception, germinating from both germ pores. The significance for classification is not known.

E. Viral studies

The electron microscopic study of *P. boydii* strain UAMH 2324 for viral particles did not yield conclusive results. An unusual formation within the cells was found (Plate 2). A dense mass of compact granular material at times quite large, almost filling the cell was seen. It is not known whether this mass represents a proviral state or is some component of the fungus. No further attempts were made to determine its nature. Viral infections of Ascomycetes have

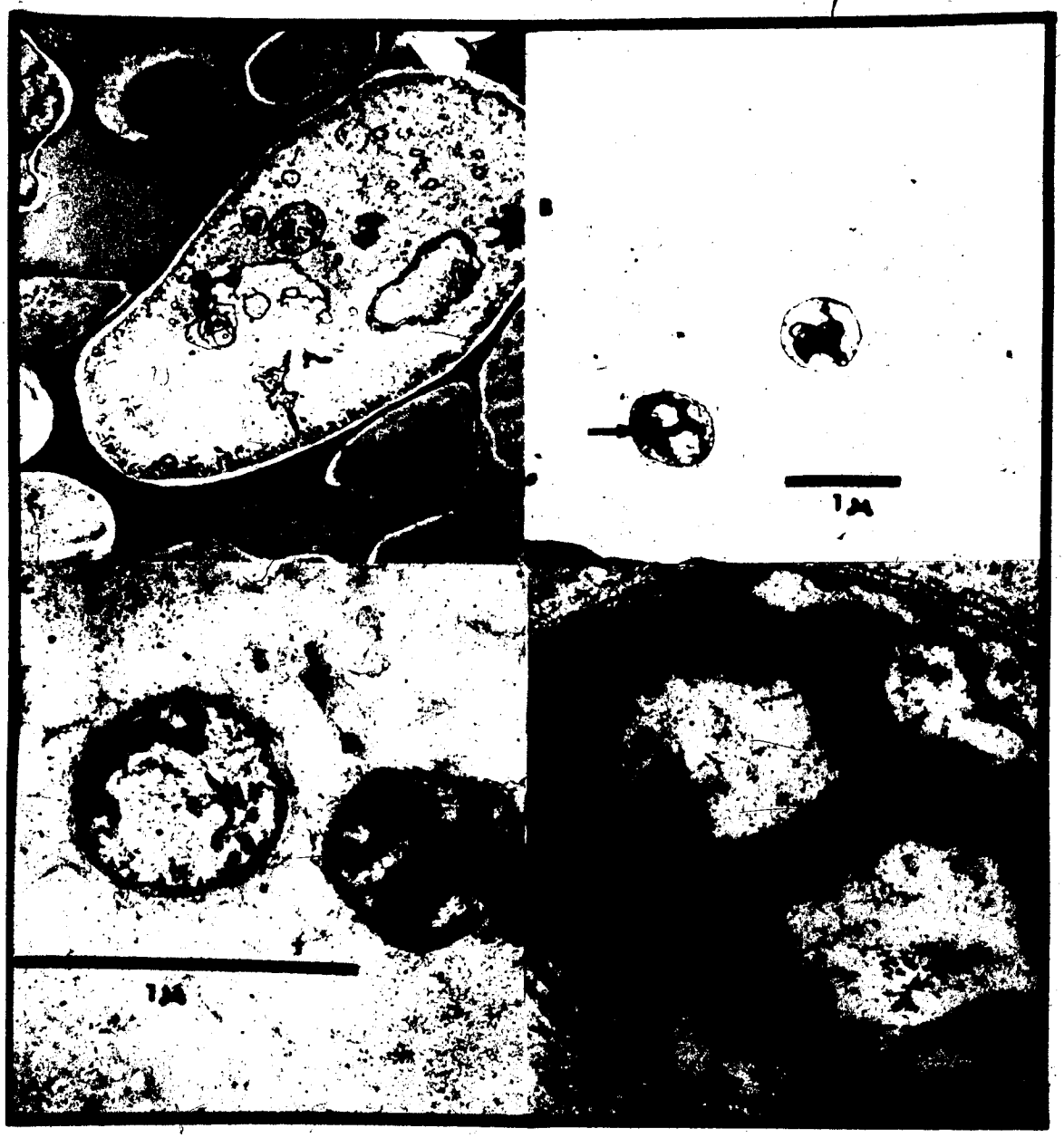
been described (Bozarth 1979, Weber 1979).

Plate #2: Viral Studies by Electron Microscopy

a-control cell of *P. boydii* UAMH 0002

b,c-two UAMH 2324 cells containing dense granules (arrow)

d-a magnification of one of the cells shown in b


B
1M
1M

F. Results: Strain descriptions

The strains examined in this study are described in this section by a standardized description form and plate of photographs for each strain. The description indicates first the species name (as finally identified in this study), the UAMH number and information of its source, isolator and original identification as well as the date received by the UAMH Culture Collection. Pictorial descriptions are given for colony growth at four (magnification 16x) and 28 days (magnification .9x). Written descriptions are given to describe the colony colour and reverse. The growth rates on the four media and on Oat. at different temperatures are represented as graphs. The microscopic characters are represented by pictures and measurements. Not all strains previously producing ascospores produced the ascocarpic state during this survey. As a result, the SEM photographs for these strains and, in a few cases ascocarp measurements are absent. Comments, if necessary, are included to further describe the strain. These descriptions also serve as legends for the plates.

Plate #3: *Petriellidium boydii* UAMH 0002

Isolated from mycetoma, leg, Edmonton, 1934 by E. S. Dowding

Entered 1954 as *Allescheria boydii*

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Lt. mouse brown/light(mod. dark)
     2) Cer- Dark mouse brown/none
     3) PYE- Mod. mouse brown/dark gold-green
     4) Sab- Lt. mouse brown/pale cream green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-9.5 x 3.5-6 *um* — Figs. N,R
   - b. Synnematous conidia- 4.5-8 x 2-3 *um* — Figs. O,S
   - c. Ascocarps- 77-111.5 *um* dia. — Figs. P,U
   - d. Ascospores- 6.5-10.5 x 4-5.5 *um*,golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

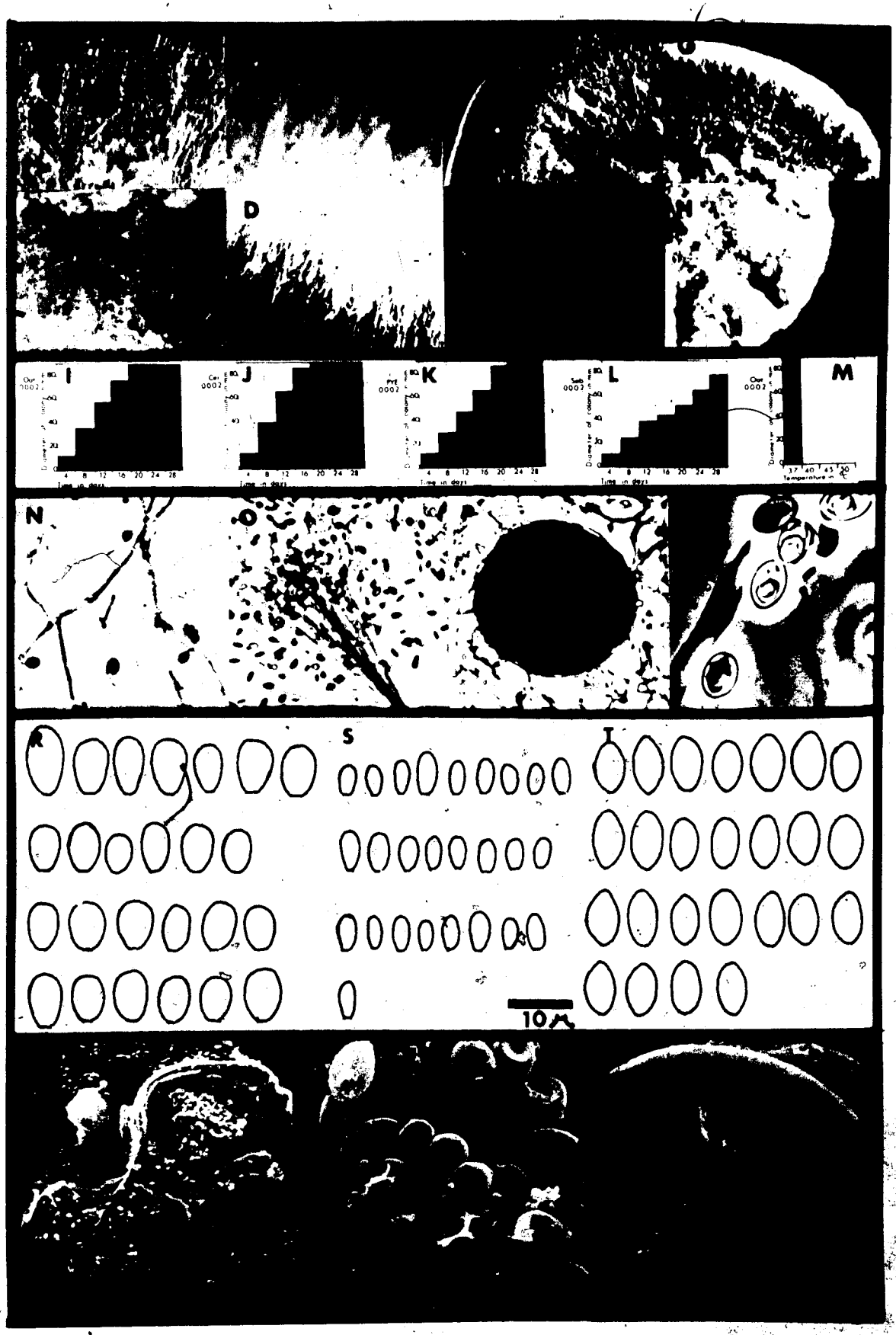

D
H
I
J
K
L
M
N
O
R
S
T
10 μ

Plate #4: *Petriellidium boydii* UAMH 0153

Isolated 1947 by Conant

Received 1954 from Conant as *Graphium*

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Mod. mouse brown-gray/mod dark
     2) Cer- Lt. mouse brown/none
     3) PYE- Lt. mouse brown-flesh/mod yellow green
     4) Sab- Lt. tan/pale cream green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-9.5 x 3.5-6 *um* — Figs. N,R
   - b. Synnematous conidia- 4.5-8 x 1.5-3 *um* — Figs. O,S
   - c. Ascocarps- 55.5-86 *um* dia. — Figs. P,U
   - d. Ascospores- 6-8.5 x 3.5-5 *um*, golden — Figs. Q,T,V,W
4. **Comments**
   - This is a typical *P. boydii* strain.

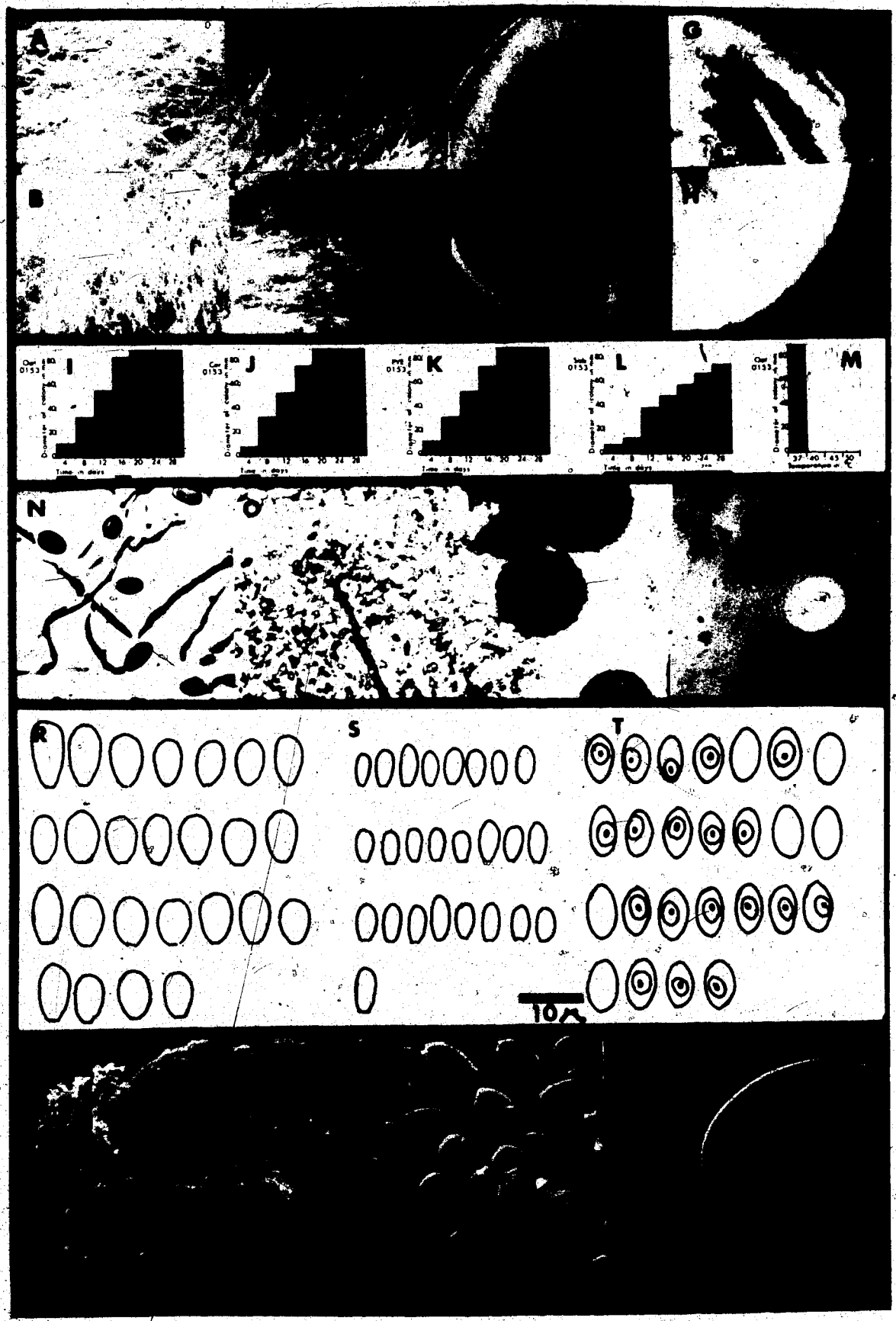

B
C
I
J
K
L
M
N
R
S
T
10 cm

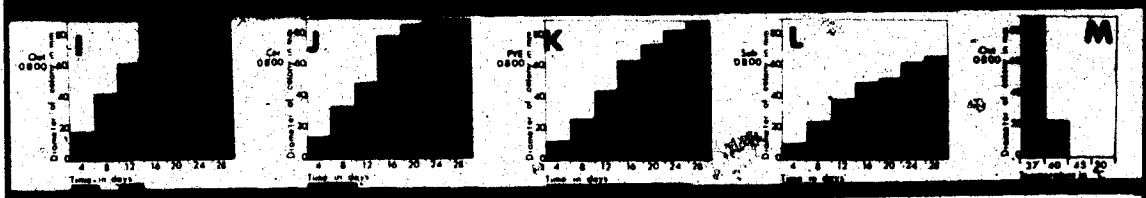
Plate #5: *Petriellidium boydii* UAMH 0800

Isolated by Ciferri

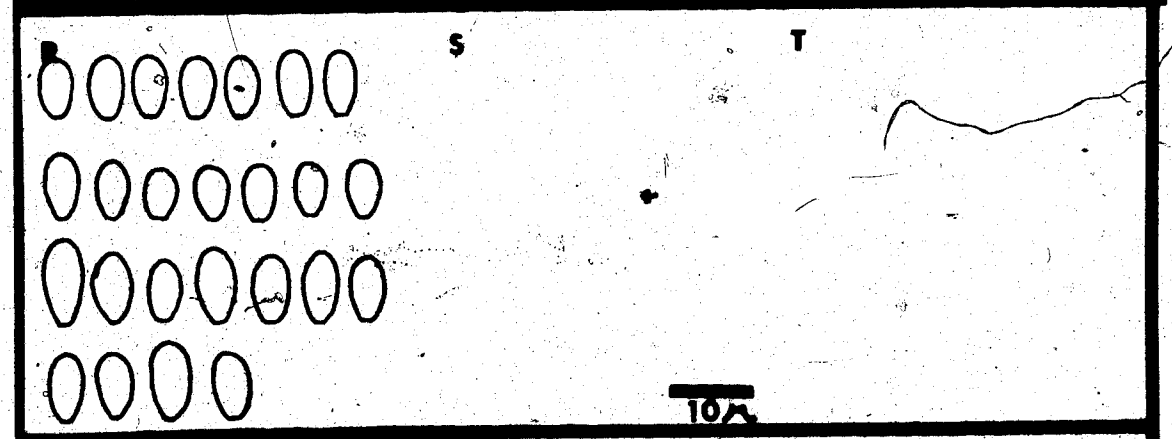
Received 1960 from CBS as *Glenospora graphii* strain Ciferri

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt. camel/dark
      2) Cer- Lt. mouse brown/greenish
      3) PYE- Lt. mouse brown/gold-lt. brown
      4) Sab- Lt. mouse-brown/dark brown
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-9.5 x 3.5-5 um — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

Although this strain was originally identified as *Glenospora graphii*, it now produces only the *Scedosporium* state. This is a typical *P. boydii* anamorph.


I
J
K
L
M


N
O
P
Q


R
S
T
10

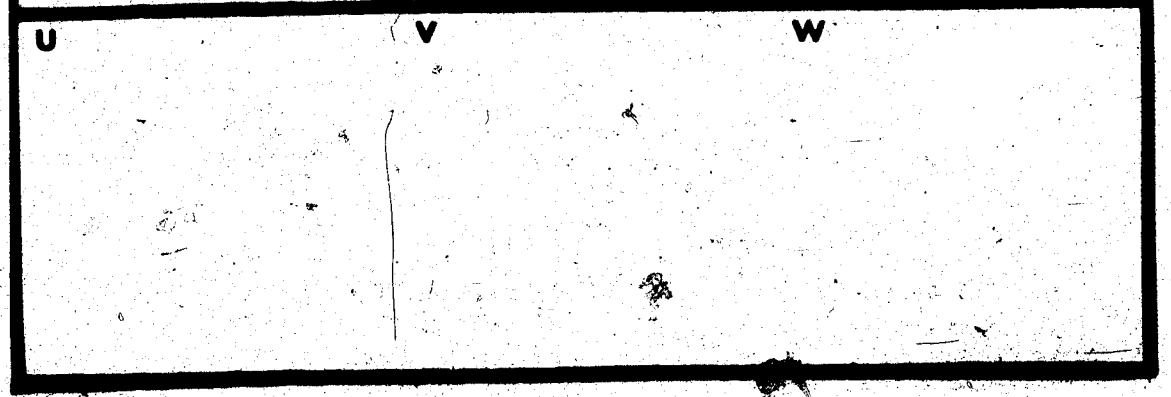

U
V
W

Plate #6: *Petriellidium boydii* UAMH 1099

Isolated from mycetoma, California, by G. F. Orr

Received 1961 from Orr as *Allesheria boydii* UCLAB-M-55

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Mod. mouse brown/dark
     2) Cer- Lt. mouse brown/greenish
     3) PYE- Mod. mouse brown/dark olive-green
     4) Sab- Mod. grey/deep blue to dark green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-10 x 3.5-5.5 µm — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

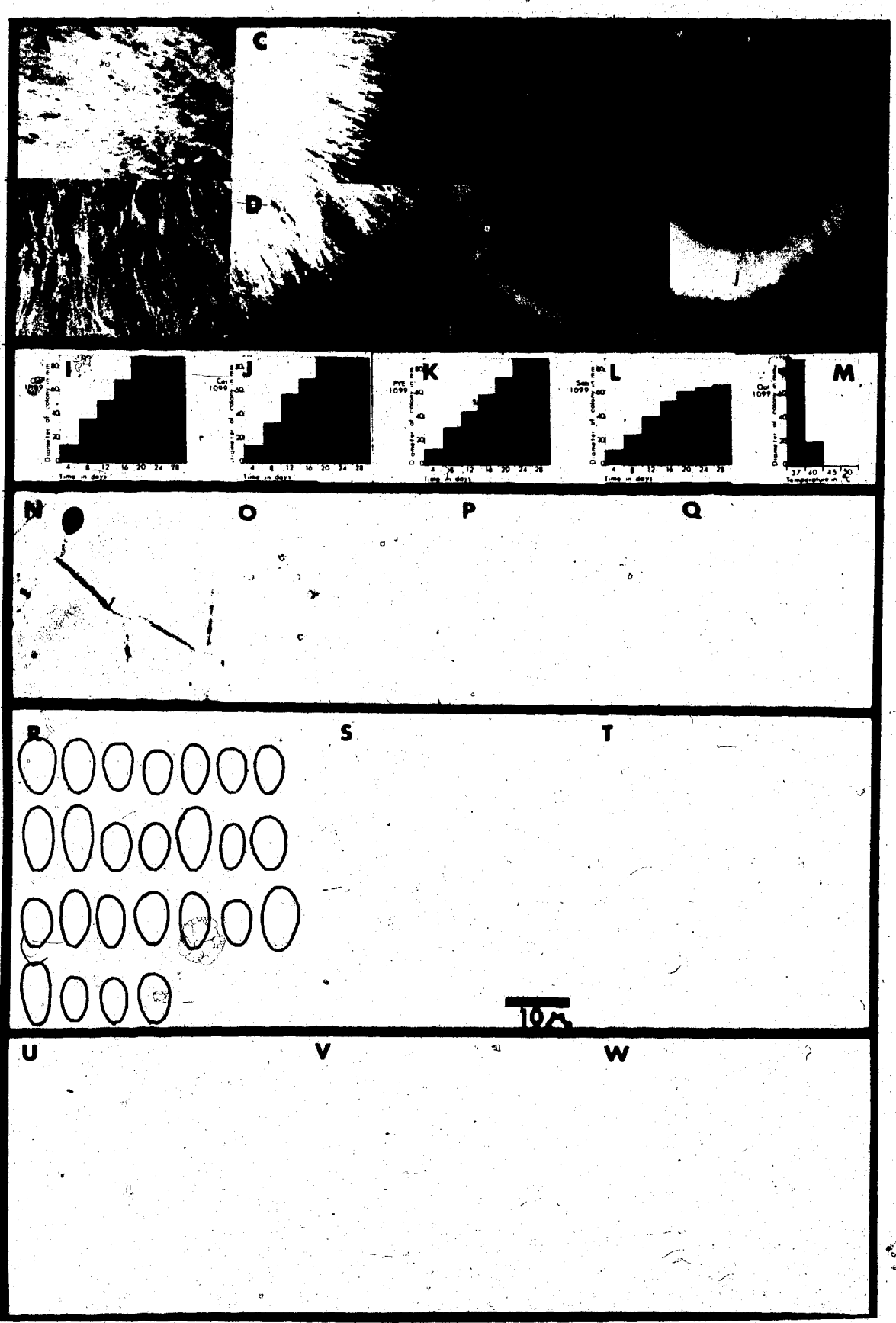

C
D
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W

Plate #7: *Petriellidium boydii* UAMH 1265

Isolated from ear canal, chronic otitis media, Edmonton, 1962 by J. W. Carmichael

Entered 1962 as *Allescheria boydii* P62-1582,

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Off white/light
     2) Cer- Lt. mouse brown/none
     3) PYE- Mod. mouse brown/gold-tan
     4) Sab- Lt. mouse brown-grey/cream-pale green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-9.5 x 3.5-5 *um* — Figs. N,R
   - b. Synnematous conidia- 4.5-7.5 x 2-3 *um* — Figs. O,S
   - c. Ascocarps- 98-145.5 *um* dia. — Figs. P,U
   - d. Ascospores- 6.5-8.5 x 3.5-5.5 *um*, golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

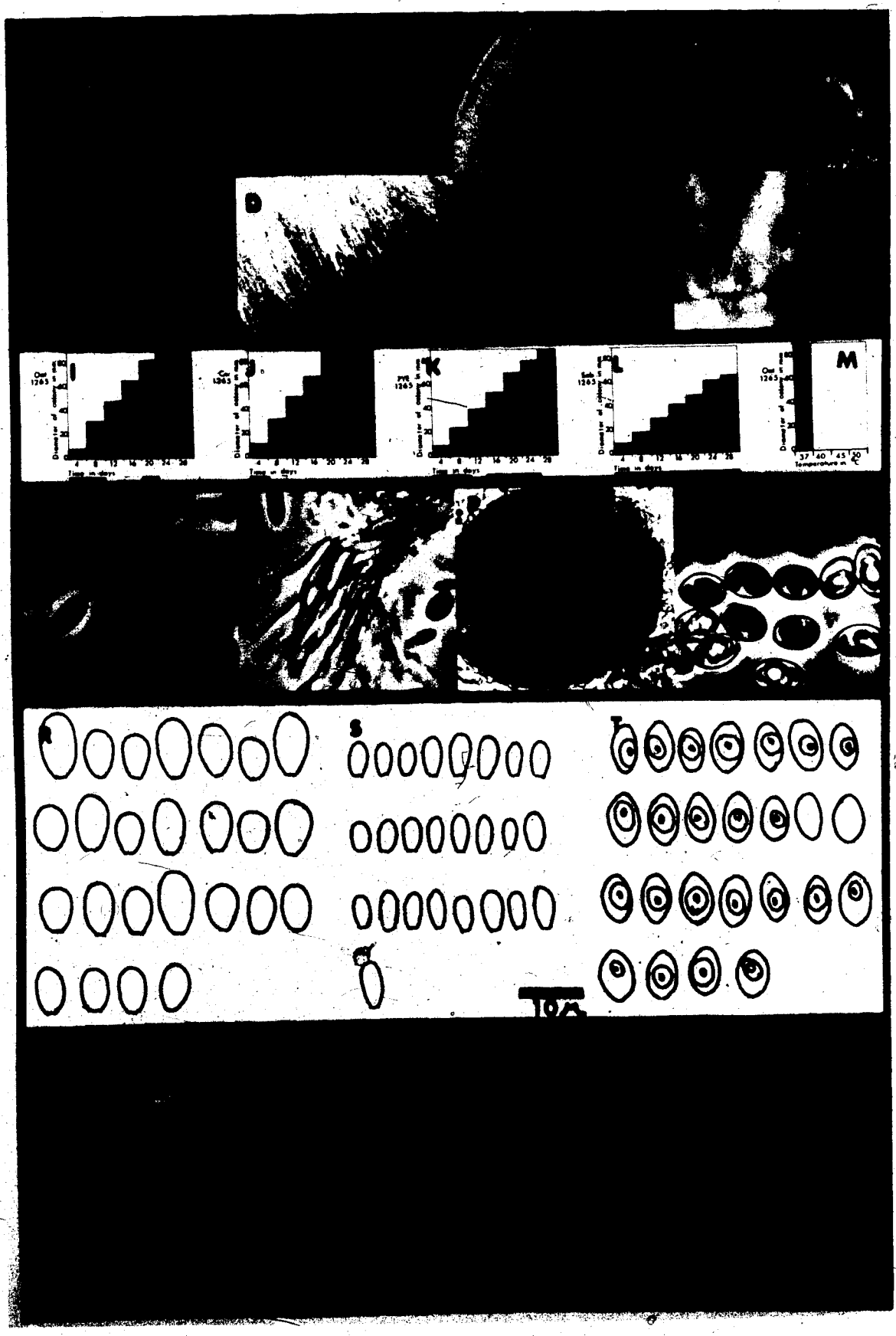

M
Temperature in °C

Plate #8: *Petriellidium boydii* UAMH 1865

Isolated by G. F. Orr

Received 1963 from Orr as *Didymostilbe* PV1

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Off white/light
     2) Cer- Lt. mouse brown/none
     3) PYE- Off white/yellow
     4) Sab- Off white/cream
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-10 x 3.5-6 *um* — Figs. N,R
   - b. Synnematous conidia- 4.5-7.5 x 2-3 *um* — Figs. O,S
   - c. Ascocarps- 103 *um* dia. — Figs. P,U
   - d. Ascospores- 6.5-8.0 x 4-5.5 *um*, golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

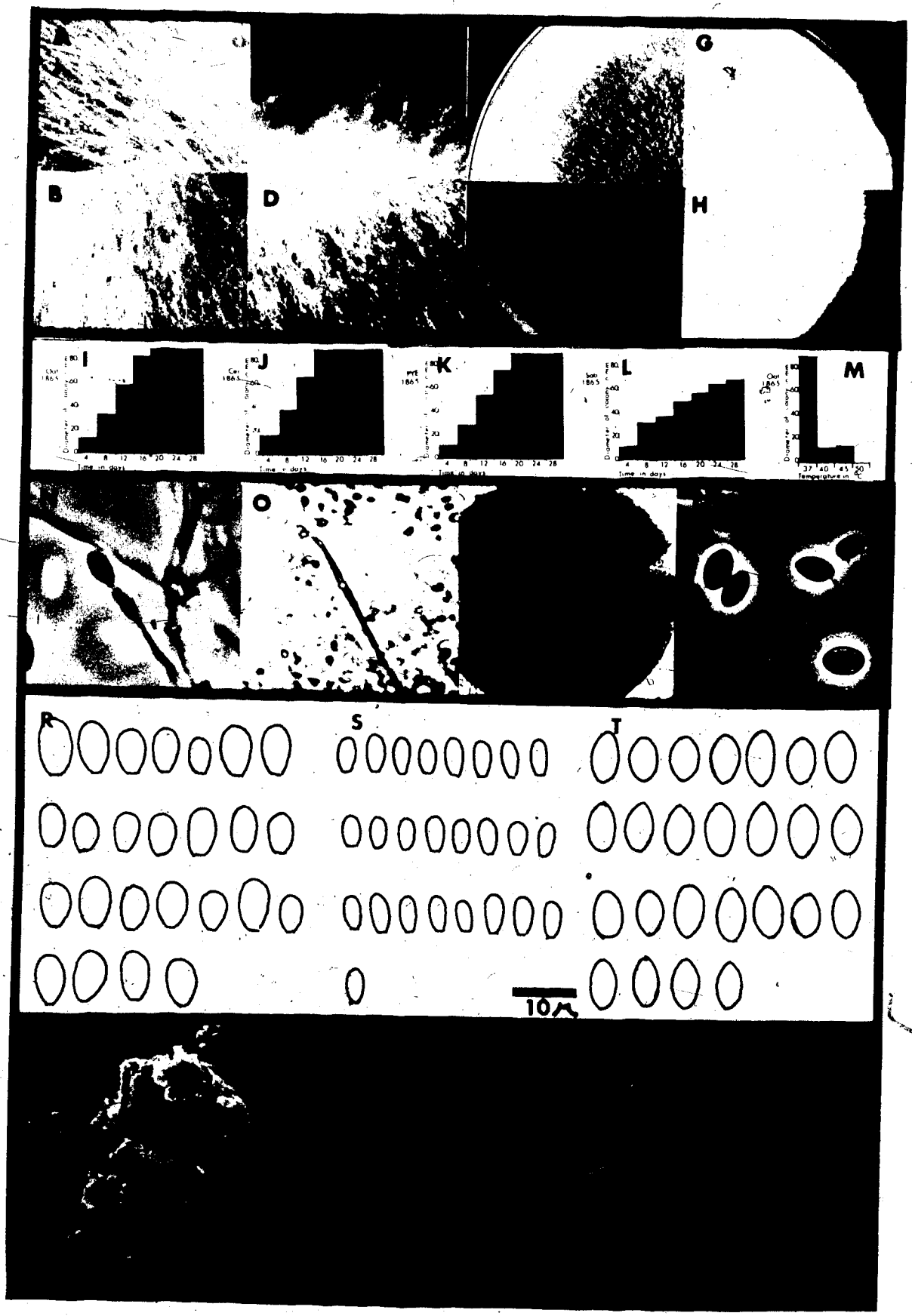

B
D
G
H
I
J
K
L
M
Time in days
Temperature in °C
O
R
S
T
10 µ

Plate #9: *Petriellidium boydii* UAMH 2217

Isolated from right ear, Edmonton, 1964 by J. W. Carmichael

Entered 1964 as *Allescheria boydii* My2820-64

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Mod. mouse brown/mod. dark
     2) Cer- Lt. mouse brown/none
     3) PYE- Mod. mouse brown/dark gold
     4) Sab- Off white/pale yellow green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 5.5-8.5 x 3.5-5.5 um — Figs. N,R
   - b. Synnematous conidia- 4-7 x 2-2.5 um — Figs. O,S
   - c. Ascocarps- 101-155.5 um dia. — Figs. P,U
   - d. Ascospores- 6.5-8.5 x 4-5.5 um, golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

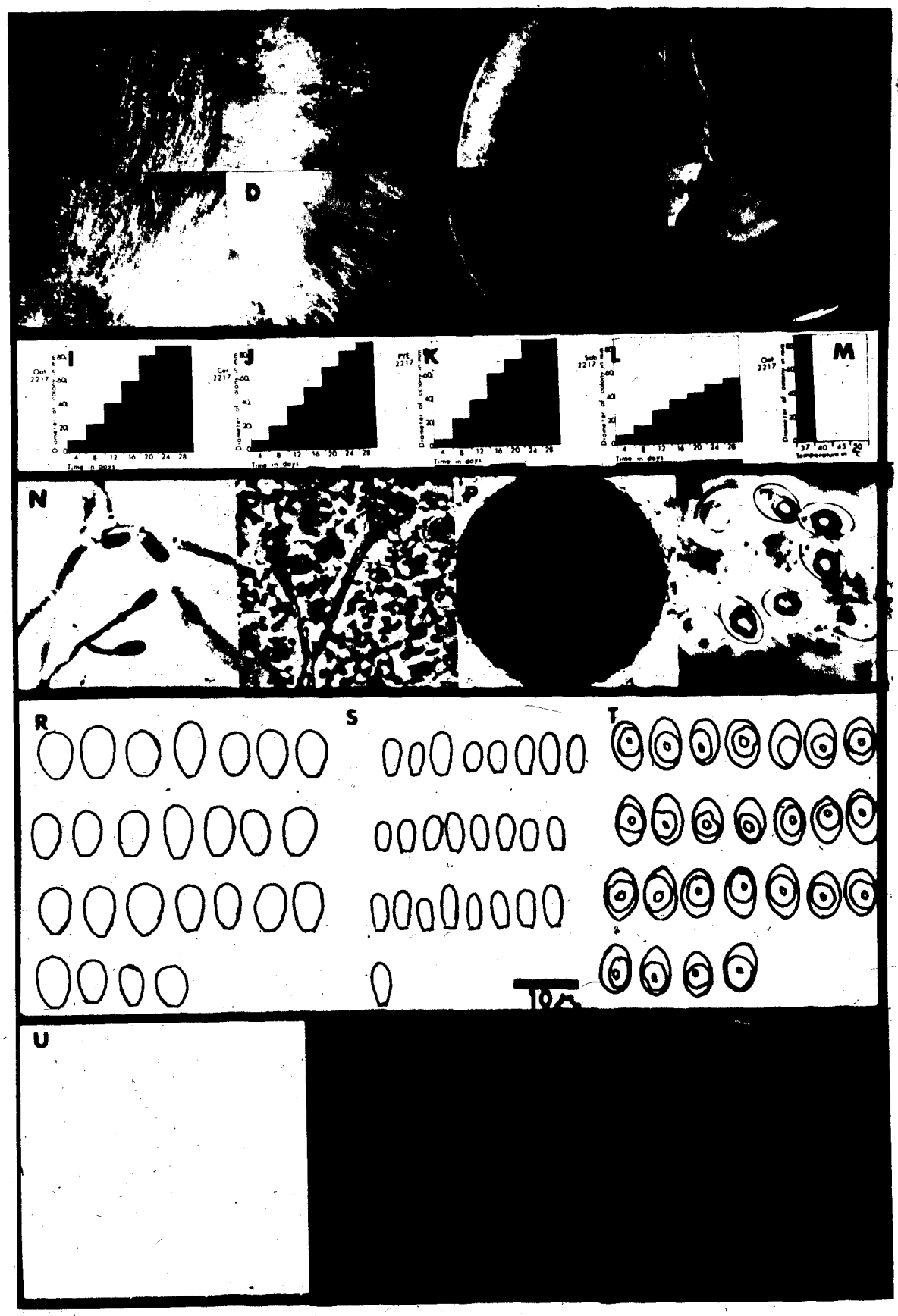

D
I
J
K
L
M
N
R
S
T
U

Plate #10: *Petriellidium boydii* UAMH 2324

Isolated from mycetoma, Venezuela, 1922 by D. Borelli

Received 1965 from Borelli as *Monosporium apiospermum*

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Clear/none
      2) Cer- Clear/none
      3) PYE- White/cream
      4) Sab- Pale cream gold/pale cream gold
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5-8 x 3-5 um — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

This strain has a "sick" appearance, aerial hyphae are seldom produced.

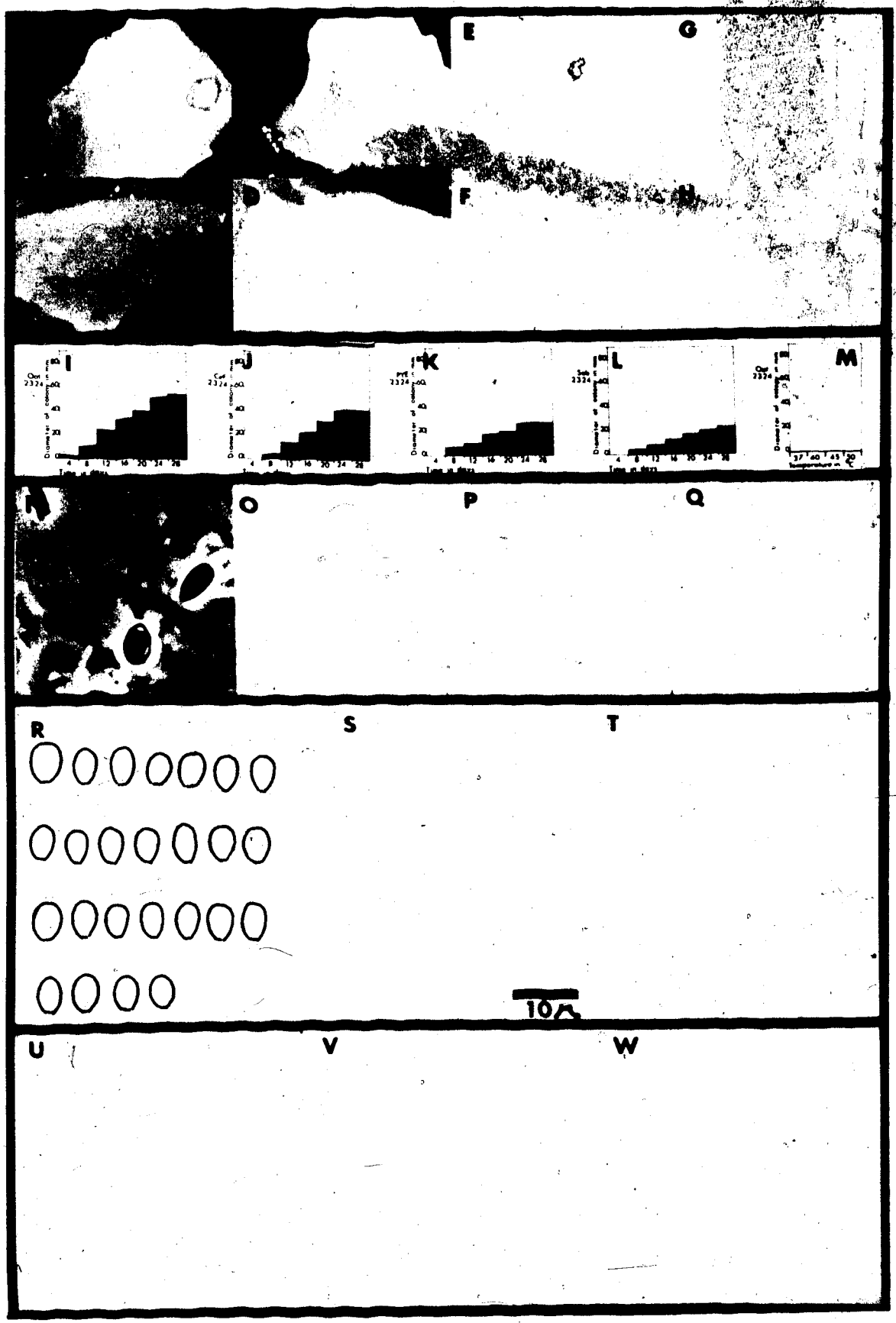

E
G
F
I
J
K
L
M
N
O
P
Q
R
S
T
10
U
V
W

Plate #11: *Petriellidium boydii* UAMH 2507

Isolated 1963 by G. F. Orr

Received 1965 from Orr as *Chrysosporium species* O-3024

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt. mouse brown(lt. grey)/mod. dark
      2) Cer- Off white/none
      3) PYE- Off white/mod. cream green
      4) Sab- Off white/mod. yellow with lt. brown(cream lt. tan)
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5.5-9 x 3.5-5.5 um — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

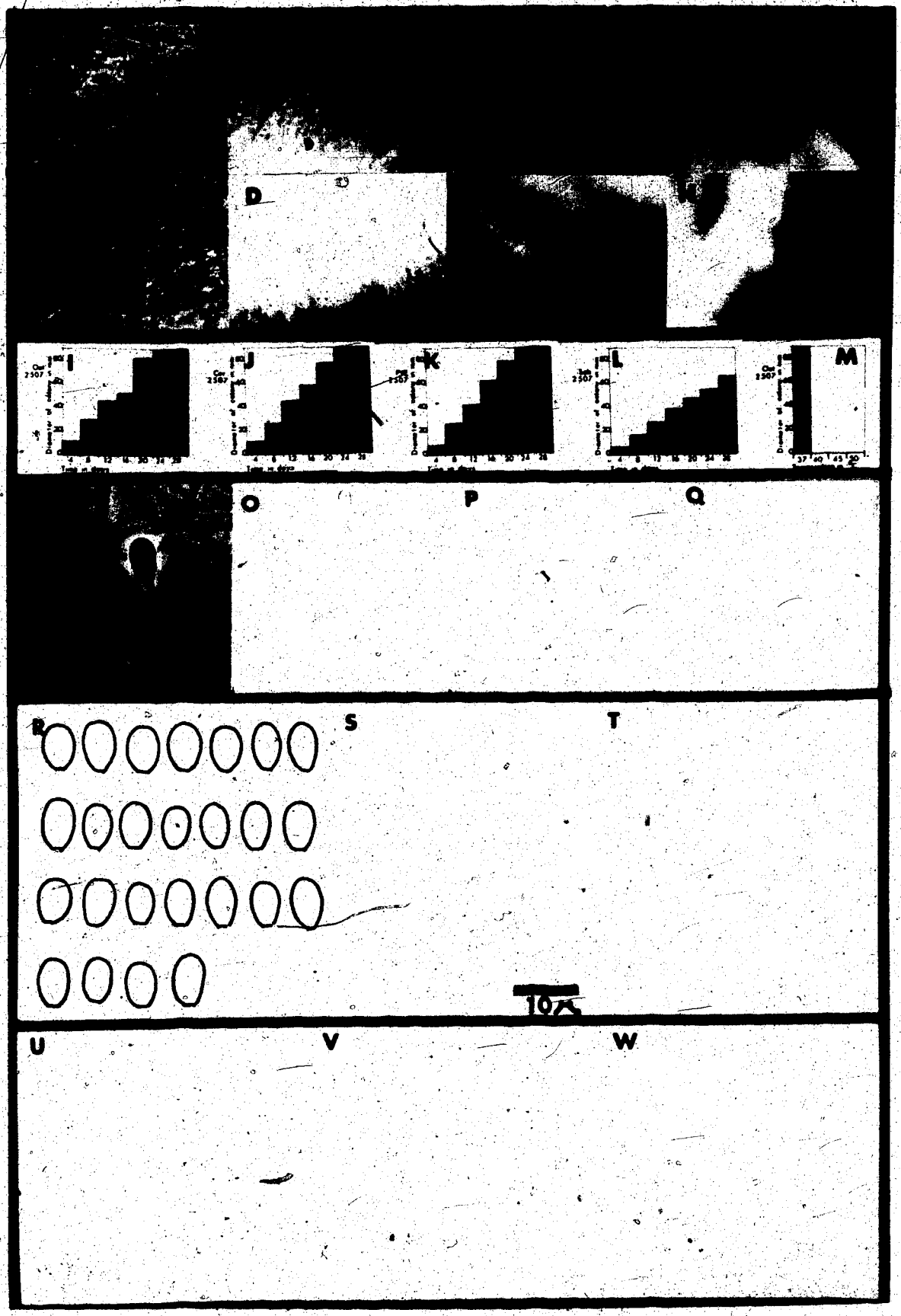

D
I
J
K
L
M
O
P
Q
R
S
T
10
U
V
W

Plate #12: *Petriellidium boydii* UAMH 2975

Isolated from bronchial washings, Alberta, 1968 by J. W. Carmichael

Entered 1968 as *Allescheria boydii* My 2632

1. Colonies
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Mod. olive green/light
      2) Cer- Lt. mouse brown/none
      3) PYE- Lt. mouse brown(dark mouse brown)/gold yellow
      4) Sab- Lt. mouse brown/mod. olive green(cream green)
2. Growth Rates
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. Microscopic Characters
   a. Diffuse conidia- 6.5-10.5 x 3.5-5.5 um — Figs. N,R
   b. Synnematous conidia- 6.5-13.5 x 2.5-4.5 um — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. Comments

   This is a typical *P. boydii* anamorph.

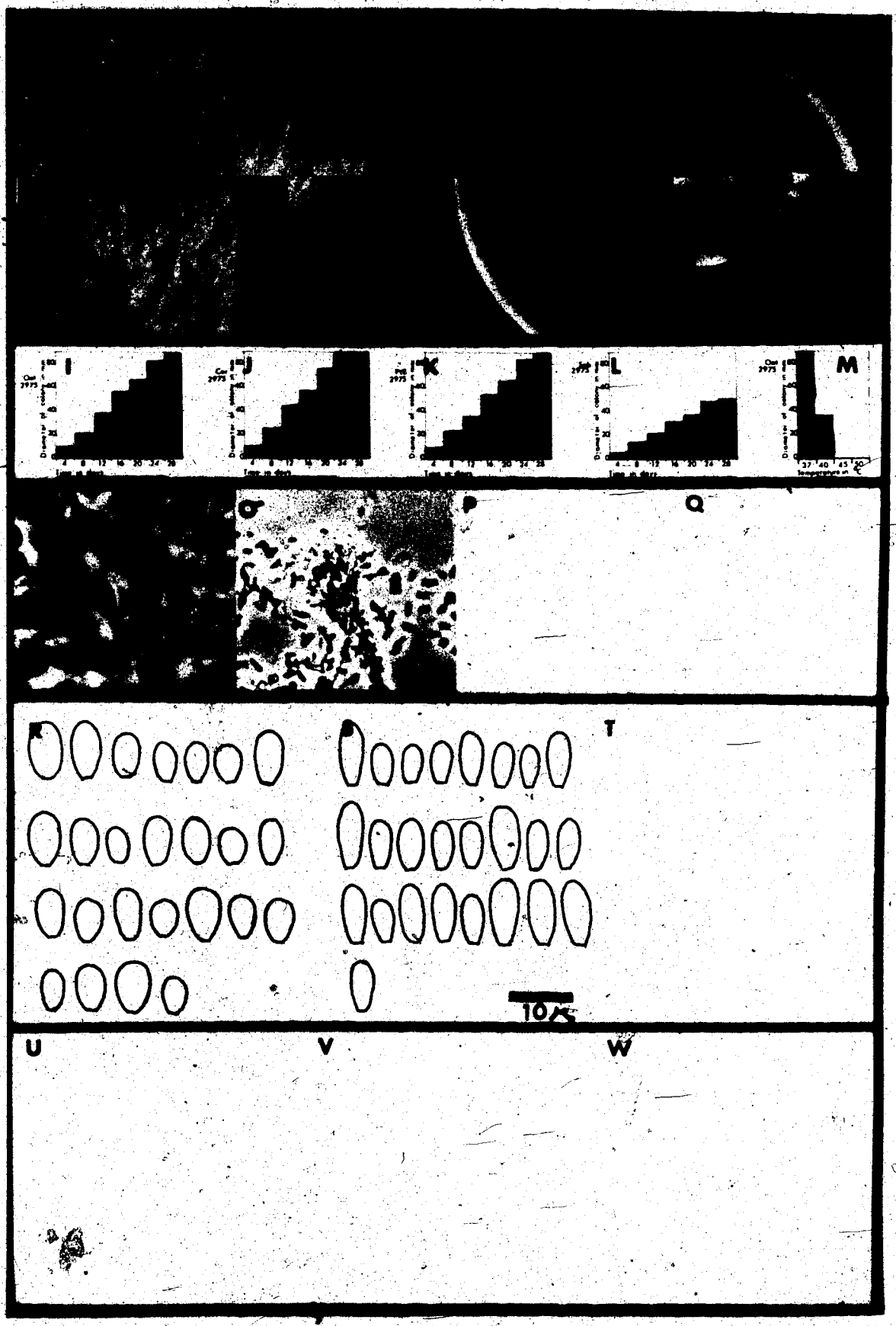

I
J
K
L
M
O
P
Q
R
T
10
U
V
W

Plate #13: *Petriellidium boydii* UAMH 3230

Isolated from turkey corrals (litter), Ontario, California, 1969 by J. W. Carmichael

Entered 1969 as synnematous fungus

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt. grey/dark
      2) Cer- Lt. mouse brown(lt. grey)/greenish
      3) PYE- Lt. mouse brown(mod. mouse brown)/gold tan
      4) Sab- Off white/dark yellow-green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5.5-8.5 x 3-5 um — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

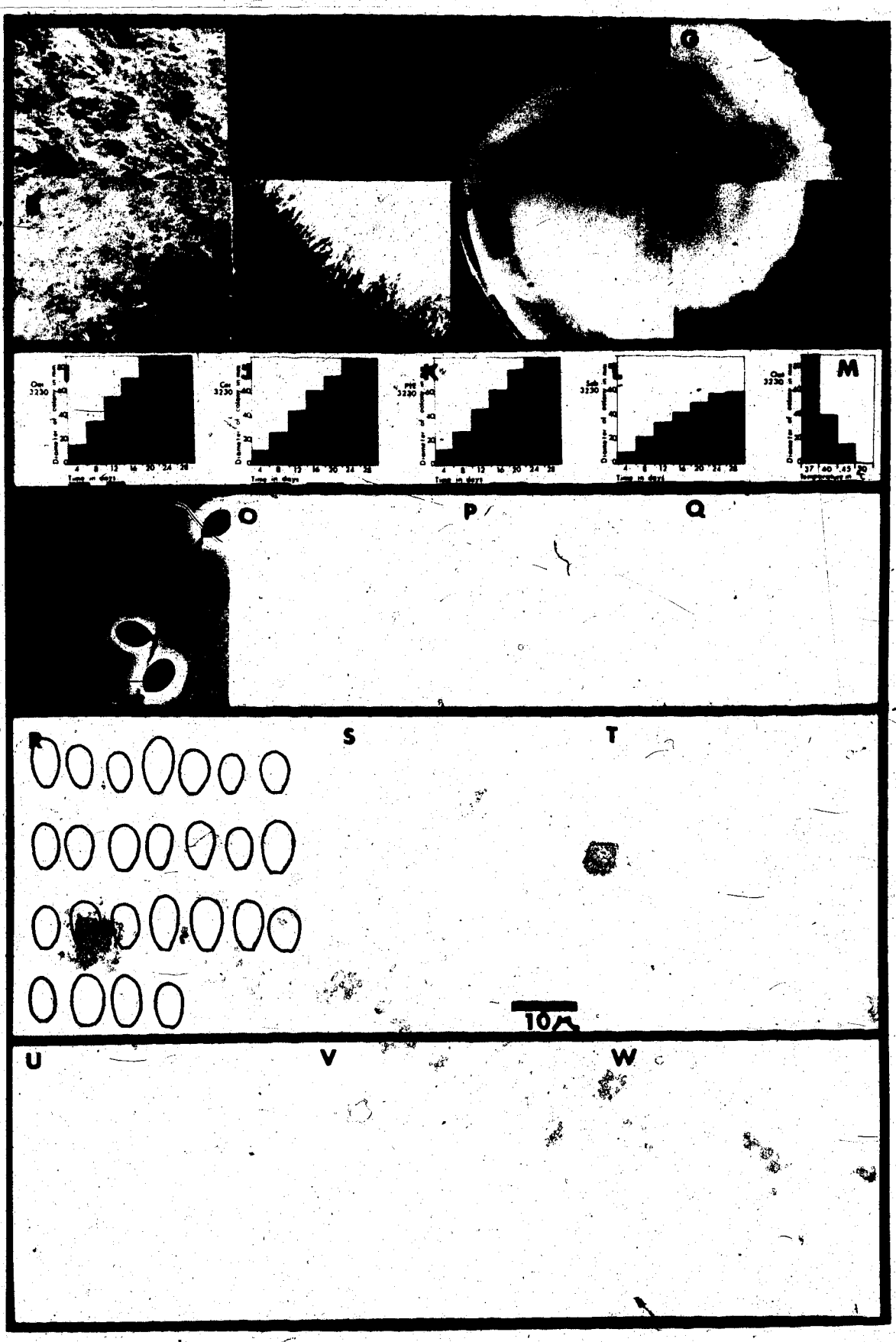

M
O
P
Q
S
T
10
U
V
W

Plate #14: *Petriellidium boydii* UAMH

Isolated from under chicken pens, Ontario, California, 1969 by J. W. Carmichael

Entered 1969 as *Stilbaceae* 53-10-6

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Mod. mouse brown/mod. dark
      2) Cer- Mod. mouse brown/none
      3) PYE- Lt mouse brown-grey/pale yellow green
      4) Sab- Off white/cream
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6.5-9.5 x 3.5-5.5 *um* — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- 66.5-99.5 *um* — Figs. P,U
   d. Ascospores- 6.5-8 x 4-5 [illegible] golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

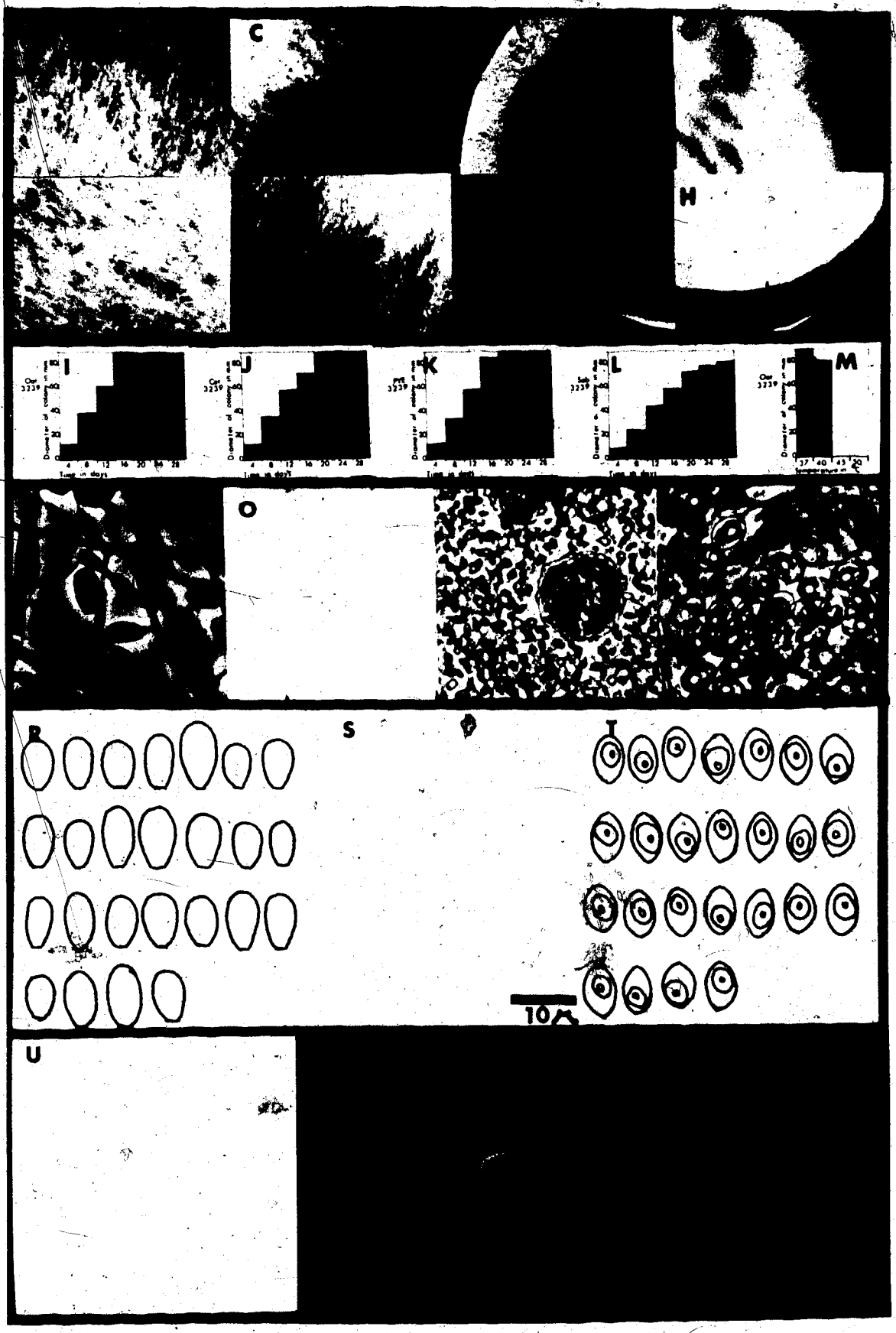

C
H
I
J
K
L
M
O
R
S
T
10
U

Plate #15: *Petriellidium boydii* UAMH 3746

Isolated from manure, Lethbridge, 1974 by R. G. Bell

Received 1974 from Bell as *Chrysosporium species* 25M

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Mod. mouse brown/dark
     2) Cer- Mod. mouse brown/none
     3) PYE- Mod. mouse brown(dark mouse brown)/yellow(cream green)
     4) Sab- Mod. mouse brown-grey(lt.)/pale cream green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M.
3. **Microscopic Characters**
   - a. Diffuse conidia- 5.5-8 x 3.5-5 *um* — Figs. N,R
   - b. Synnematous conidia- 5-8.5 x 2-3 *um* — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

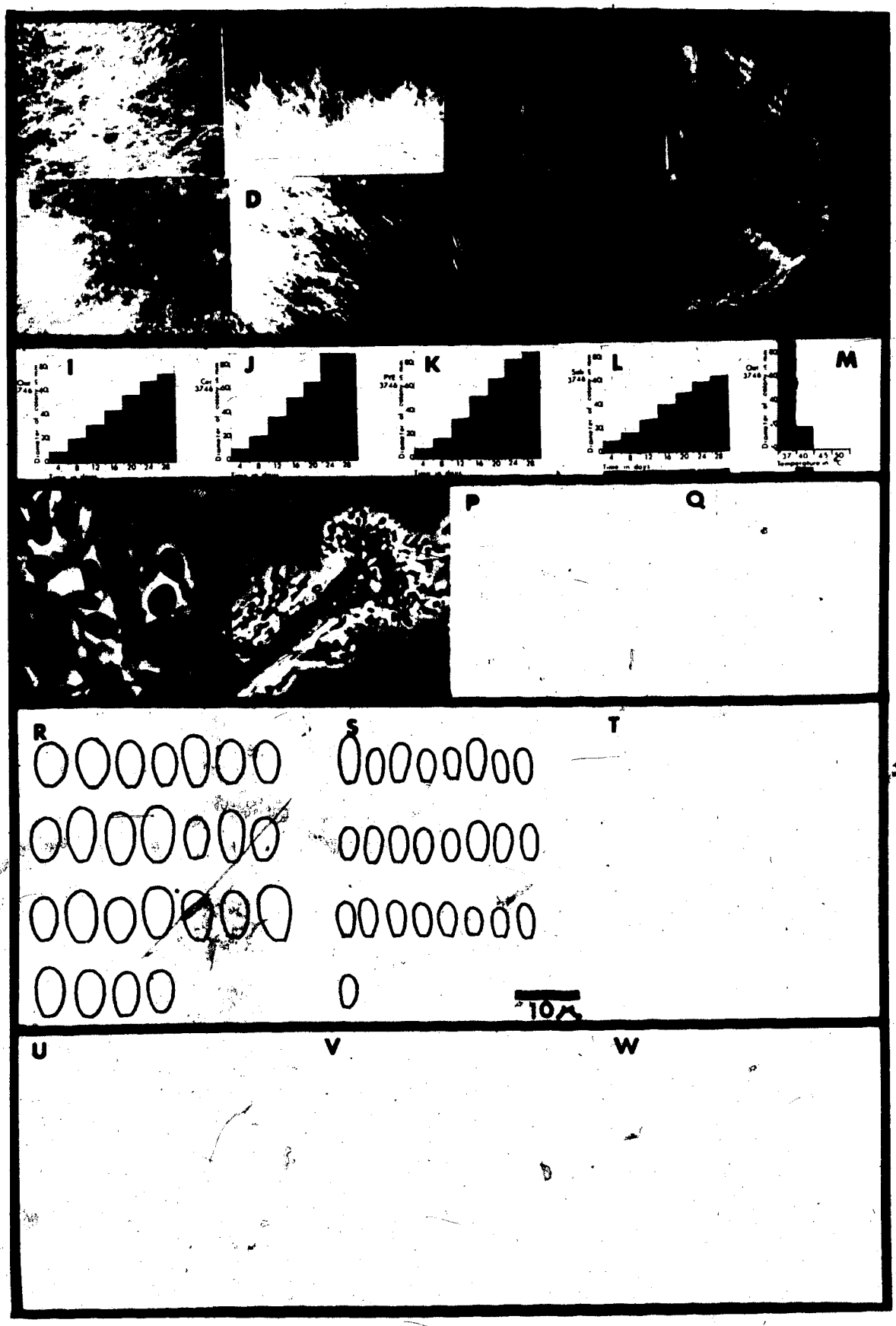

D
I
J
K
L
M
P
Q
R
S
T
10
U
V
W

Plate #16: *Petriellidium boydii* UAMH 3749

Isolated from cattle manure, Lethbridge, 1974 by R. G. Bell

Received 1974 from Bell as *Petriella setifera* TM

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Dark grey(mod. to dark mouse brown)/orange
      2) Cer- Dark mouse brown/orange
      3) PYE- Lt. grey/dark burnt orange
      4) Sab- Lt grey-flesh/dark burnt orange
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5.5-8.5 x 3-5 um — Figs. N,R
   b. Synnematous conidia- 4.5-7.5 x 1.5-2.5 um — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

This is a typical *P. boydii* anamorph, although the production of orange pigment is evident.

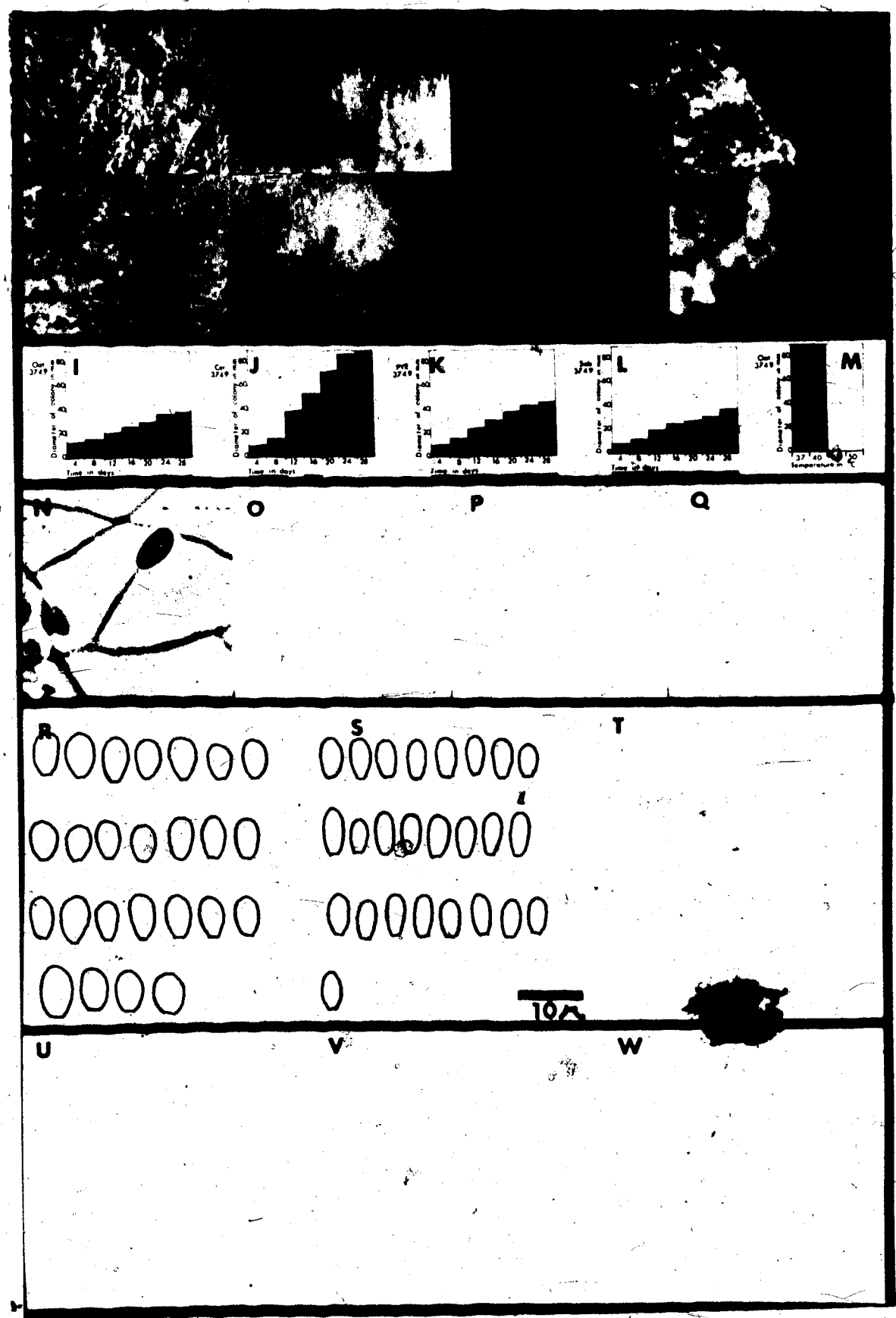

I
J
K
L
M
N
O
P
Q
R
S
T
10
U
V
W

Plate #17: *Petriellidium boydii* UAMH 3750

Isolated from cattle manure, Lethbridge, 1974 by R. G. Bell

Received 1974 from Bell as *Petriella setifera* M37

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Mod. mouse brown-grey/mod. dark
     2) Cer- Lt. mouse brown(lt. grey)/none
     3) PYE- Lt. mouse brown(lt. grey)/yellow-lt. gold
     4) Sab- Off white/pale cream green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-8.5 x 3.5-5.5 um — Figs. N,R
   - b. Synnematous conidia- 5.5-8 x 2-3.5 um — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

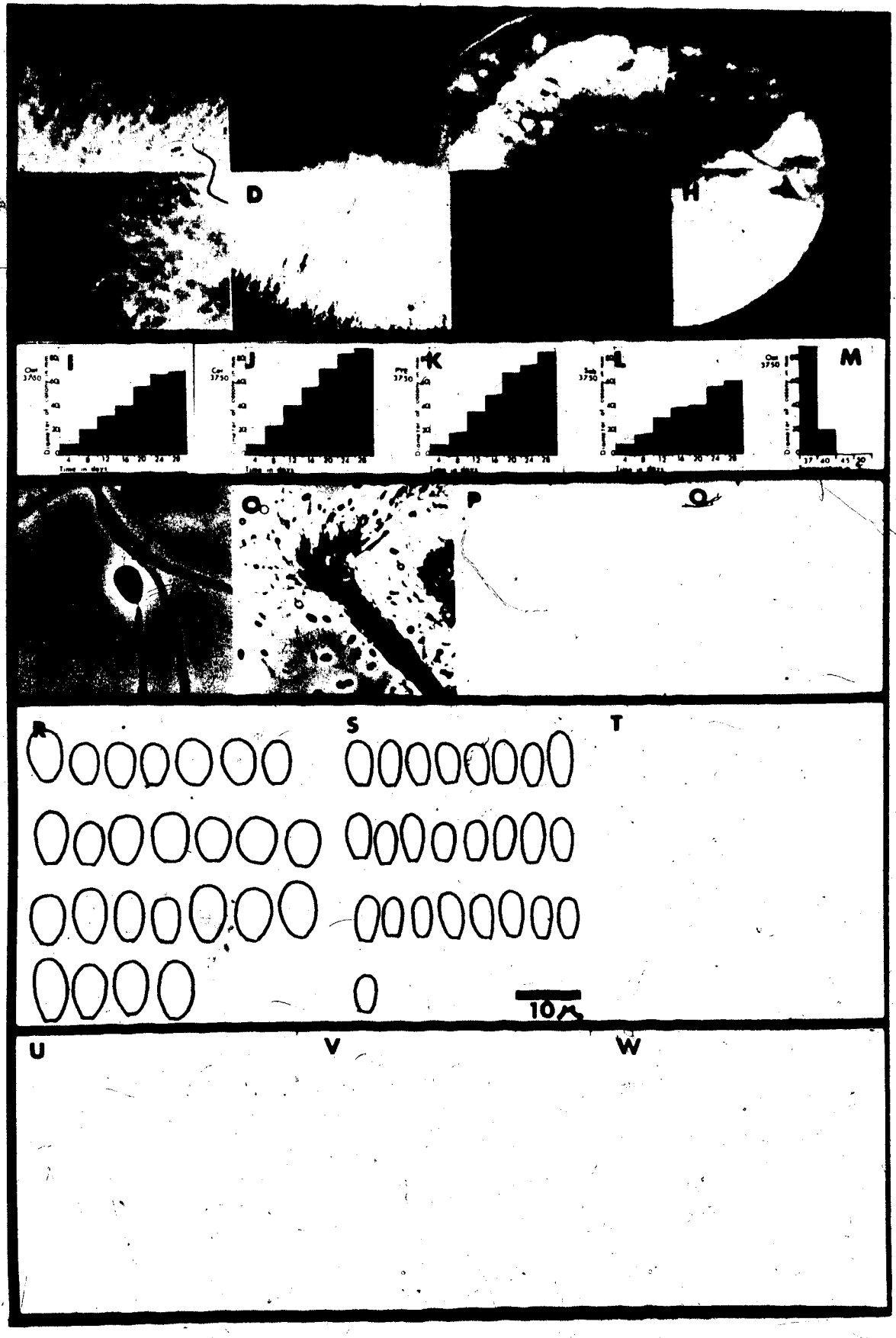

D
H
I
J
K
L
M
N
O
P
Q
R
S
T
10 μm
U
V
W

Plate #18: *Petriellidium boydii* UAMH 3872

Isolated from cattle manure, Lethbridge, 1975 by R. G. Bell

Received 1975 from Bell as *Petriellidium boydii* 1CF1

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Mod. mouse brown(dark mouse brown)/mod. dark
      2) Cer- Lt. mouse brown/none
      3) PYE- Lt. mouse brown/yellow
      4) Sab- Off white/pale yellow green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-9 x 3.5-6 *um* — Figs. N,R
   b. Synnematous conidia- 4.5-7 x 2-3 *um* — Figs. O,S
   c. Ascocarps 88.5-135 *um* dia. — Figs. P,U
   d. Ascospores- 6.5-8 x 3.5-5 *um*,golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

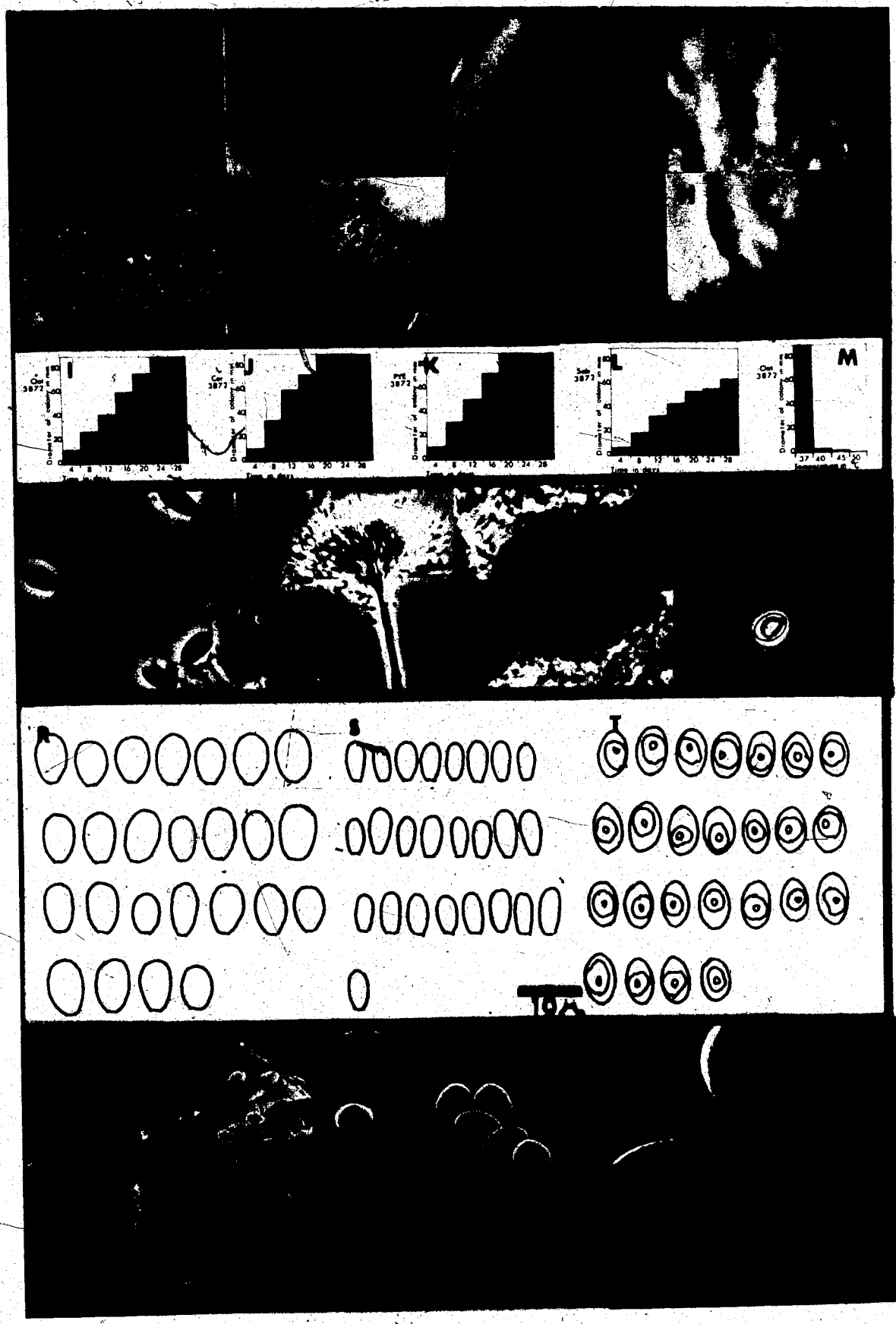

I
J
K
L
M

Plate #191 *Petriellidium boydii* UAMH 3873

Isolated from cattle manure, Lethbridge, 1975 by R. G. Bell

Received 1975 from Bell as *Petriellidium boydii* 36F1

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Dark mouse brown(dark green)/dark
      2) Cer- Dark mouse brown/greenish
      3) PYE- Dark mouse brown/dark orange green
      4) Sab- Mod. mouse brown/olive green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-9.5 x 3.5-5.5 µm — Figs. N,R
   b. Synnematous conidia- 5.5-7 x 1.5-2 µm — Figs. O,S
   c. Ascocarps- 73-133 µm dia. — Figs. P,U
   d. Ascospores- 6-8 x 3.5-5 µm, golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

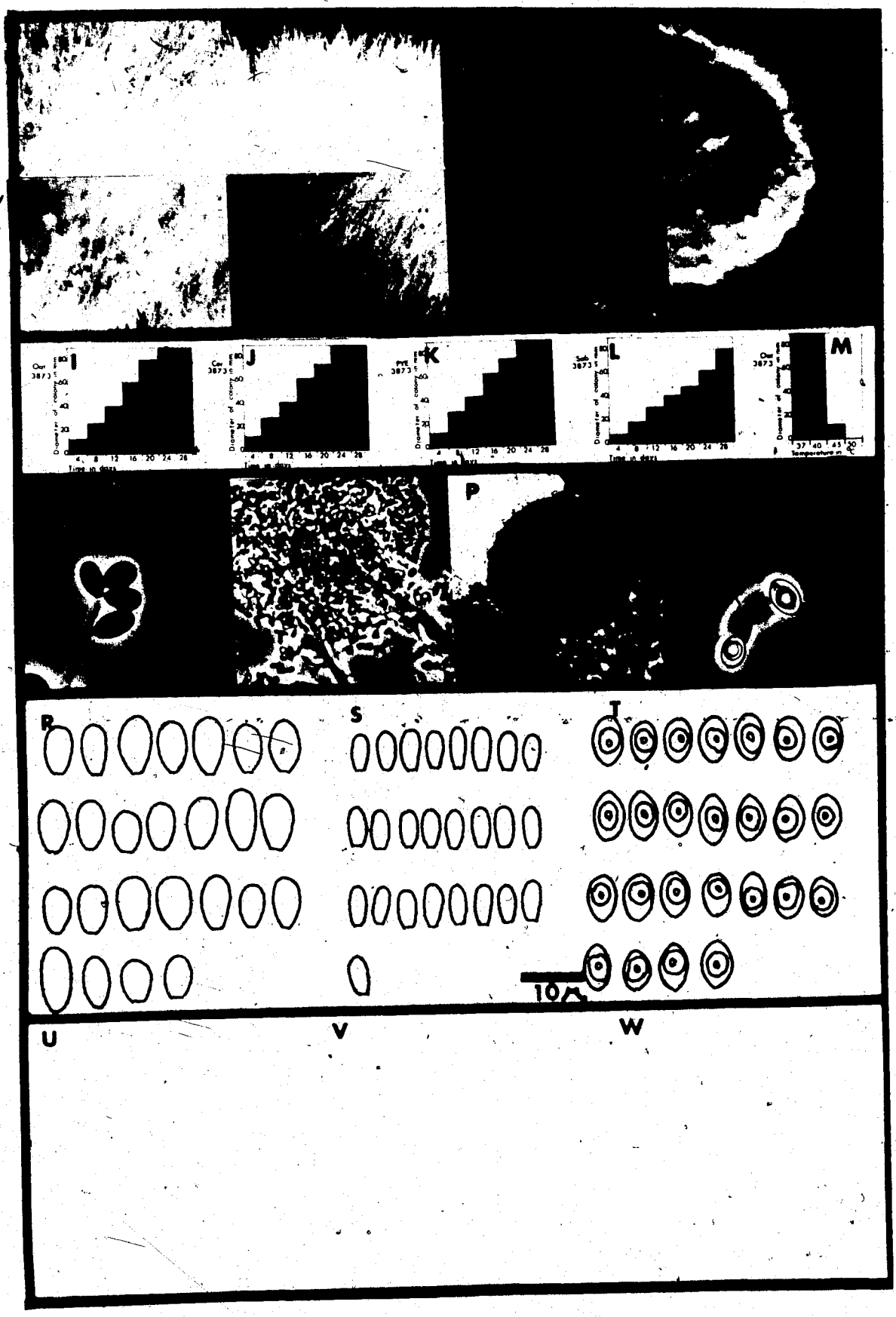

I
J
K
L
M
P
R
S
T
10
U
V
W

Plate #20: *Petriellidium boydii* UAMH 3904

Isolated from Fungus ball- autopsy human, Chicago, 1975 by J. W. Rippon

Received 1975, from Rippon as *Monosporium*?

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Dark mouse brown(lt. to mod. mouse brown)/dark
      2) Cer- Lt. mouse brown/none
      3) PYE- Mod. mouse brown/yellow green
      4) Sab- Mod. mouse brown(lt. grey)/cream
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-8.5 x 3.5-6 um — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

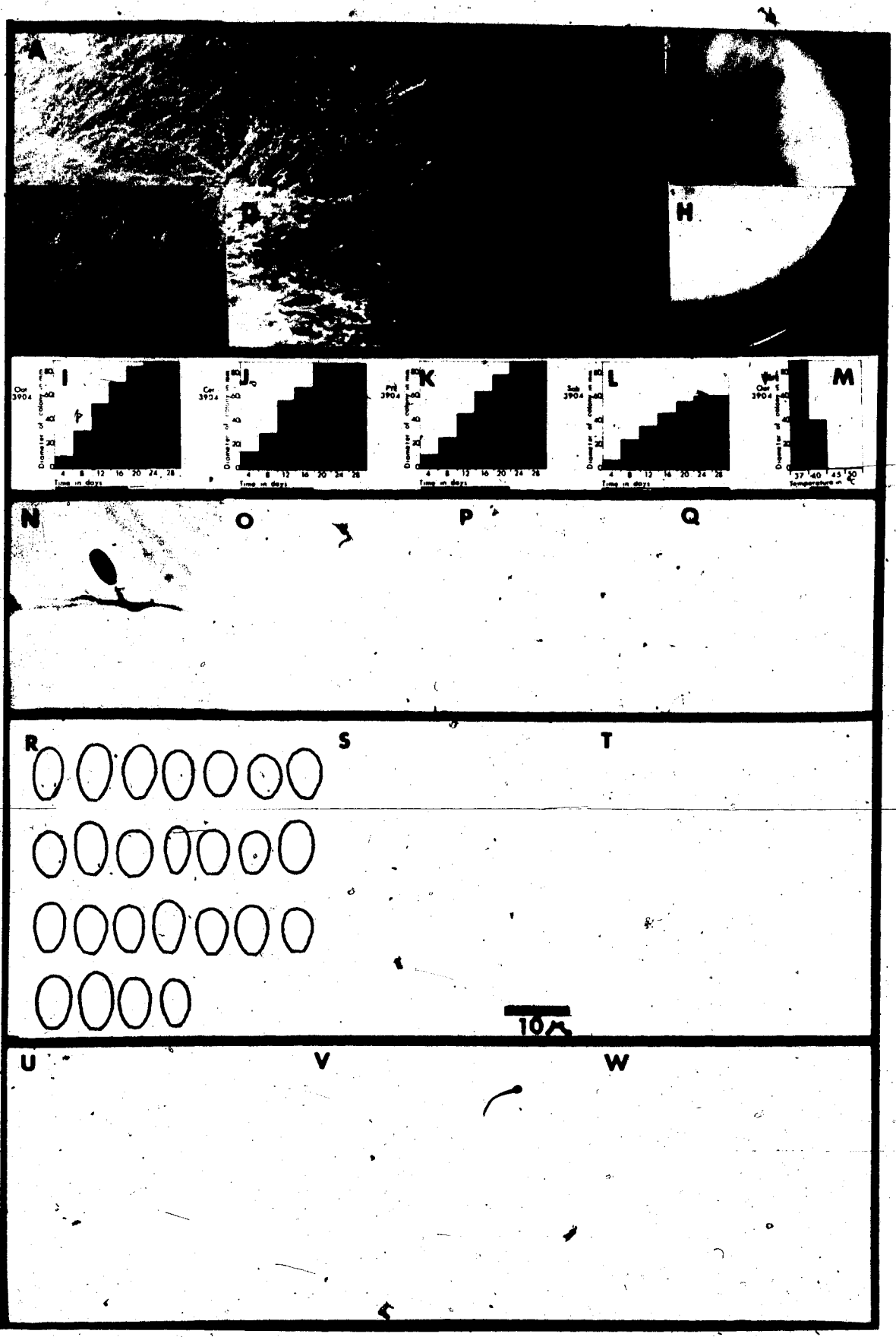

A
H
I
J
K
L
M
Time in days
N
O
P
Q
R
S
T
10
U
V
W

Plate #21: *Petriellidium boydii* UAMH 3905

Isolated from sputum, Chicago, 1975 by J. W. Rippon

Received 1975 from Rippon as *Monosporium*

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Deep grey-green/dark
      2) Cer- Mod. grey(dark grey)/none
      3) PYE- Lt. mouse brown/dark olive green
      4) Sab- Lt. grey/mod olive green(blue green)
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6.5-10 x 4-6 um — Figs. N,R
   b. Synnematous conidia- 9.5-22.5 x 2.5-6.5 um — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,V,W
4. **Comments**

The *Graphium* conidia are larger than normally seen in the other strains.

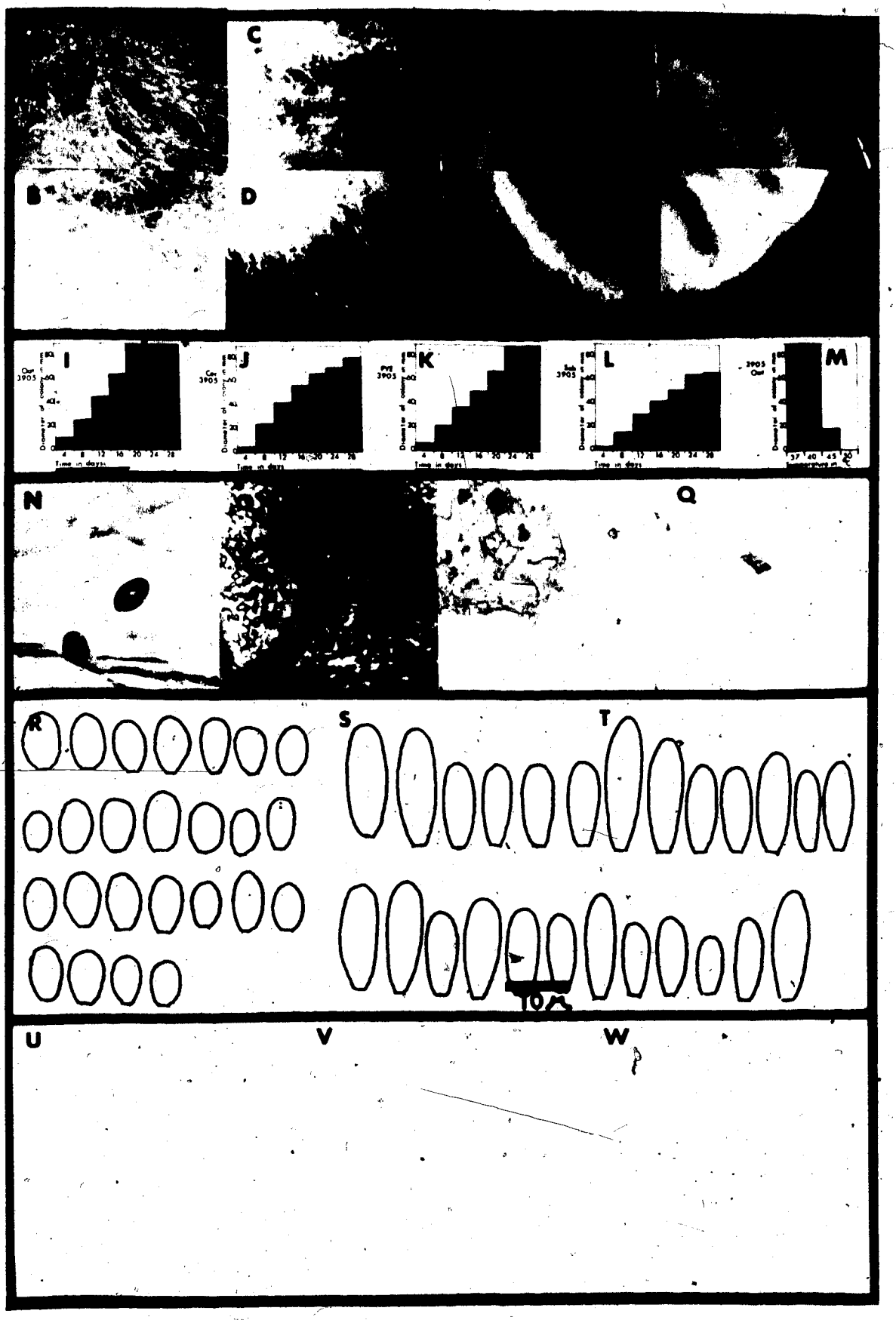

B
C
D
I
J
K
L
M
N
Q
R
S
T
U
V
W

Plate #22: *Petriellidium boydii* **UAMH 3973**

Isolated from knee paramycetoma, Argentina, 1944 by Fischer

Received 1976 from Negroni as *Pseudallescheria shearii*

Type strain 5163

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt: mouse brown/mod.dark
      2) Cer- Lt. mouse brown-grey/none
      3) PYE- Lt. mouse brown/yellow green
      4) Sab- Lt. grey/cream pale yellow green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-9 x 3.5-5.5 um — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

This is the type strain of *Pseudallescheria shearii*. It is a typical *P. boydii* anamorph.

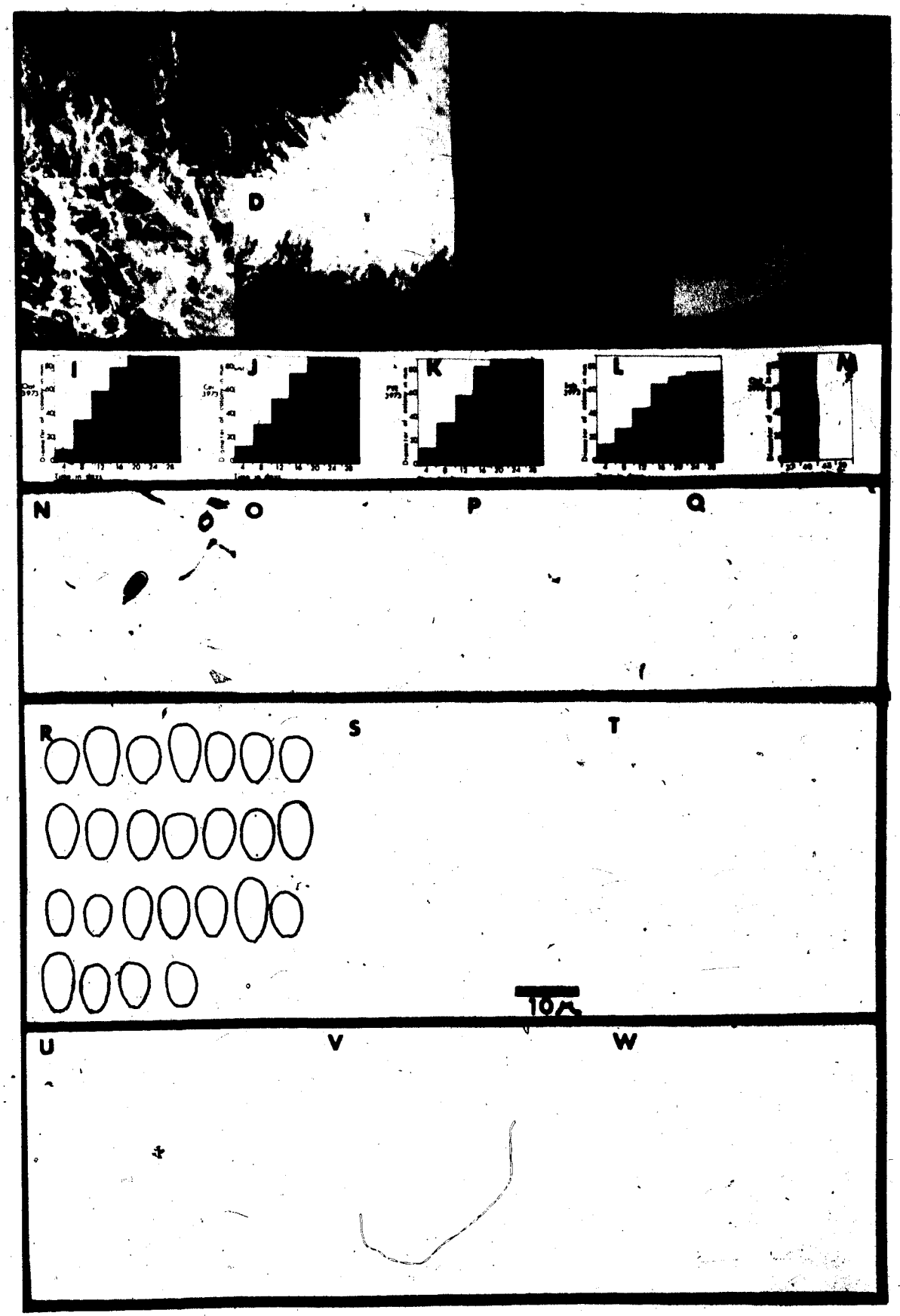

D
I
J
K
L
N
O
P
Q
R
S
T
U
V
W

Plate #23: *Petriellidium boydii* UAMH 3981

Isolated from man

Received 1976 from CBS as *Petriellidium boydii* CBS 316.54

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Mod. silver grey/dark
      2) Cer- Mod. grey/none
      3) PYE- Mod. mouse brown-grey/dark olive green
      4) Sab- Mod. mouse brown/deep blue green(dark brown)
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 7-10 x 4-6.5 um — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

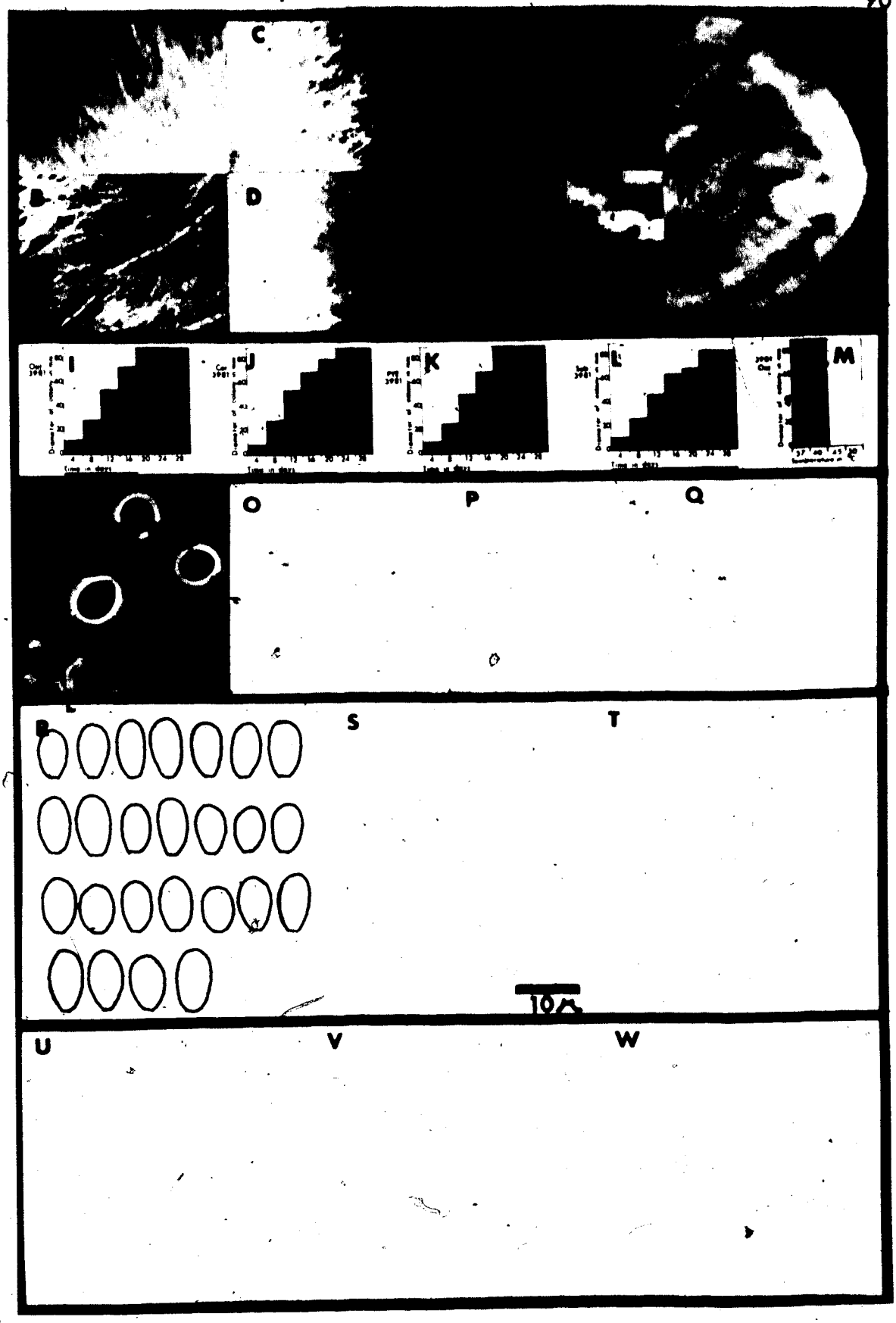

C
D
I
J
K
L
M
O
P
Q
R
S
T
10
U
V
W

Plate #24: *Petriellidium boydii* **UAMH 3982**

Isolated from mycetoma, Texas, 1921 by C. L. Shear

Received 1976 from CBS as *Petriellidium boydii* Type CBS 101.22

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt. mouse brown(lt. grey)/light(mod. dark)
      2) Cer- Mod. mouse brown(mod. grey)/none
      3) PYE- Lt. mouse brown-flesh/yellow
      4) Sab- Lt. silver/cream(yellow)
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-10 x 3.5-6 *um* — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

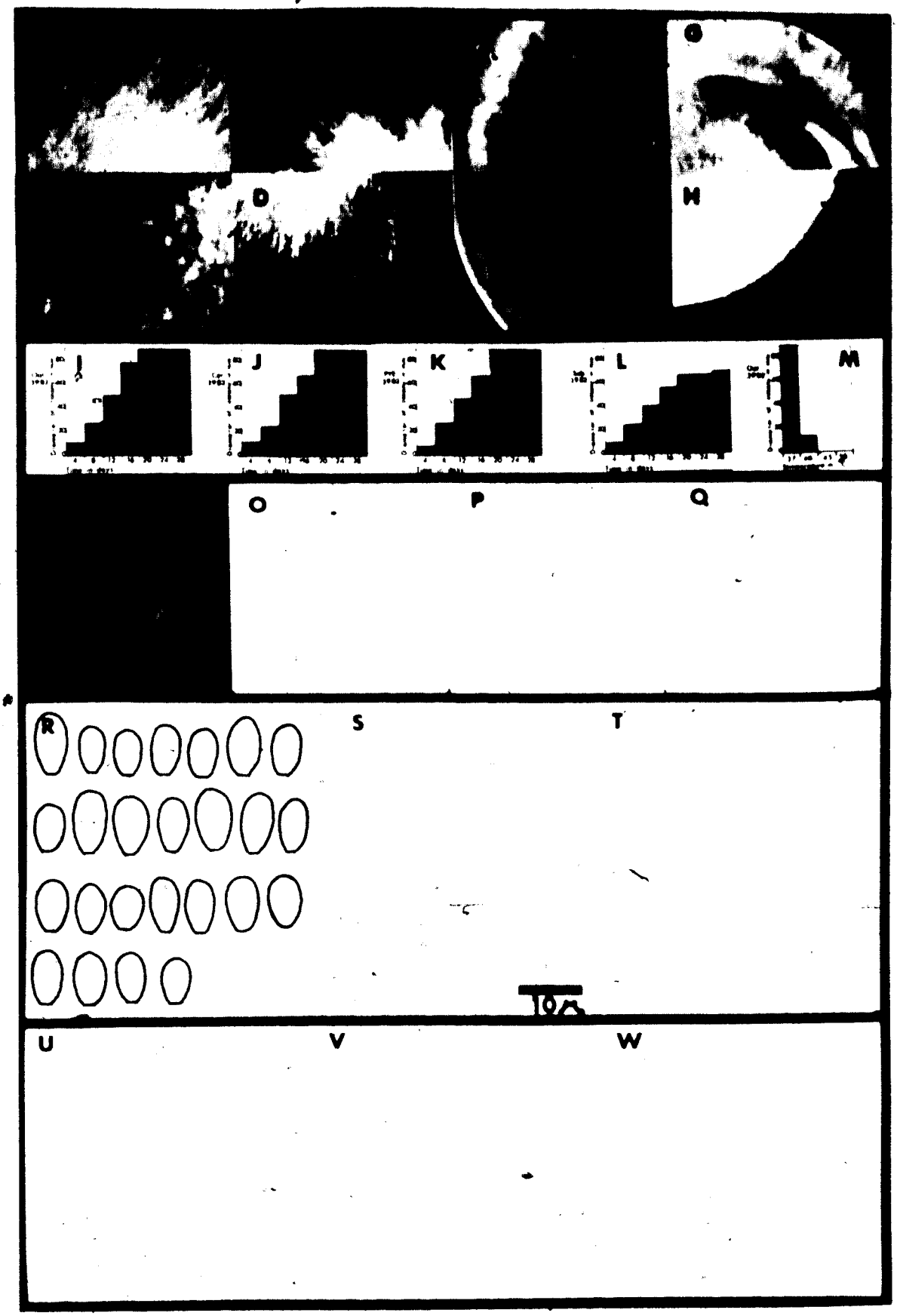

D
G
H
I
J
K
L
M
O
P
Q
R
S
T
U
V
W

Plate #25: *Petriellidium boydii* UAMH 3987

Isolated from soil, Tadzhikistan, 1973 by O. Fassatiova

Received 1976 from CBS as *Petriellidium ellipsoideum*

Type CBS 418.73

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Dark olive green/dark
     2) Cer- Lt. mouse brown/none
     3) PYE- Off white/yellow(pie shaped dark area)
     4) Sab- Off white/cream yellow
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 5.5-9 x 3-5.5 *um* — Figs. N,R
   - b. Synnematous conidia- 5.5-9 x 2-3.5 *um* — Figs. O,S
   - c. Ascocarps- 73-125 *um* dia. — Figs. P,U
   - d. Ascospores- 6.5-8 x 3.5-5 *um*,golden — Figs. Q,T,V,W
4. **Comments**

   This is the type strain of *P. ellipsoideum*. It is a typical *P. boydii* strain.

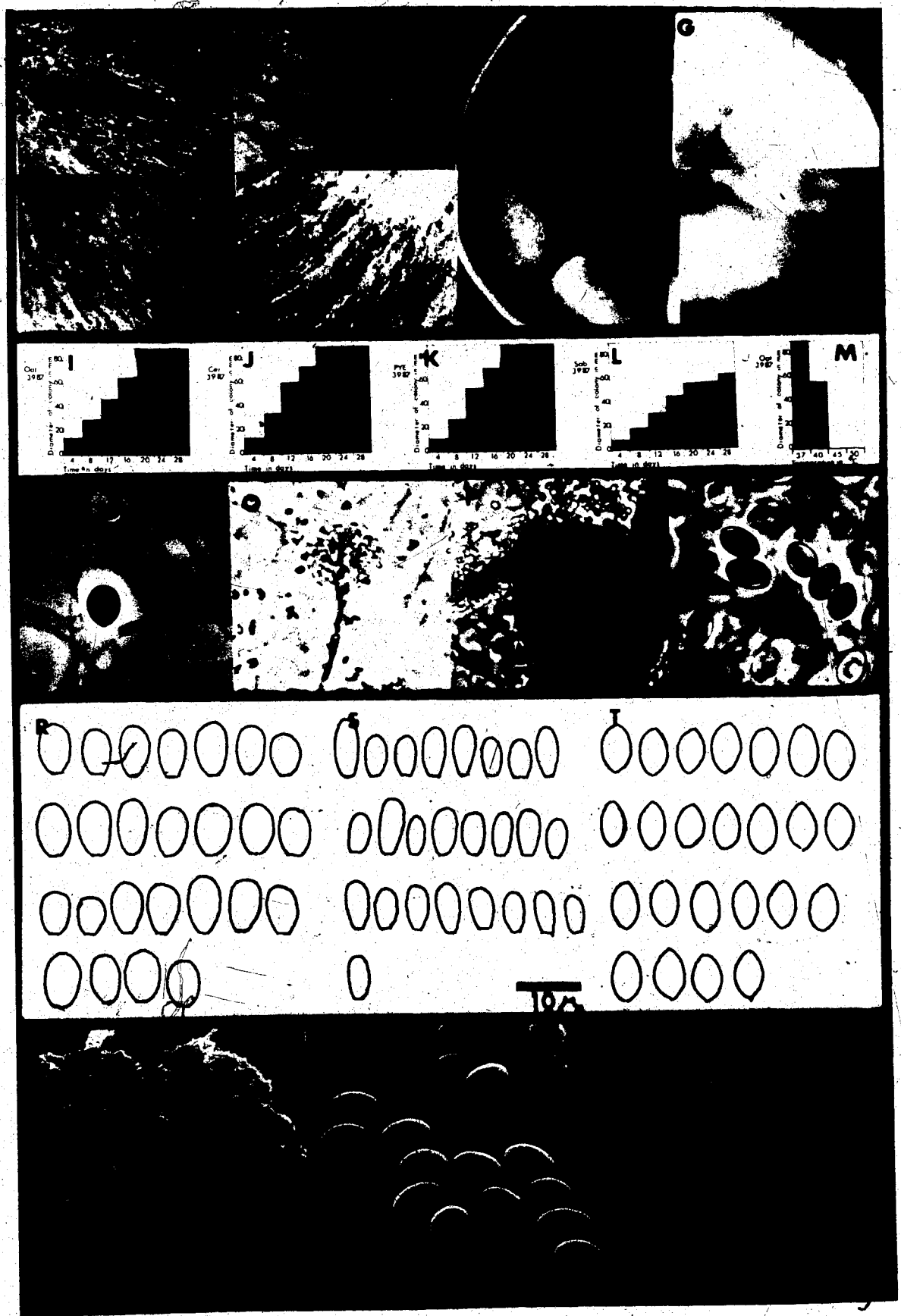

G
I
J
K
L
M
Time in days
Diameter of colony in mm

Plate #26: *Petriellidium boydii* UAMH 3990

Isolated from nasal cavity of swine, by A. A. Milko

Received 1976 from CBS as *Petriellidium boydii* CBS 695.70

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Mod. mouse brown(silver grey)/mod. dark
      2) Cer- Lt. grey to tan/none
      3) PYE- Off white/yellow
      4) Sab- Off white/pale yellow green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-9 x 4-6 um — Figs. N,R
   b. Synnematous conidia- 6-9 x 2-3.5 um — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

This is the type strain of *Acremonium suis*. It is a typical *P. boydii* anamorph.

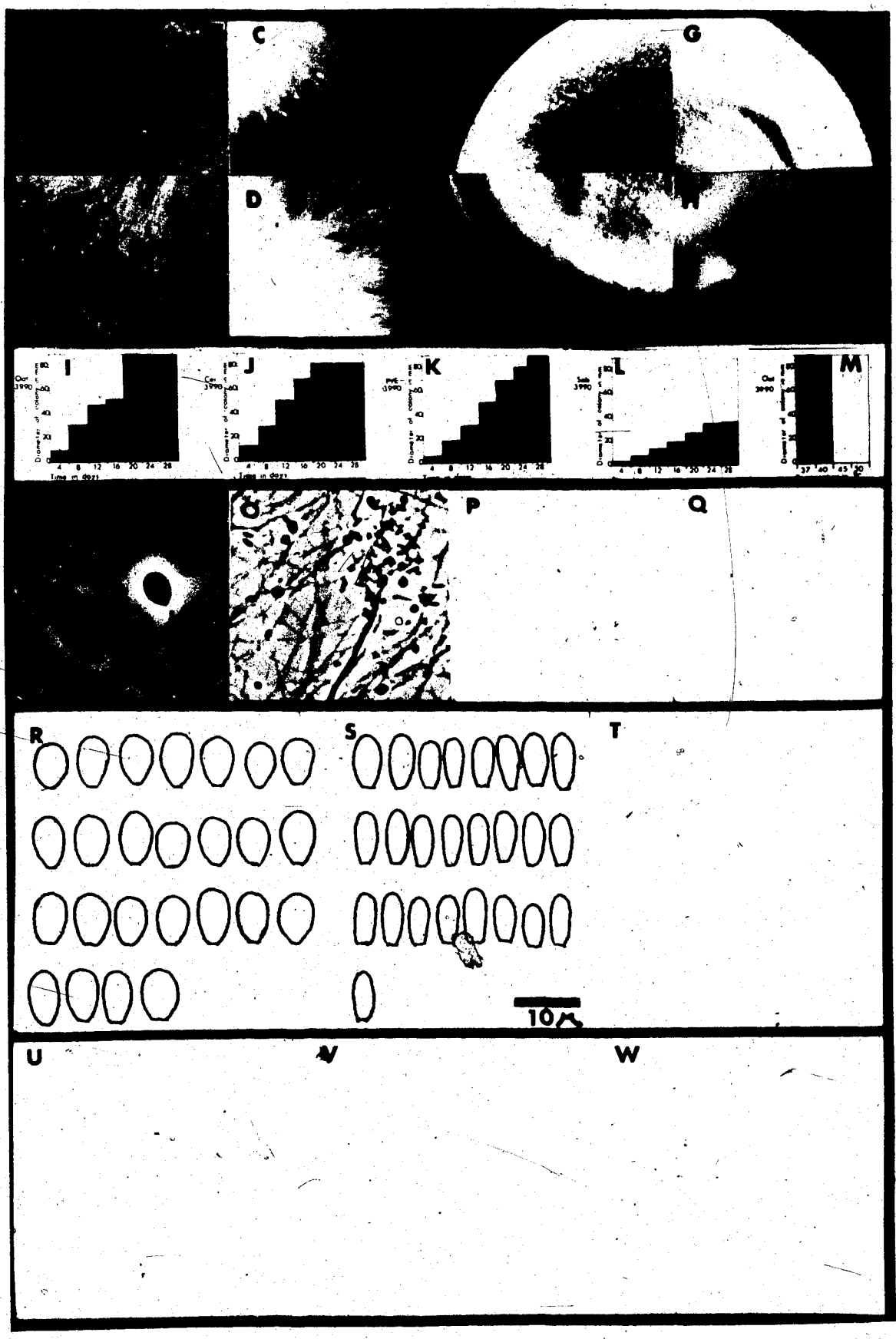

C
G
D
I
J
K
L
M
P
Q
R
S
T
10
U
V
W

Plate #27: *Petriellidium boydii* UAMH 3991

Isolated from soil by D. Mucke

Received 1976 from CBS as *Petriellidium boydii* CBS 114.59

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Off white/light(mod. dark)
      2) Cer- Mod. grey/none
      3) PYE- Lt. mouse brown//mod. olive green
      4) Sab- Off white/pale cream green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-8.5 x 3.5-5.5 µm — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

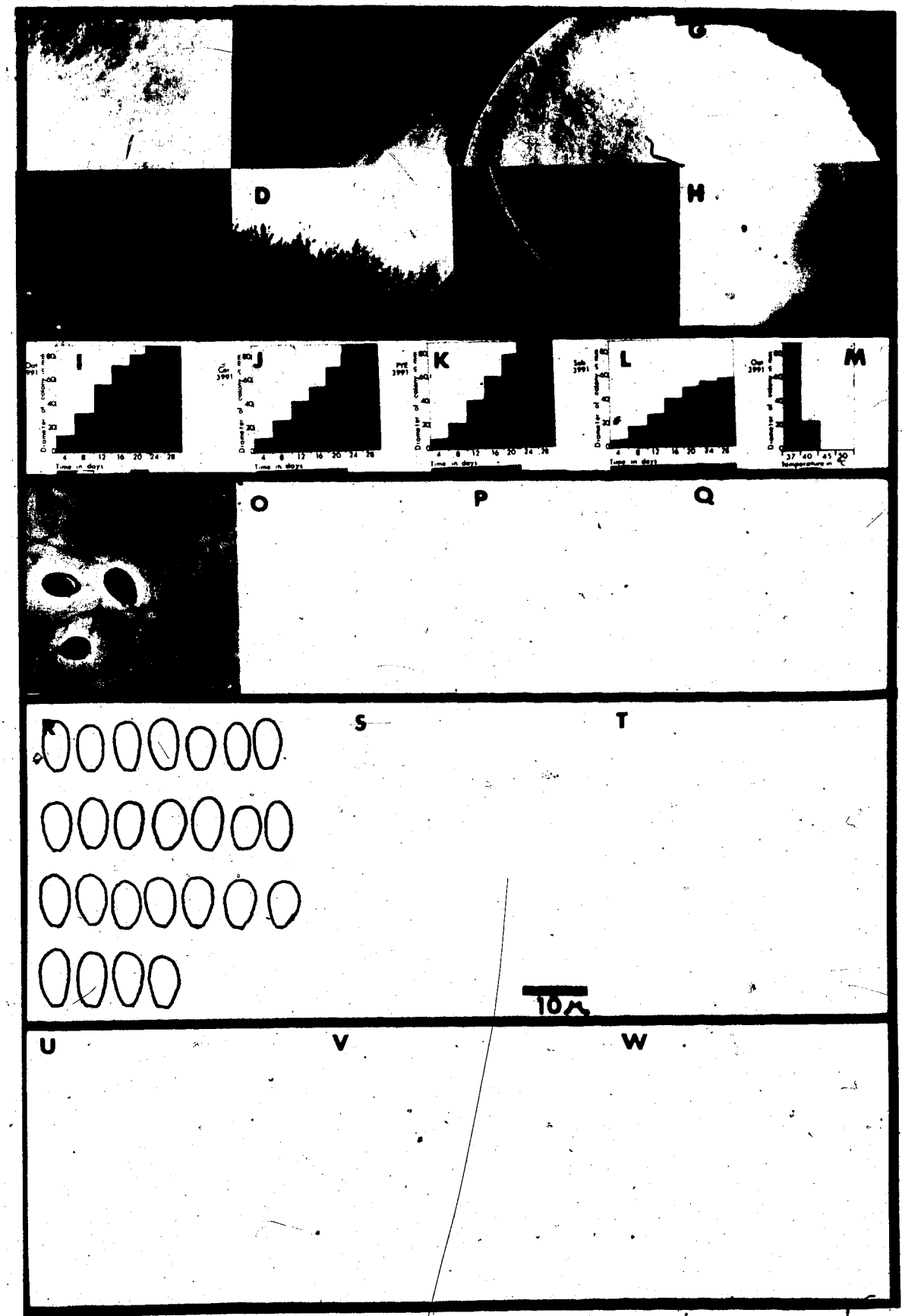

G
D
H
I
J
K
L
M
Time in days
Temperature in °C
O
P
Q
S
T
10 μm
U
V
W

Plate #28: *Petriellidium boydii* UAMH 3995

Isolated from Savannah soil, Africa, by J. L. Renard

Received 1976 from CBS as *Petriellidium boydii* CBS 254.66

1. **Colonies**
   - a. 4 days on Oat Cer RYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Off white/light
     2) Cer- Off white/none
     3) PYE- Off white/yellow-gold
     4) Sab- Off white/yellow
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 5-8 x 2.5-4.5 um — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

This is a typical *P. boydii* anamorph.

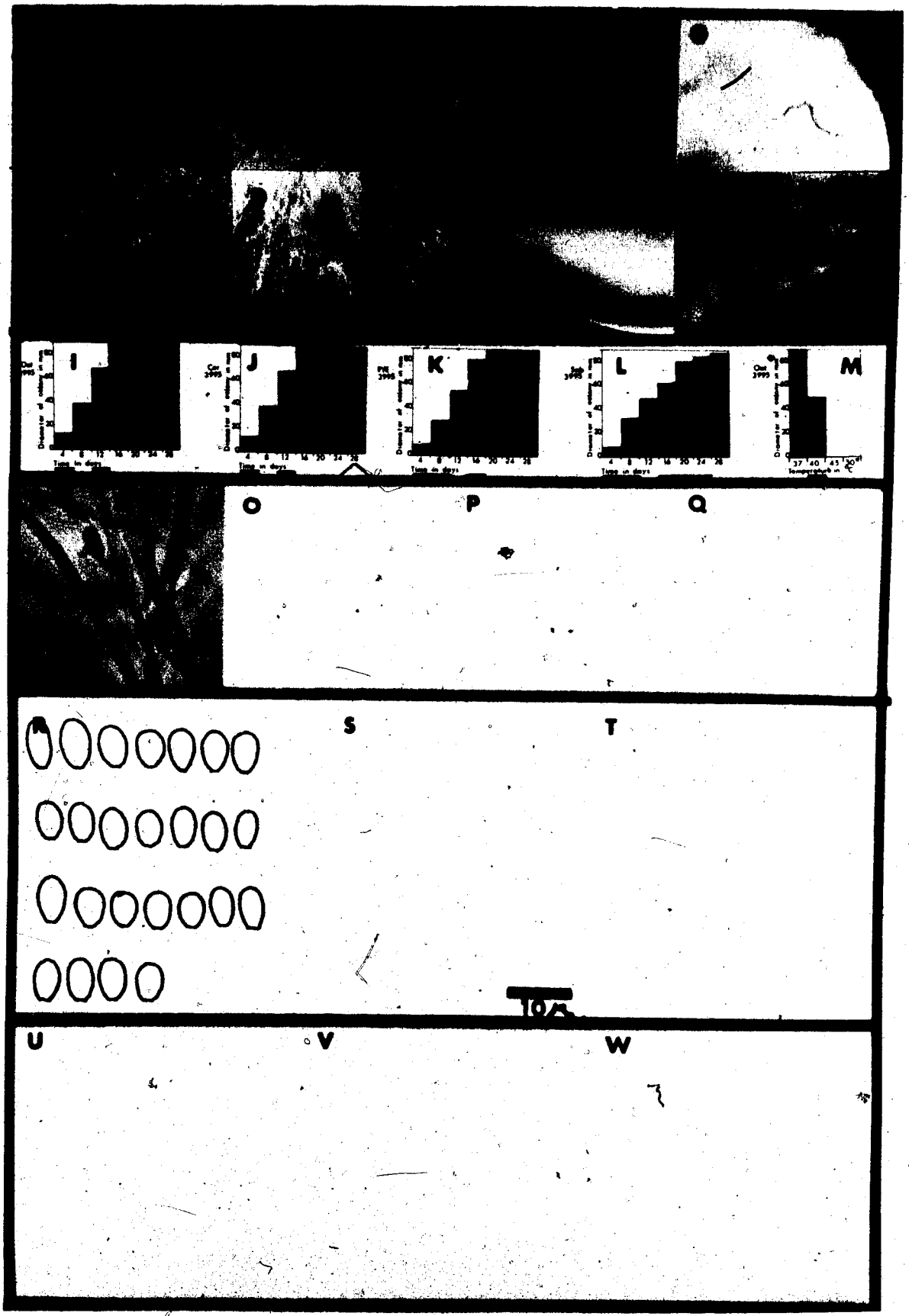

I
J
K
L
M
O
P
Q
S
T
U
V
W

Plate #29: ***Petriellidium boydii*** **UAMH 4218**

Isolated from eye and chest wall biopsy, Chicago, 1979 by J. Rippon

Received 1979 from Rippon as *Petriellidium boydii*

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Mod. mouse brown(dark olive green)/dark
      2) Cer- Mod. mouse brown/none
      3) PYE- Mod. mouse brown/yellow green
      4) Sab- Lt. mouse brown(mod. grey)/pale olive green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5-8 x 3.5-5.5 *um* — Figs. N,R
   b. Synnematous conidia- 4.5-7 x 2-3.5 *um* — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

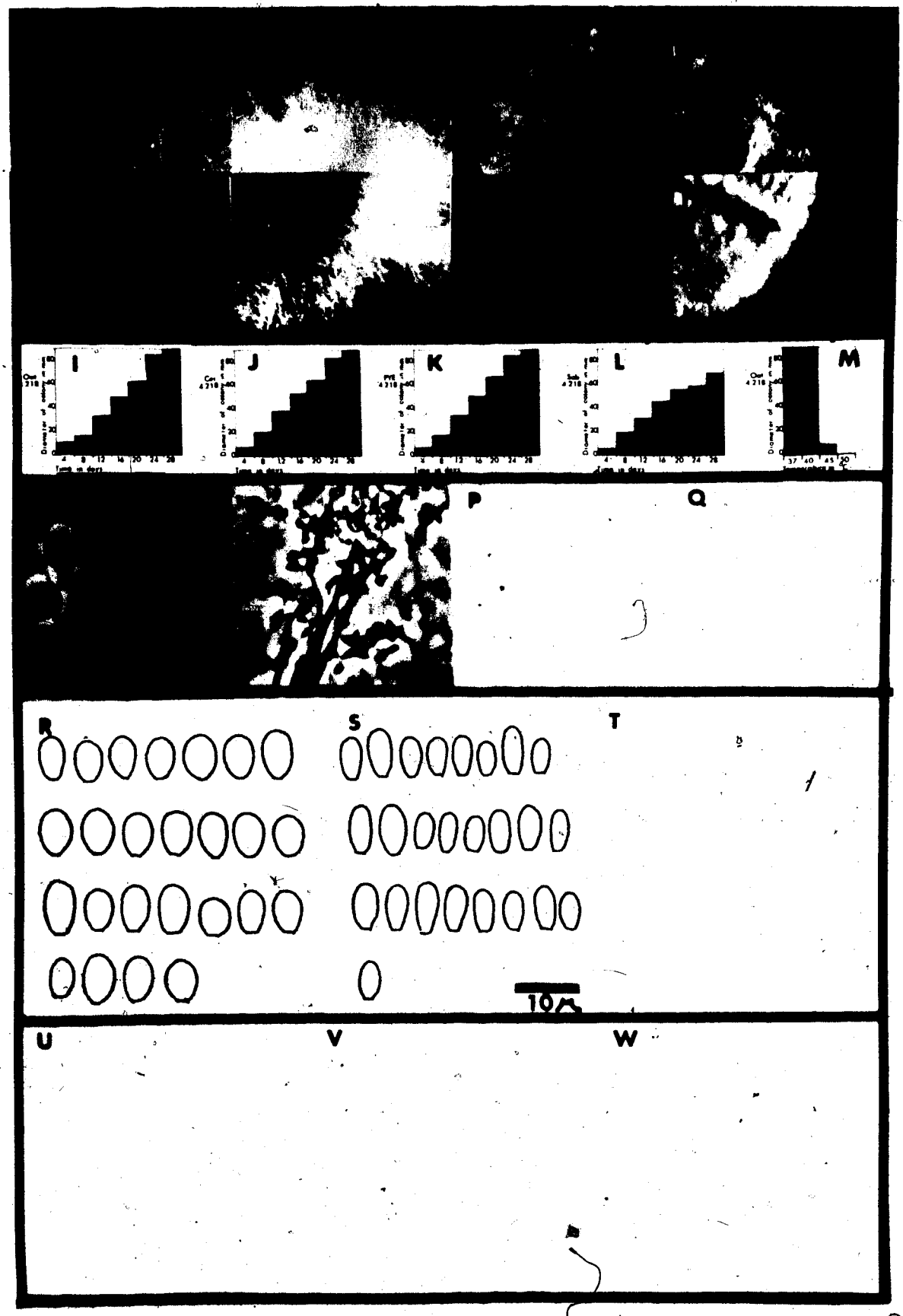

I
J
K
L
M
P
Q
R
S
T
10
U
V
W

Plate #30: *Petriellidium boydii* UAMH 4238

Isolated from immunosuppressed patient at autopsy, UCLA, 1979 by D. Howard

Received 1979 from Howard as *Petriellidium boydii* 8375

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Dark olive green/dark
     2) Cer- Mod. mouse brown/none
     3) PYE- Dark olive green/dark olive green
     4) Sab- Mod. olive green/dark olive green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-9 x 3.5-5.5 µm — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

This is a typical *P. boydii* anamorph.

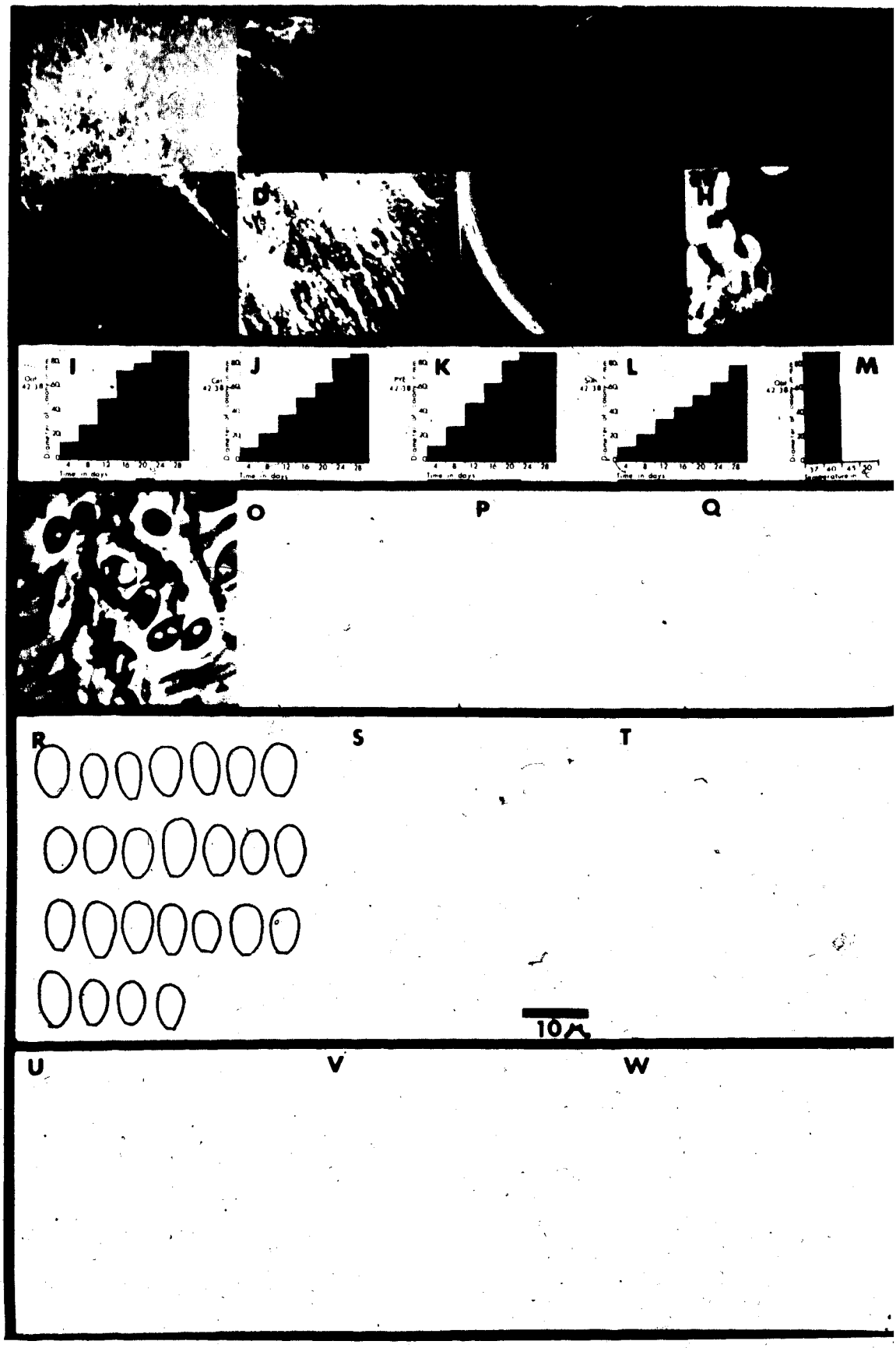

H
I
J
K
L
M
Time in days
Temperature in °C
O
P
Q
R
S
T
10 μ
U
V
W

Plate #31: *Petriellidium boydii* UAMH 4248

Isolated from widespread disseminated disease, UCLA, by D. Howard

Received 1979 from Howard as *Scedosporium* species 3382

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Dark olive green/dark
     2) Cer- Dark mouse brown/none
     3) PYE- Lt. mouse brown over dark olive green/dark olive green
     4) Sab- Dark olive green/dark olive green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-9 x 3.5-5.5 um — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

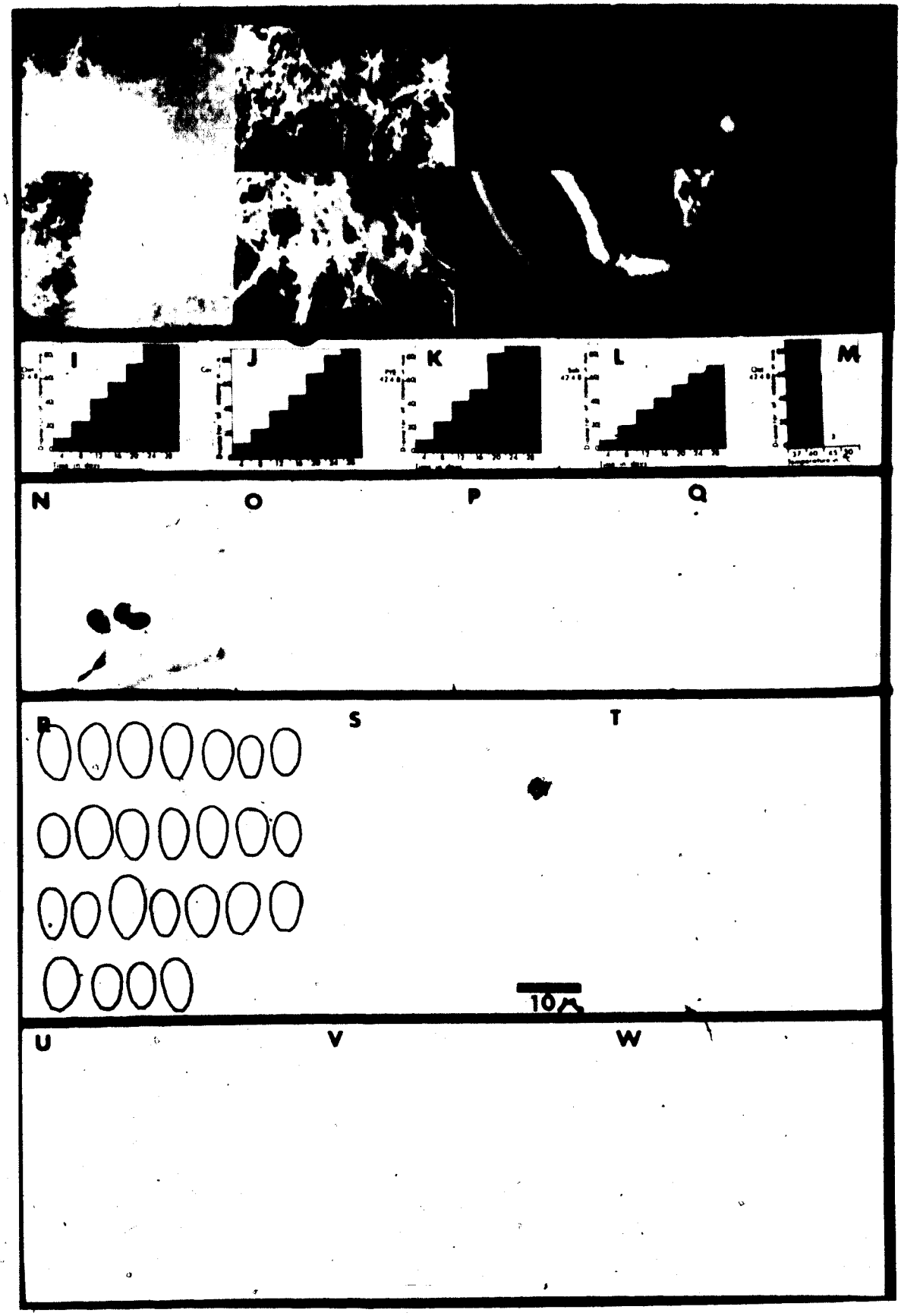

I
J
K
L
M
N
O
P
Q
R
S
T
10
U
V
W

Plate #32: *Petriellidium boydii* UAMH 4301

Isolated from sputum, Ontario, 1980 by J. Kane

Received 1980 from Kane as *Petriellidium boydii* OMH 1

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Lt. mouse brown/light
     2) Cer- Lt. mouse brown/none
     3) PYE- Off white/gold
     4) Sab- Off white/pale yellow gold
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 5.5-8.5 x 3-5 *um* — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

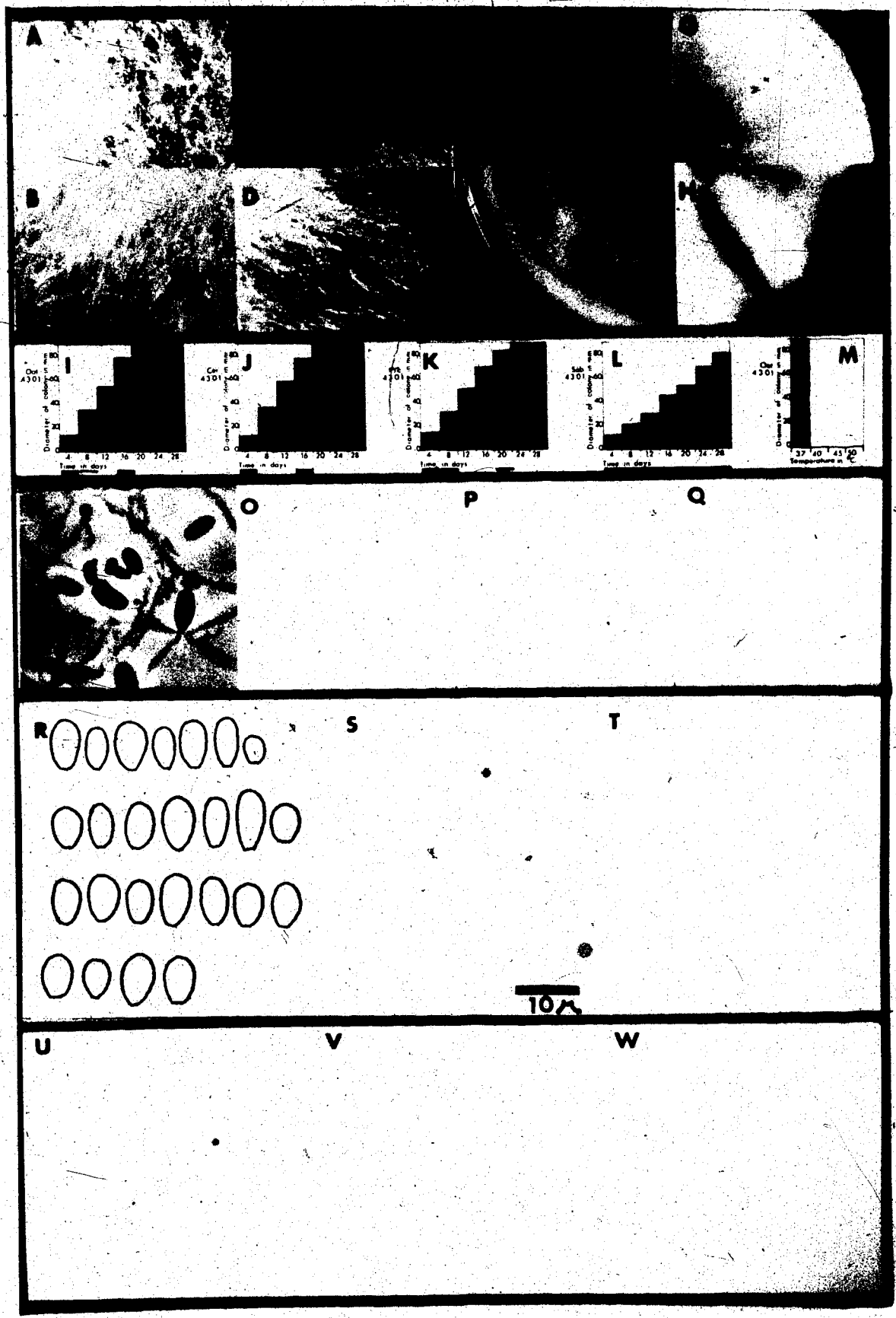

A
B
D
H
I
J
K
L
M
Time in days
Temperature in °C
O
P
Q
R
S
T
10
U
V
W

Plate #33: *Petriellidium boydii* UAMH 4302

Isolated from sputum, Ontario, 1980 by J. Kane

Received 1980 from Kane as *Petriellidium boydii* OMH 1159

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Mod. mouse brown/dark
     2) Cer- Dark mouse brown/none
     3) PYE- Mod. mouse brown/yellow green
     4) Sab- Lt. mouse brown/cream
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-8 x 3-5 um — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- 66.5-107 um dia. — Figs. P,U
   - d. Ascospores- 6-7.5 x 4-5 um,golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

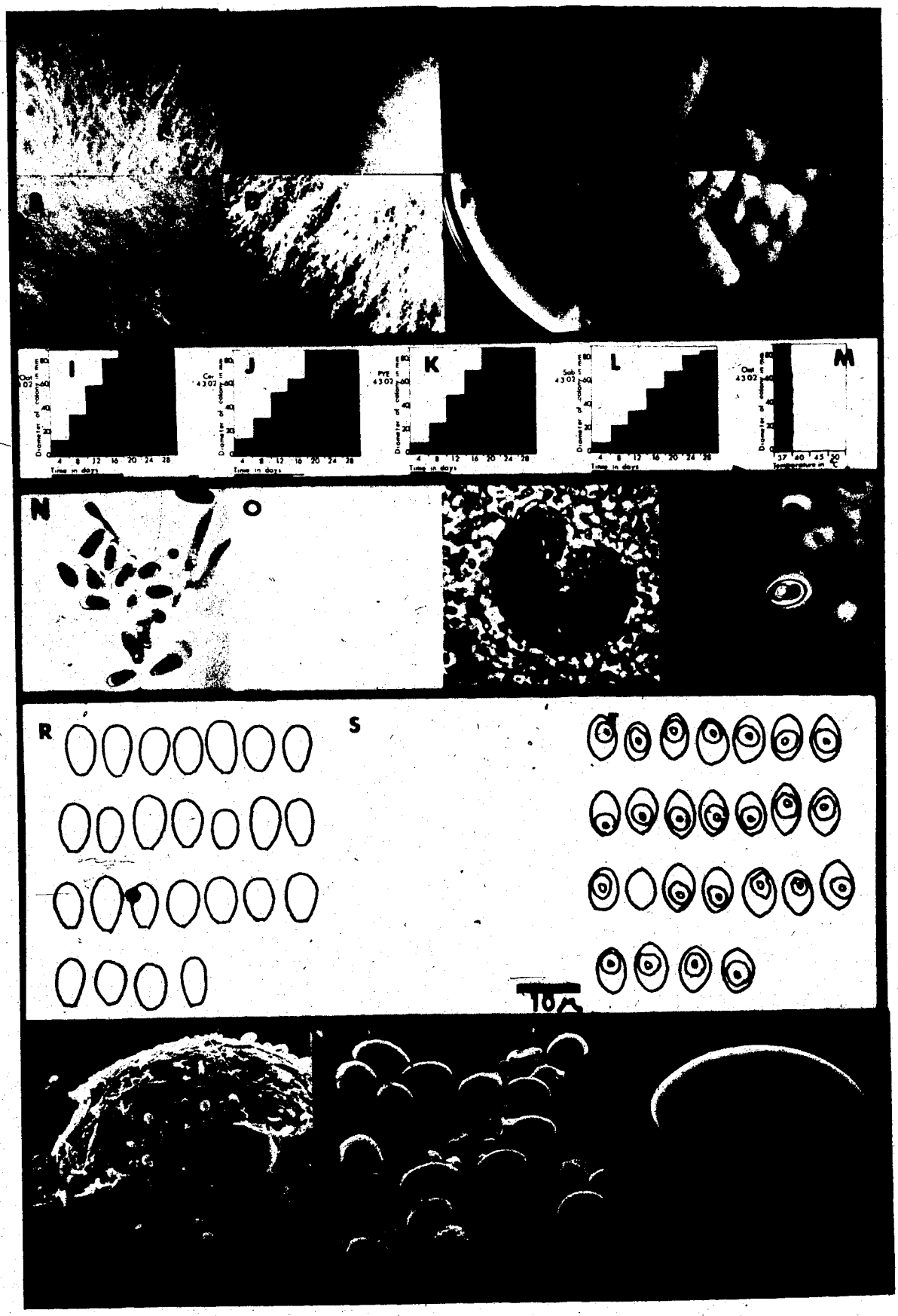

I
J
K
L
M
N
O
R
S
10 µ

Plate #34: *Petriellidium boydii* UAMH 4303

Isolated from sputum, Ontario, 1980 by J. Kane

Received 1980 from Kane as *Petriellidium boydii* Fr 676

1. **Colonies**

   a. 4 days on Oat Cer PYE and Sab — Figs. A-D

   b. 21 days on Oat Cer PYE and Sab — Figs. E-H

   c. Colour at 28 days (Surface/Reverse)

      1) Oat- Dark mouse brown/dark

      2) Cer- Mod. mouse brown/none

      3) PYE- Mod. mouse brown(dark mouse brown)/dark yellow green

      4) Sab- Lt. mouse brown/pale yellow green

2. **Growth Rates**

   a. at 25°C on different media — Figs. I-L

   b. at different temperatures on Oat — Fig. M

3. **Microscopic Characters**

   a. Diffuse conidia- 6-8.5 x 3.5-5.5 um — Figs. N,R

   b. Synnematous conidia- 4-8 x 2-3.5 um — Figs. O,S

   c. Ascocarps- 101.5-155.5 um dia. — Figs. P,U

   d. Ascospores- 6-8 x 4-5 um,golden — Figs. Q,T,V,W

4. **Comments**

   This is a typical *P. boydii* strain. The photographs illustrating colonial growth on Sab. at 4 and 21 days were not available.

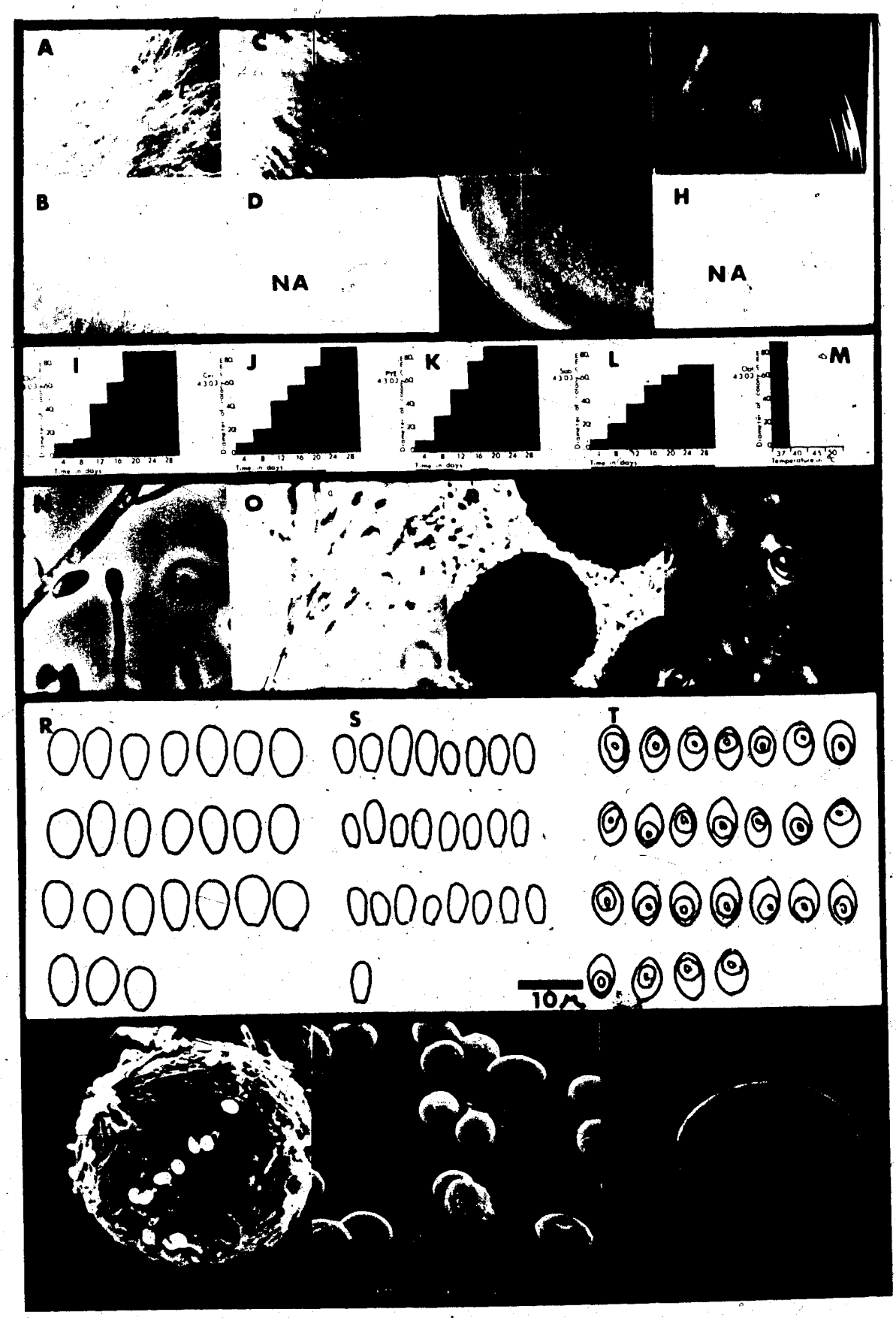

A
B
NA
C
D
NA
H
NA
I
J
K
L
M
N
O
R
S
T
10μ

Plate #35: *Petriellidium boydii* UAMH 4304

Isolated from sputum, Ontario, 1980 by J. Kane

Received 1980 from Kane as *Petriellidium boydii* Fr 642

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Mod. mouse brown/dark
     2) Cer- Lt. mouse brown/none
     3) PYE- Mod mouse brown-grey/yellow tan(cream green)
     4) Sab- Lt. grey-green/pale green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6-8.5 x 3-5 um — Figs. N,R
   - b. Synnematous conidia- 6-11.5 x 2-3.5 um — Figs. O,S
   - c. Ascocarps- 92.5-140 um dia. — Figs. P,U
   - d. Ascospores- 7-8.5 x 4.5-5.5 um,golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

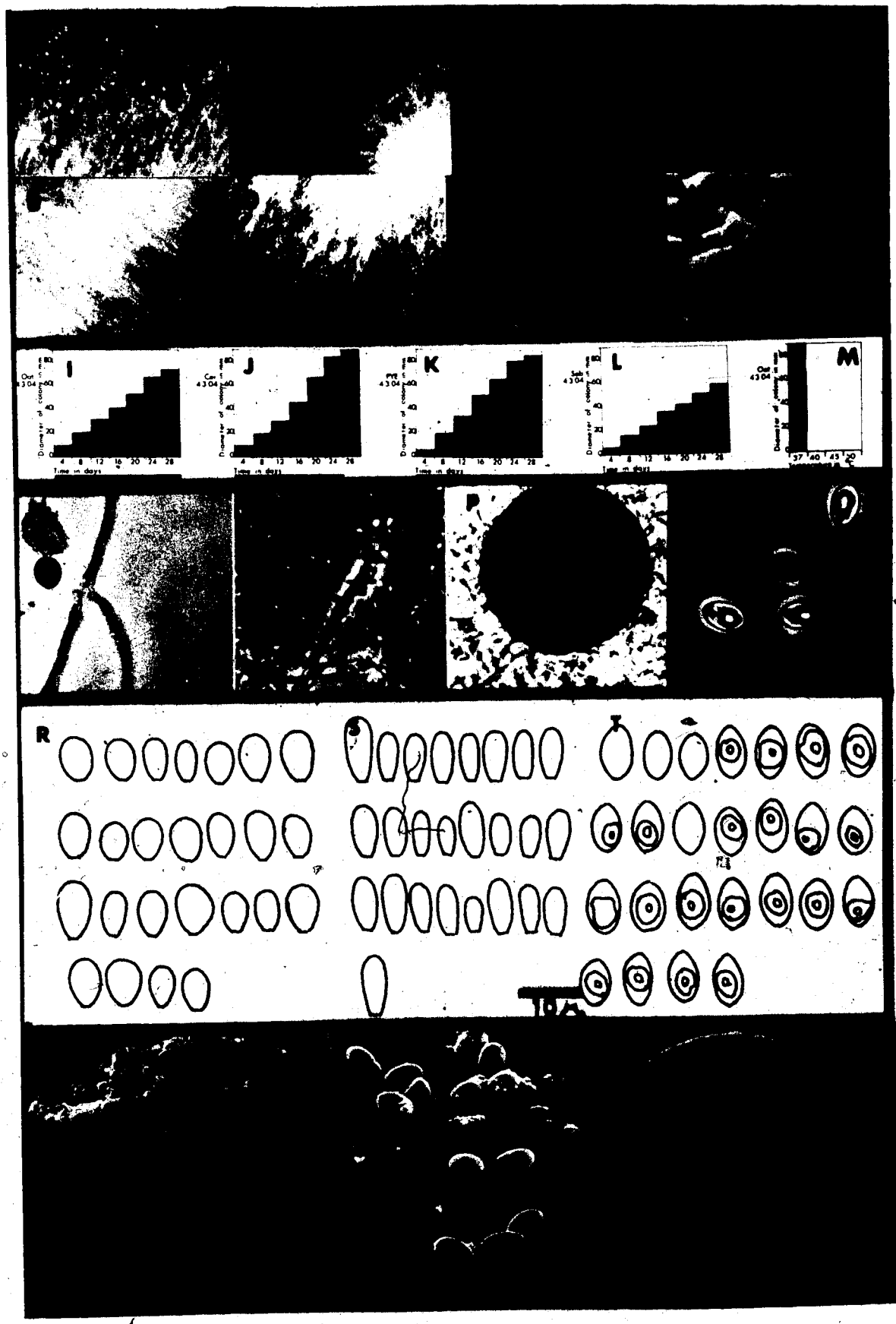

I
J
K
L
M
R

Plate #36: *Petriellidium boydii* UAMH 4310

Isolated from ear sample, Ontario, 1980 by J. Kane

Received 1980 from Kane as *Petriellidium boydii* Fr 806

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Dark mouse brown/dark
     2) Cer- Dark mouse brown/none
     3) PYE- Dark mouse brown-grey/yellow green
     4) Sab- Lt. mouse brown/gold
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 5.5-8 x 3-5.5 um — Figs. N,R
   - b. Synnematous conidia- 5.5-9 x 2-3.5 um — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

This is a typical *P. boydii* anamorph. An abundant production of synnemata was observed.

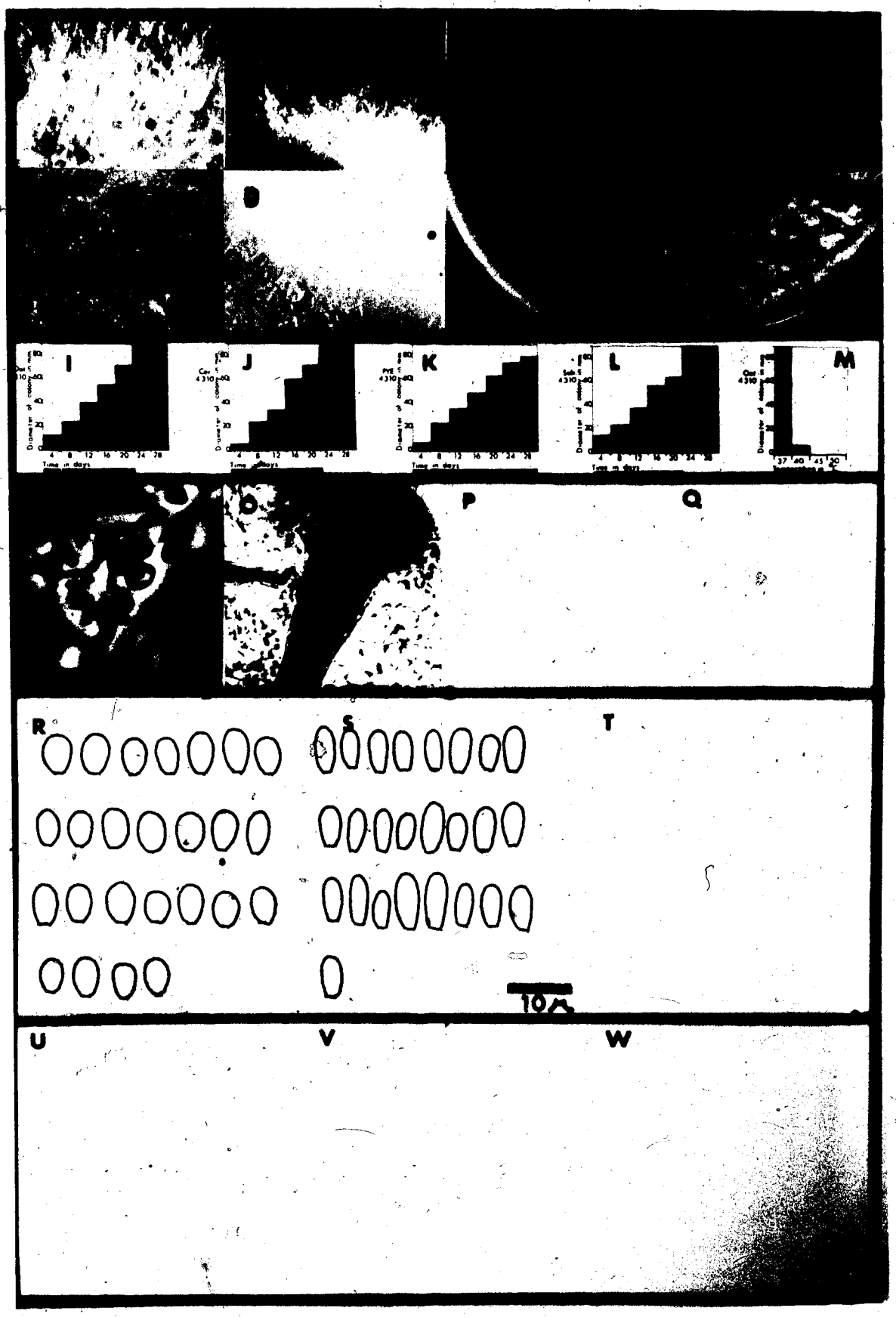

I
J
K
L
M
P
Q
R
S
T
U
V
W

Plate #37: *Petriellidium boydii* UAMH 4408

Isolated from pasture soil, Alberta, 1980 by V. Mann

Entered 1980 as *Petriellidium boydii* S21F

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt. mouse brown-grey/mod.dark
      2) Cer- Lt. mouse brown/none
      3) PYE- Lt. mouse brown/gold
      4) Sab- Lt. mouse brown-grey/pale green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5.5-7.5 x 3.5-5 um — Figs. N,R
   b. Symnematous conidia- 3-7.5 x 1.5-2.5 um — Figs. O,S
   c. Ascocarps- 133.5-182 um dia. — Figs. P,U
   d. Ascospores- 7.5-8.5 x 4.5-5 um,golden — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* strain.

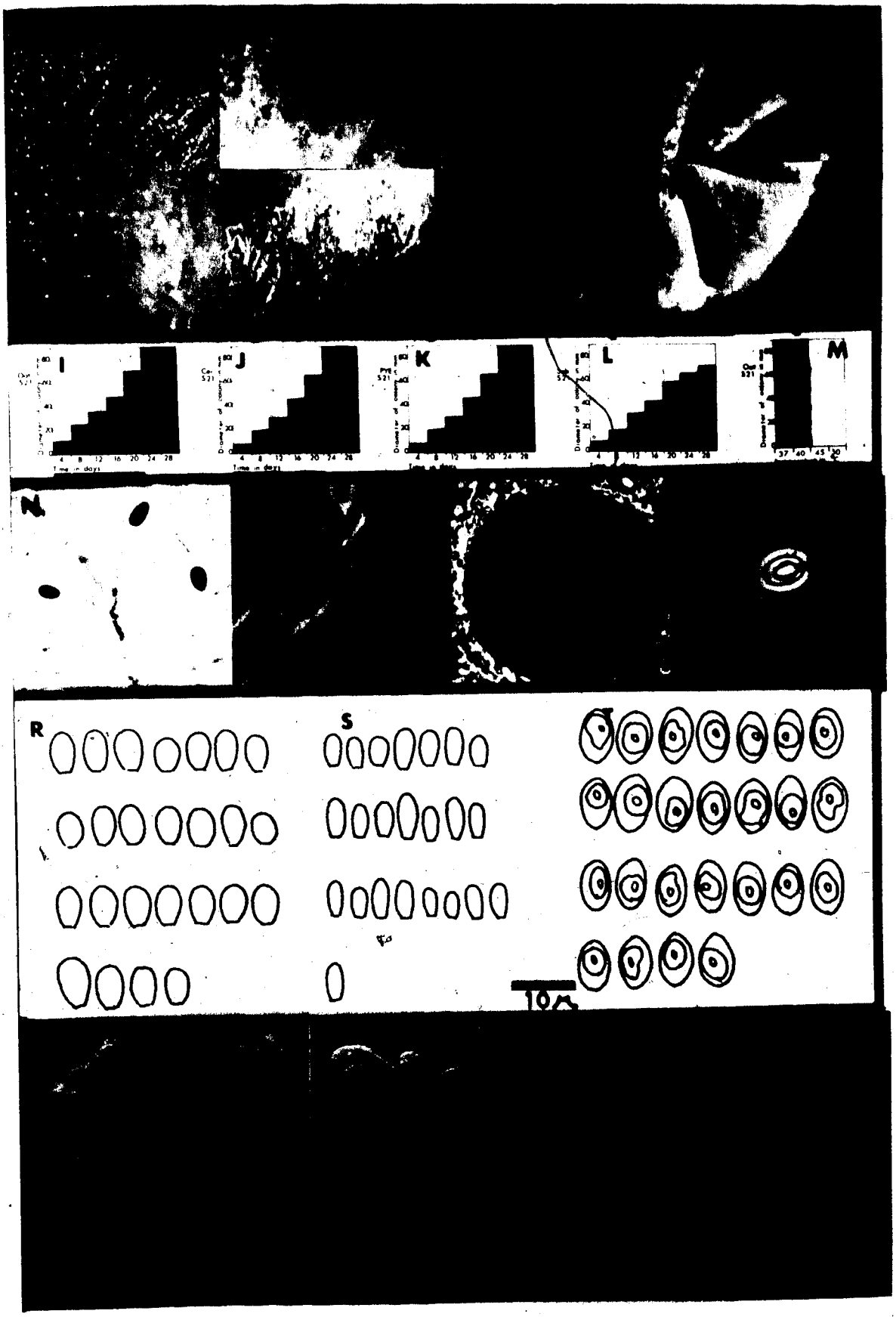

I
J
K
L
M
N
R
S
10

Plate #38: *Petriellidium boydii* **UAMH 4409**

Isolated from pasture soil, Alberta, 1980 by V. Mann

Entered 1980 as *Petriellidium boydii* S22DH

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt. mouse brown/mod. dark
      2) Cer- Lt. mouse brown/none
      3) PYE- Lt. mouse brown/yellow gold
      4) Sab- Lt. mouse brown/pale lt. green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5-7.5 x 3-5 um — Figs. N,R
   b. Synnematous conidia- 4-7.5 x 1.5-3.5 um — Figs. O,S
   c. Ascocarps- not seen — Figs. P,U
   d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

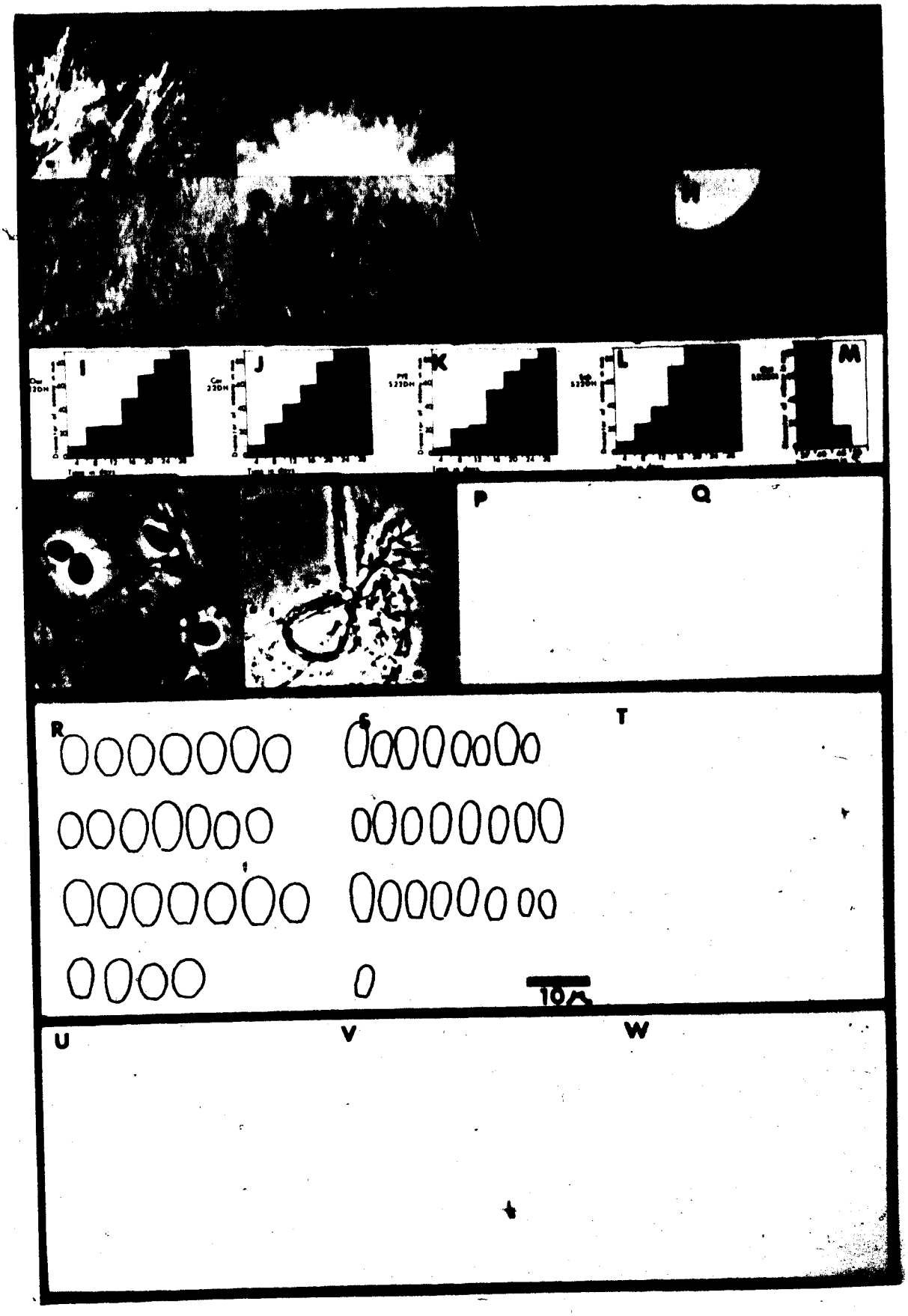

I
J
K
L
M
P
Q
R
T
10
U
V
W

Plate #39: *Petriellidium boydii* UAMH 4410

Isolated from pasture soil, Alberta, 1980 by V. Mann

Entered 1980 as *Petriellidium boydii* S22 LH

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Lt. gray/mod.
     2) Cer- Lt. mouse brown/none
     3) PYE- Mod. mouse brown/gold
     4) Sab- White/cream
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 5.5-8 x 3.5-5.5 *um* — Figs. N,R
   - b. Synnematous conidia- 5-6.5 x 1.5-3.5 *um* — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

   This is a typical *P. boydii* anamorph.

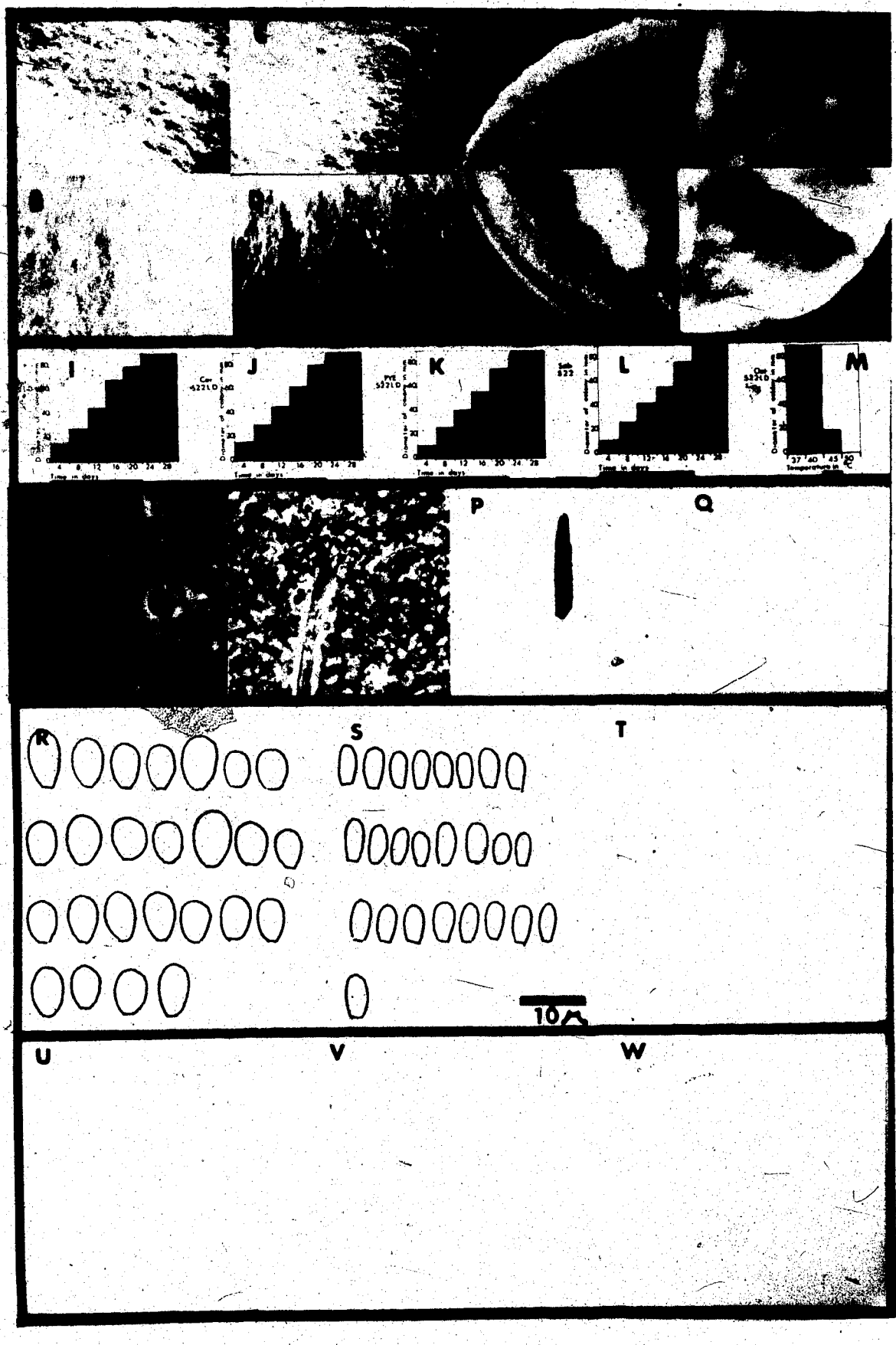

I
J
K
L
M
P
Q
R
S
T
10
U
V
W

Plate #40: *Petriellidium africanum* UAMH 4000

Isolated from sandy soil, Africa, 1972 by G. Franz

Received 1976 from CBS as *P. africanum* Type CBS 311.72

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Clear/light
     2) Cer- Cream tan/none
     3) PYE- Gold cream/gold tan
     4) Sab- Cream tan/lt. cream tan
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 3.5-6 x 1-2.5 *um* — Figs. N,R
   - b. Synnematous conidia- 3-5.5 x 1-2 *um* — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

This is the type strain of *P. africanum*. No other strains have been reported.

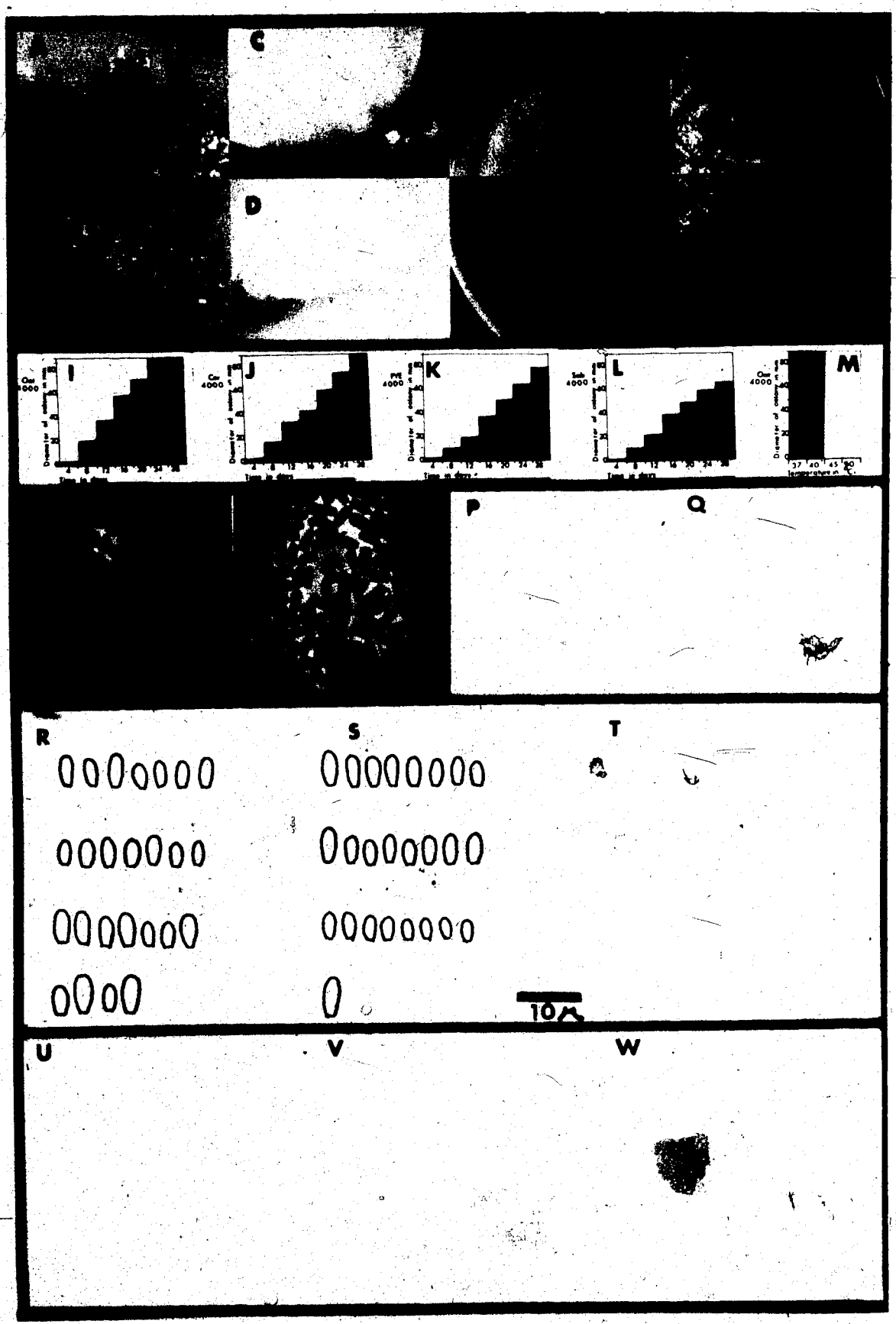

C
D
I
J
K
L
M
P
Q
R
S
T
10
U
V
W

Plate #41: *Petriellidium angustum* UAMH 3984

Isolated from sewage half digestion tank, USA, 1972 by D. Malloch

Received 1976 from CBS as *Petriellidium angustum* Type CBS 254.72

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt. mouse brown/light
      2) Cer- Lt. mouse brown/none
      3) PYE- Off white/yellow
      4) Sab- Off white/cream yellow
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5-7.5 x 2.5-4.5 *um* — Figs. N,R
   b. Synnematous-like conidia- — Figs. O,S
   c. Ascocarps- 40-68.5 *um* dia. — Figs. P,U
   d. Ascospores- 5-6.5 x 2.5-3.5 *um*, golden — Figs. Q,T,V,W
4. **Comments**

This is the type strain of *P. angustum*. It differs from *Petriellidium boydii* mainly in ascospore size. The *Scedosporium* state is identical to that of *Petriellidium boydii*.

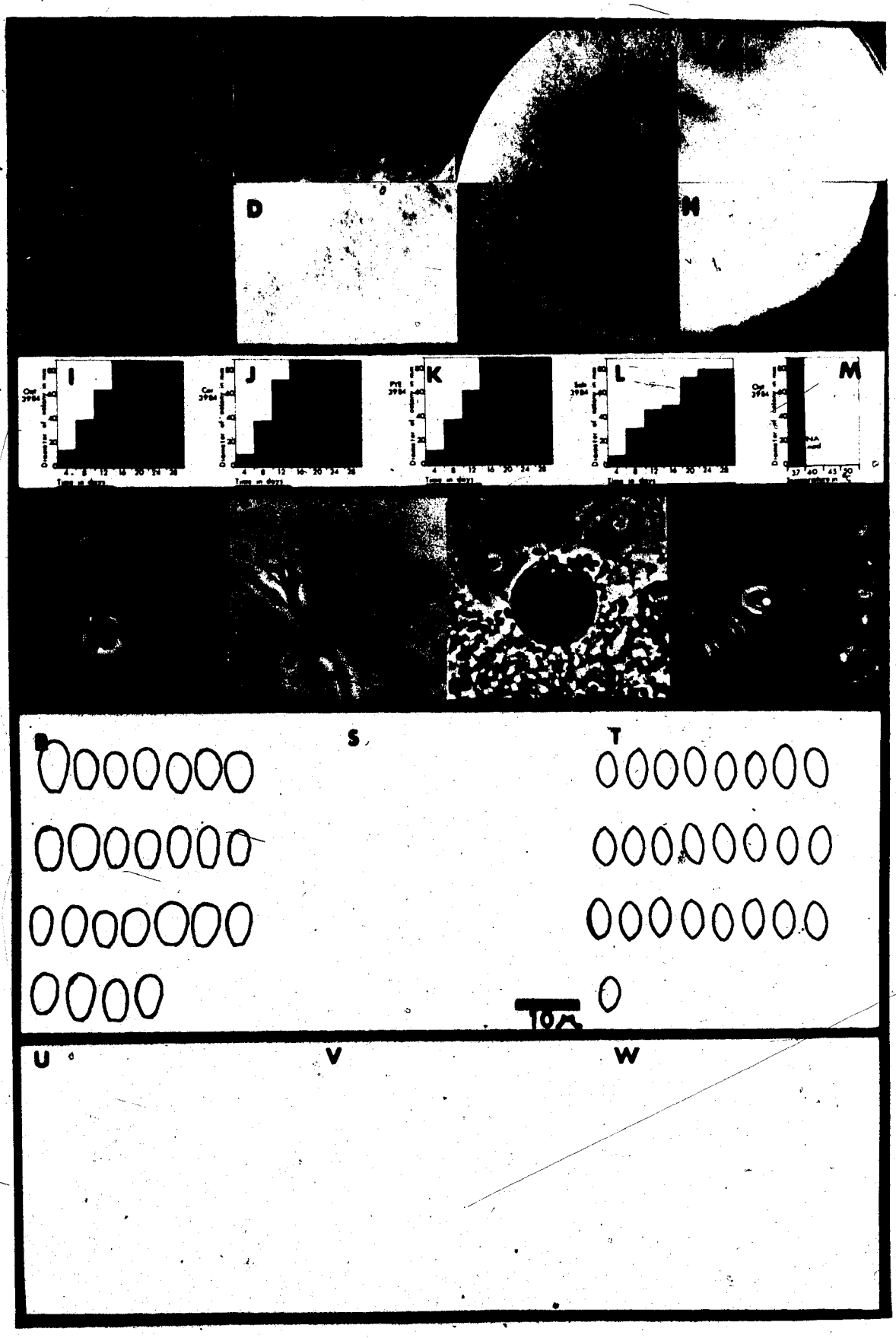

D
H
I
J
K
L
M
S
T
U
V
W

Plate #42: *Petriellidium angustum* UAMH 1101

Isolated from Brazil nut by Orr

Received 1961 from Orr as *Allescheria boydii* UCLA-M-148

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Mod. mouse brown(mod. grey)/mod.dark
      2) Cer- Off white/none
      3) PYE- Lt. mouse brown/yellow with a brown ring
      4) Sab- Off white/cream
2. **Growth Rates**
   a. at 25° C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6.5-10 x 4-6 *um* — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- 90-143 *um* dia. — Figs. P,U
   d. Ascospores- 5.5-6.5 x 2-4 *um*,golden — Figs. Q,T,V,W
4. **Comments**

   This strain was originally identified as *Petriellidium boydii*

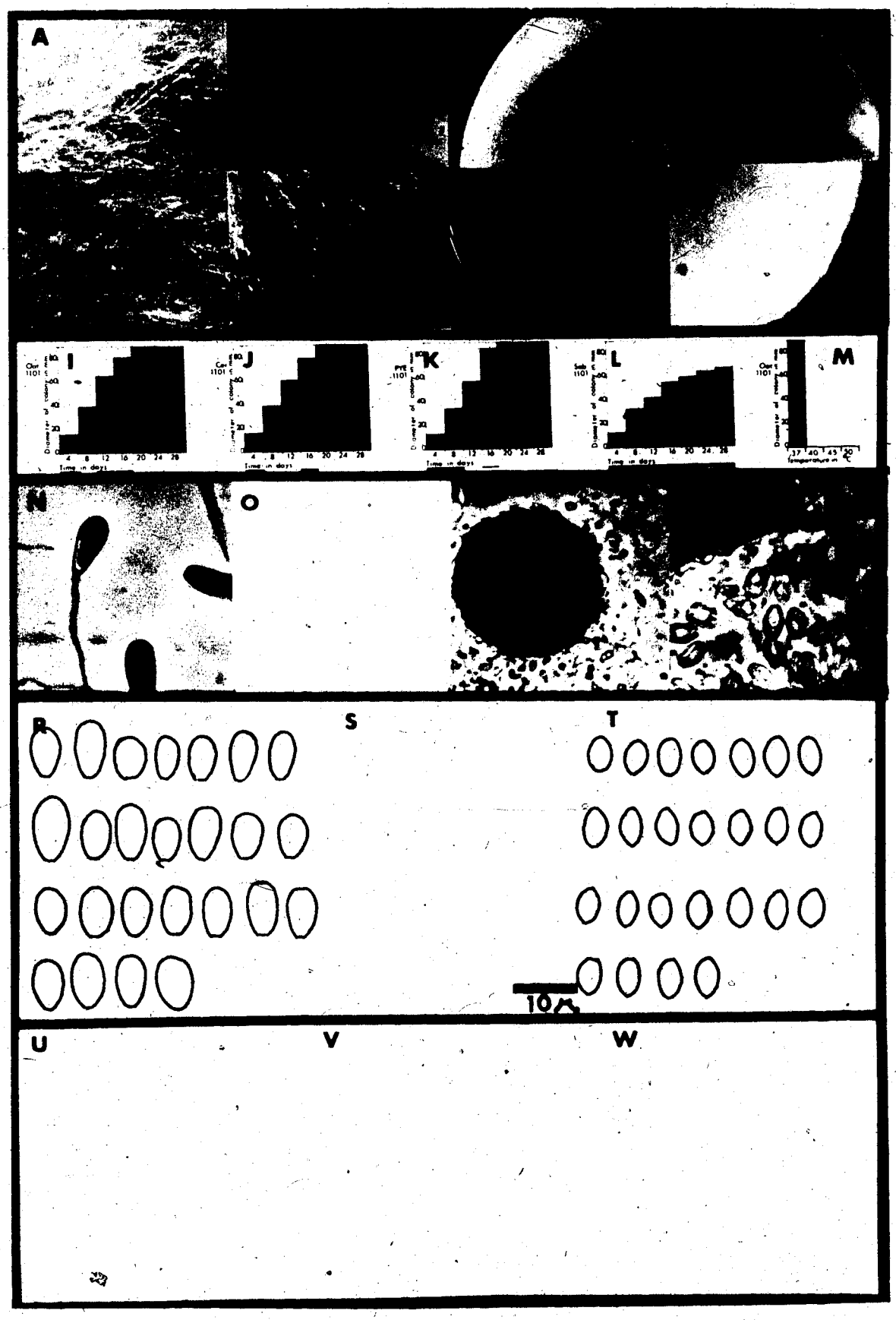

A
I
J
K
L
M
N
O
R
S
T
10 μm
U
V
W

Plate #43: *Petriellidium angustum* UAMH 3992

Isolated from soil, Surinam, by J. H. van Emden

Received 1976 from CBS as *Petriellidium boydii* CBS 593.73

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Lt. mouse brown/ light
      2) Cer- Off white/none
      3) PYE- Off white/yellow
      4) Sab- Off white/yellow
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5.5-8 x 3-5 um — Figs. N,R
   b. Synnematous conidia- 3.5-6 x 1.5-2 um — Figs. O,S
   c. Ascocarps- 76 um dia. — Figs. P,U
   d. Ascospores- 5-7 x 2-3.5 um,golden — Figs. Q,T,V,W
4. **Comments**

   This strain was originally identified as *Petriellidium boydii*.

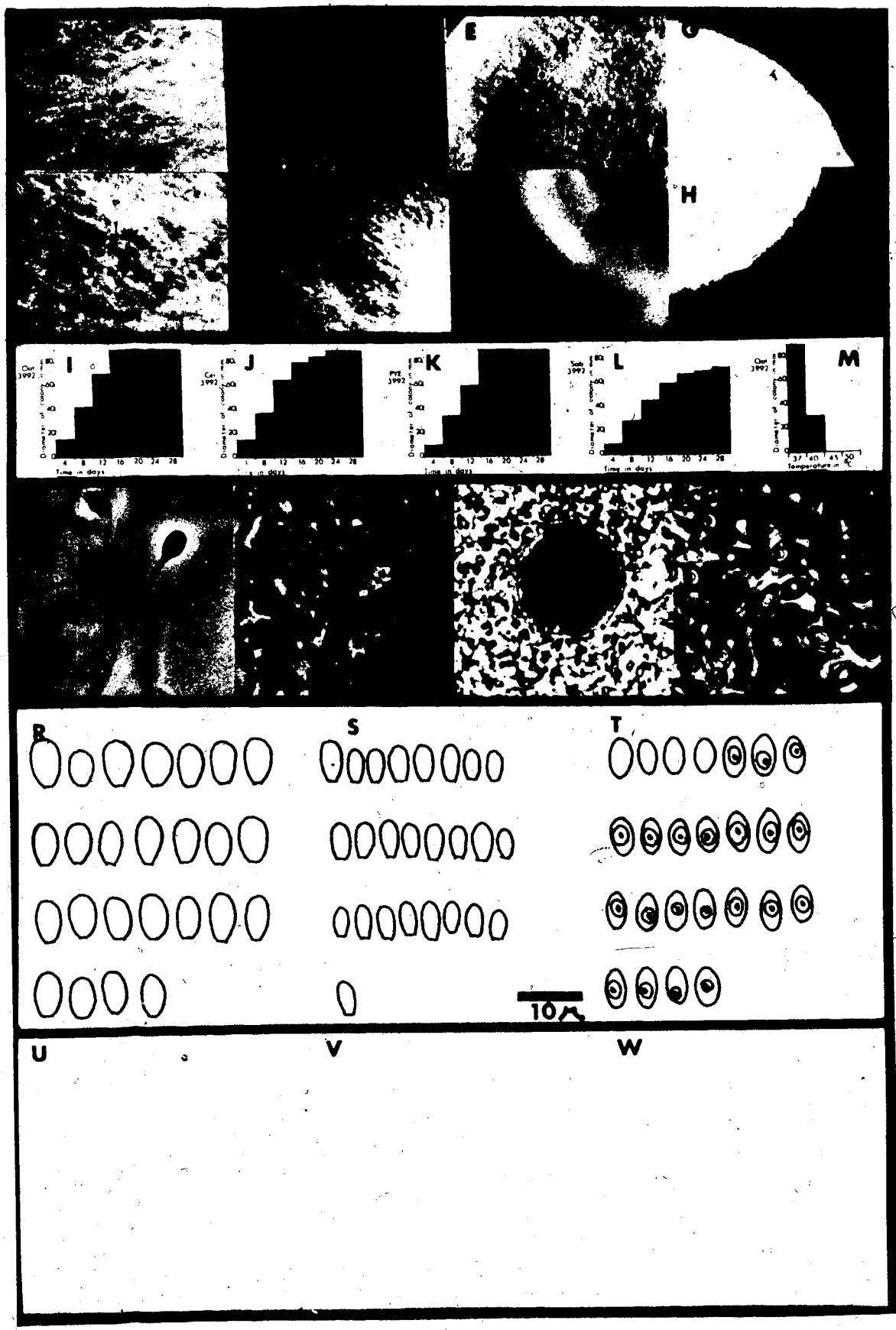

E
H
I
J
K
L
M
Time in days
Temperature in °C
R
S
T
10
U
V
W

Plate #44: *Petriellidium angustum* UAMH 3997

Isolated from soil, Panama, 1953 by L. Ajello

Received 1976 from CBS as *Petriellidium fusoideum* Type CBS 106.53

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Dark mouse brown/dark
     2) Cer- Dark mouse brown/none
     3) PYE- Mod. mouse brown-grey/yellow tan
     4) Sab- Lt. gray/lt. tan
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 5.5-8 x 3-4.5 um — Figs. N,R
   - b. Synnematous conidia- 3.5- 6.5 x 1.5-2 um — Figs. O,S
   - c. Ascocarps- 65-107.5 um dia. — Figs. P,U
   - d. Ascospores- 5.5-7 x 2.5-3.5 um,golden — Figs. Q,T,V,W
4. **Comments**

This strain was originally identified as *A. boydii* but von Arx later reclassified it as *P. fusoideum*.

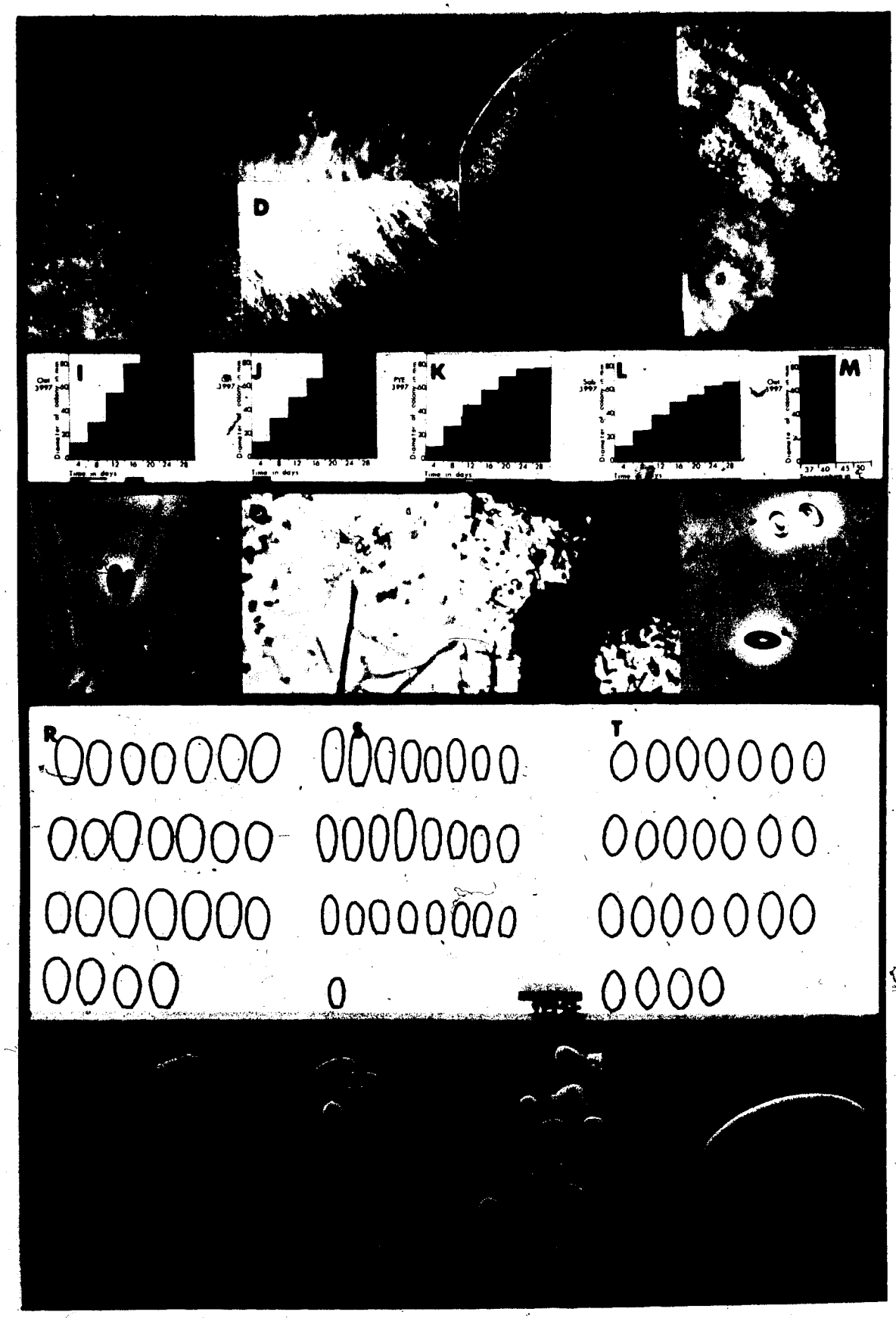

D
I
J
K
L
M
R
S
T

Plate #45: *Petriellidium desertorum* UAMH 3993

Isolated from salt marsh soil, Kuwait, 1972 by A. F. Moustafa

Received 1976 from CBS as *Petriellidium desertorum* Type CBS 489.72

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Off white/light
     2) Cer- Off white/none
     3) PYE- Off white/dark tan
     4) Sab- White/cream yellow
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 4-8 x 1.5-4 um — Figs. N,R
   - b. Synnematous conidia- not seen
   - c. Brown chlamydospores- 10-15 x 7.5-13 um — Figs. O,S
   - d. Ascocarps- 68.5-108.5 um dia. — Figs. P,U
   - e. Ascospores- 11-14 x 7-8 um, golden — Figs. Q,T,V,W
4. **Comments**

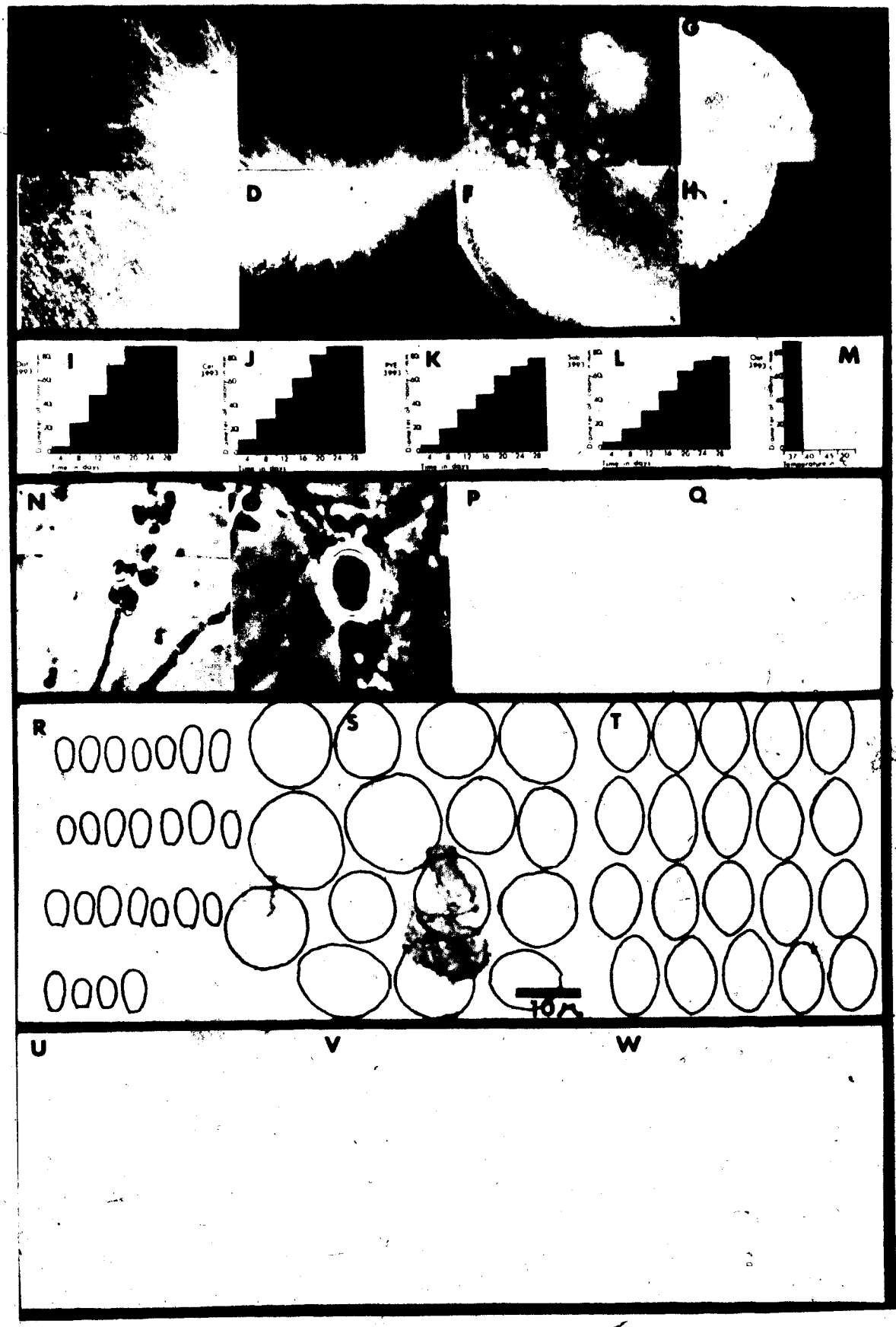

D
F
H
I
J
K
L
M
N
P
Q
R
S
T
10
U
V
W

Plate #46: *Petriellidium fimeti* UAMH 4257

Isolated from dung of nilgai, India, by K. G. Mukerji

Received 1979 from CBS as *Petriellidium fimeti* Type CBS 129.78 mixed with *Pithoascus langeronii*

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Lt. mouse brown/light
     2) Cer- Lt. grey/slight orange
     3) PYE- Mod. grey/dark brown
     4) Sab- Dark olive green/dark olive green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- not seen — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- 81.5-225 um dia. — Figs. P,U
   - d. Ascospores- 10-13 x 7-9 um, golden — Figs. Q,T,V,W
4. **Comments**

The ascospores of this strain germinated from both germ pores.

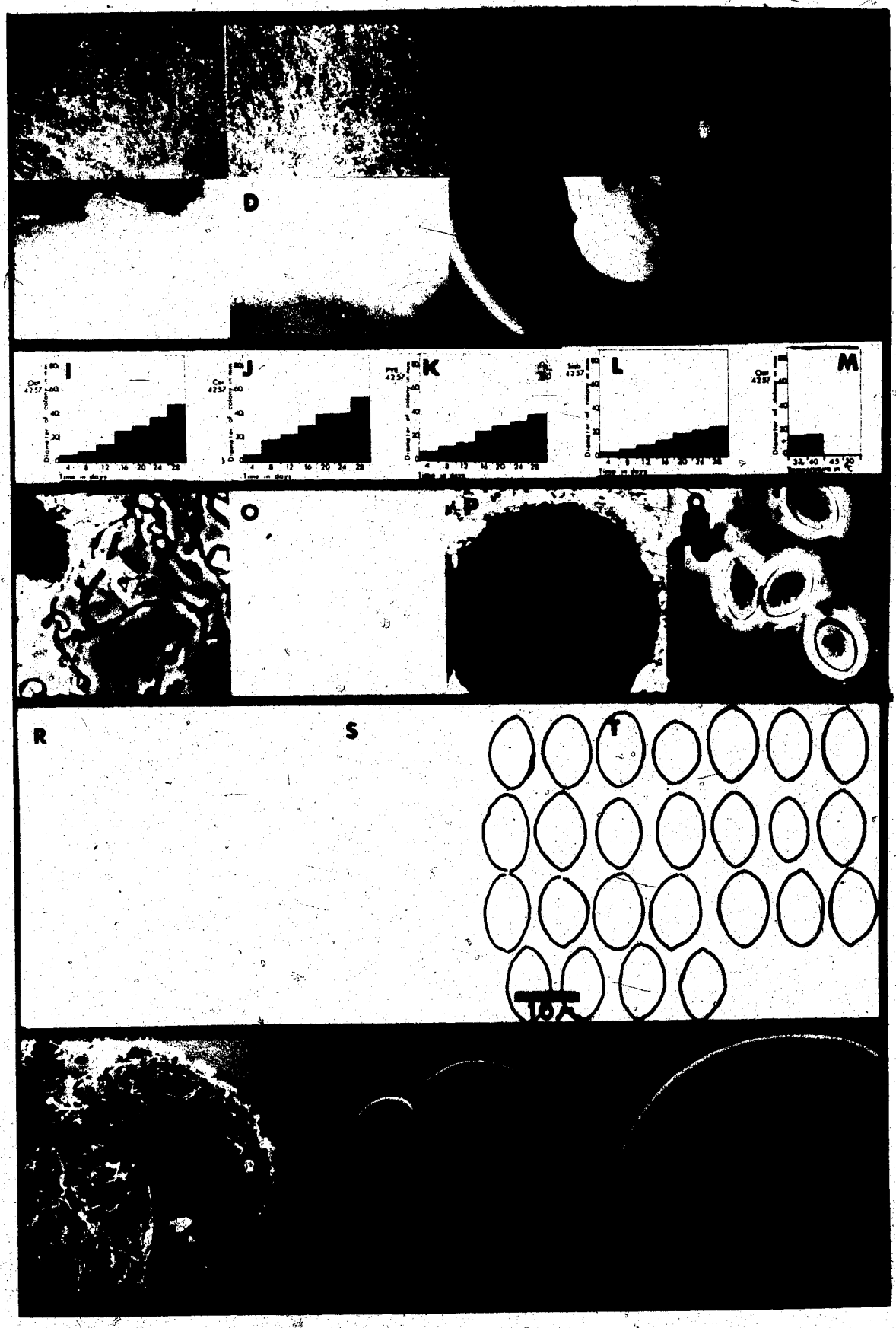

D
I
J
K
L
M
O
P
Q
R
S
T
TOX

Plate #47: *Petriella guttulata* UAMH 3996

Isolated from partridge dung, by G. L. Barron

Received 1976 from CBS *Petriella guttulata* CBS 362.61

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Clear with lt. mouse brown ring/light
     2) Cer- Off white/none
     3) PYE- Gream yellow green/yellow green
     4) Sab- Cream/cream
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 4-7 x 1-3 *um* — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

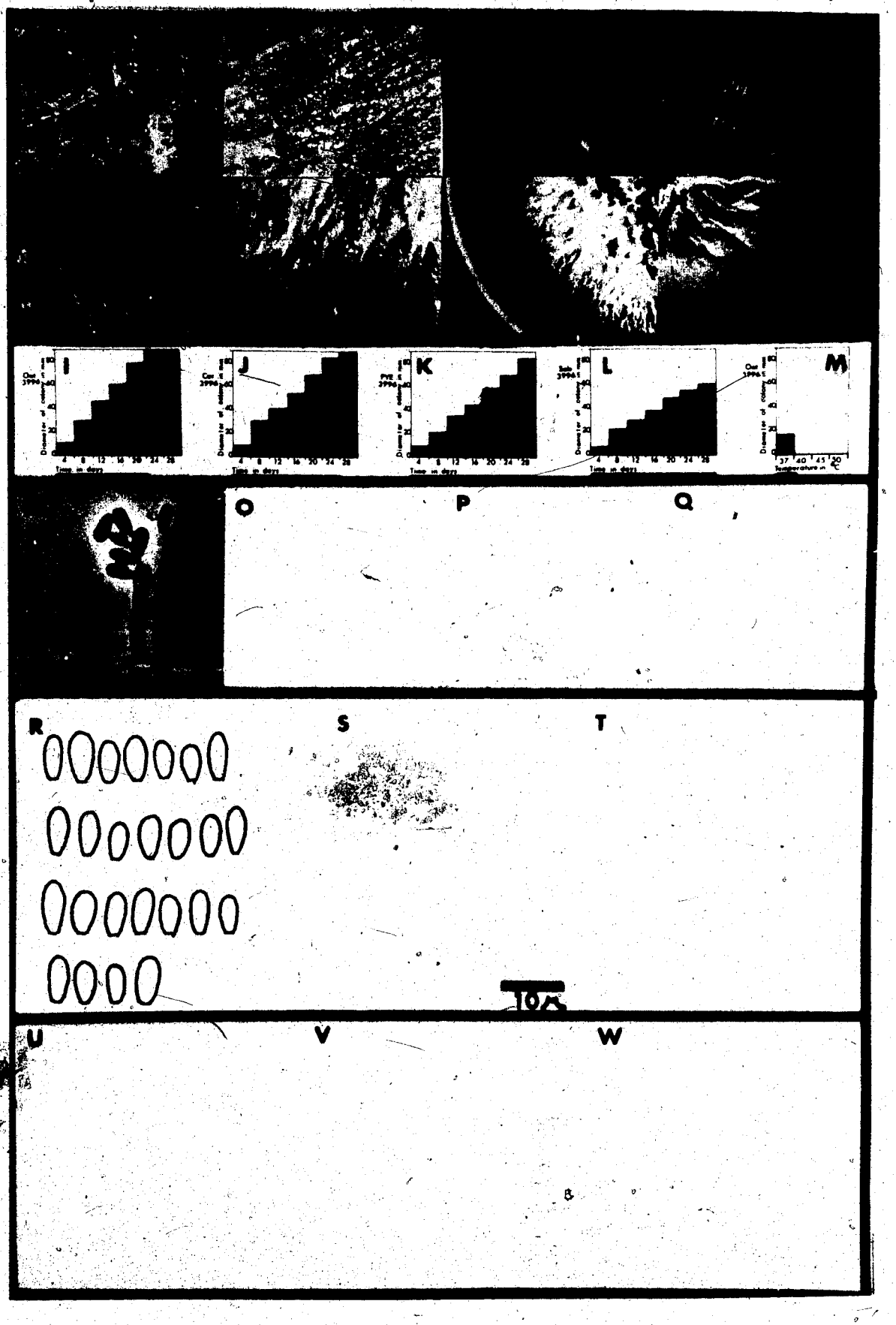

I
J
K
L
M
O
P
Q
R
S
T
U
V
W

Plate #48: *Petriella lindforsii* UAMH 3999

Isolated

Received 1976 from CBS as *Petriella lindforsii* CBS 352.59

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Clear/light
      2) Cer- Camel/none
      3) PYE- Cream yellow/yellow
      4) Sab- Cream pale yellow/cream
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 5-8 x 2.5-4 um — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- measurement not available — Figs. P,U
   d. Ascospores- 8-9.5 x 3.5-5 um,golden — Figs. Q,T,V,W
4. **Comments**

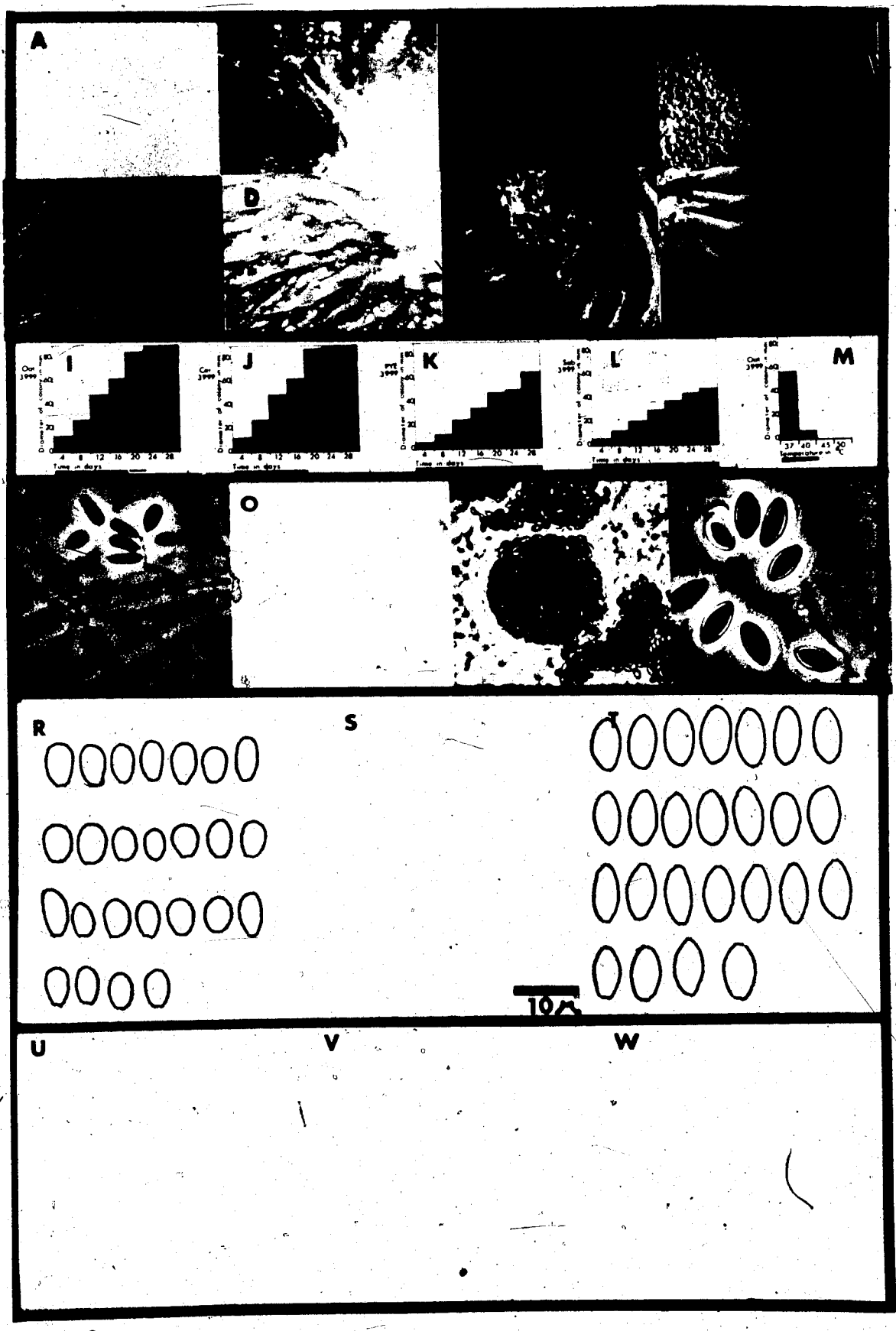

A
D
I
J
K
L
M
O
R
S
T
10 cm
U
V
W

Plate #49: *Petriella musispora* UAMH 3986

Isolated from wood, by D. Malloch

Received 1976 from CBS as *Petriella musispora* Type CBS 745.69

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Lt. grey-green/light
     2) Cer- Lt.grey/none
     3) PYE- Pale cream yellow/yellow
     4) Sab- Pale green/lt. cream green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 4.5-8.5 x 1-2 um — Figs. N,R
   - b. Chlamydospores — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

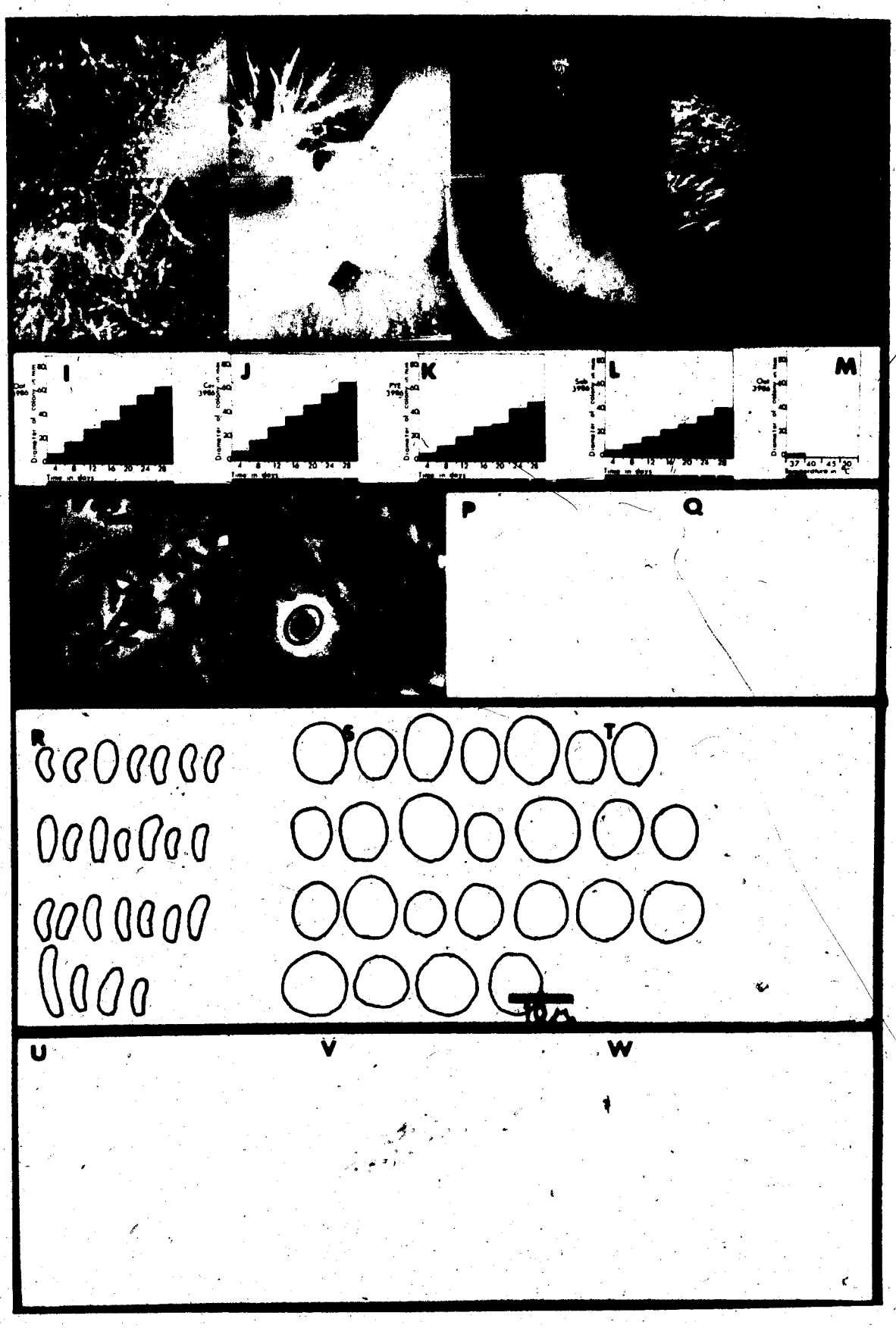

I
J
K
L
M
P
Q
R
S
T
U
V
W

Plate #50: *Petriella setifera* UAMH 1662

Isolated as contaminant, Edmonton, 1963 by J. W. Carmichael

Entered 1963 as *Petriella setifera*

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Clear with lt. mouse brown ring/light
      2) Cer- Off white with mouse brown/none
      3) PYE- Mod. mouse brown/yellow green
      4) Sab- Cream yellow tan/cream lt. tan
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 6-9.5 x 3-4.5 µm — Figs. N,R
   b. Synnematous conidia- 6-12 x 2 4.5 µm — Figs. O,S
   c. Ascocarps- 50-123 µm dia. — Figs. P,U
   d. Ascospores- 8-11 x 4-5 µm, golden — Figs. Q,T,V,W
4. **Comments**

This is not the type strain, however the type strain no longer produces ascospores. Three additional strains were included in the quantitative analysis: UAMH 805, UAMH 1924 from Tokyo soil, and UAMH 2702 from corn field soil.

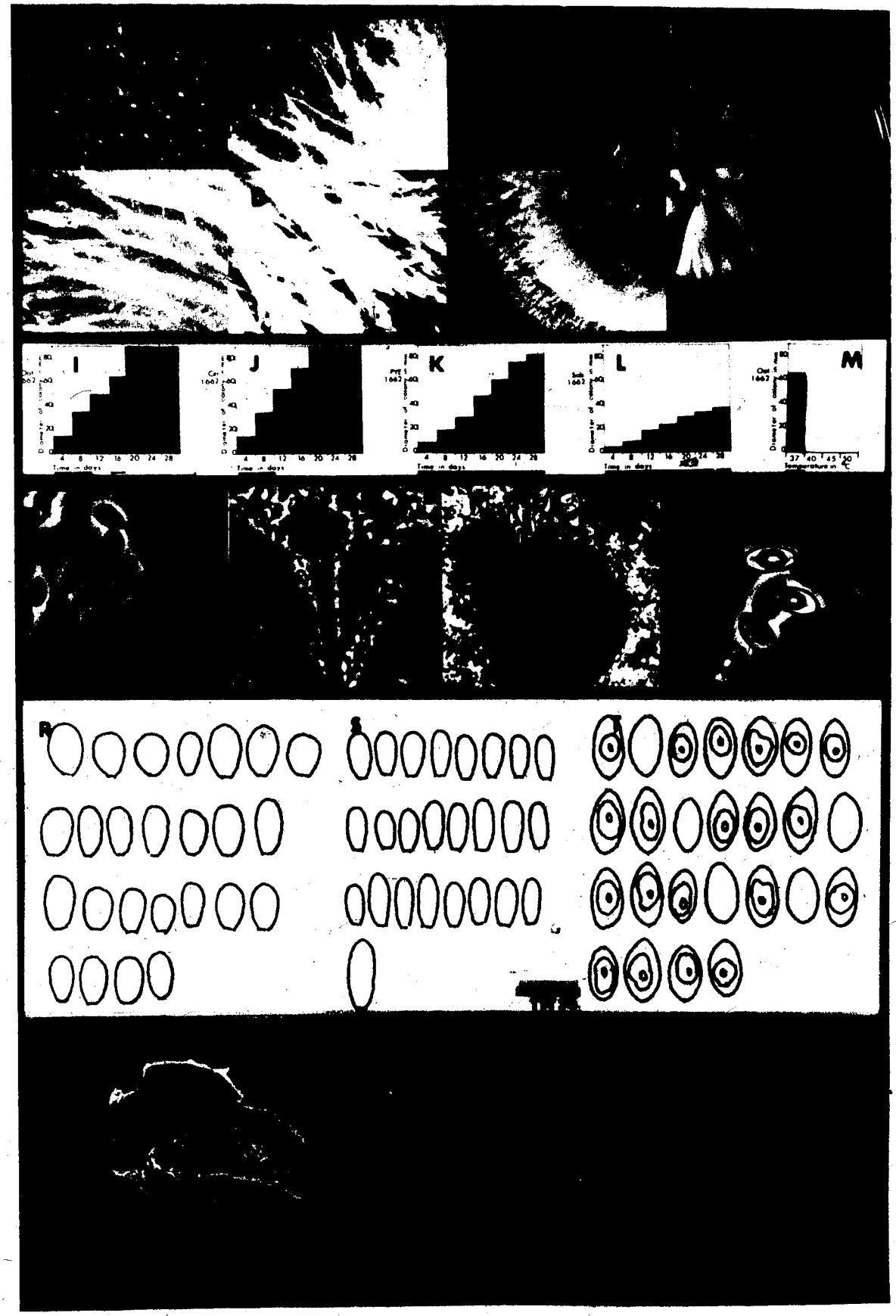

I
J
K
L
M
Time in days
Temperature in °C

Plate #51: *Petriella sordida* UAMH 1410

Isolated from *Chrysanthemum*, Ottawa, 1958 by H. S. Thompson

Received 1962 from Thompson as *Petriella asymmetrica*

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Pale green-grey/light
     2) Cer- Lt beige(pale green)/none
     3) PYE- Pale cream yellow/cream yellow
     4) Sab- Cream/cream
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 4-7 x 2-4 *um* — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- 128 *um* dia. — Figs. P,U
   - d. Ascospores- 8-10 x 3-5 *um*, golden — Figs. Q,T,V,W
4. **Comments**

This is not the type strain, however because the type no longer produces ascospores, this strain was illustrated. Two additional strains were included in the quantitative analysis: UAMH 3983 from *Pyrus communis* and UAMH 3985 from soil in mixed wood.

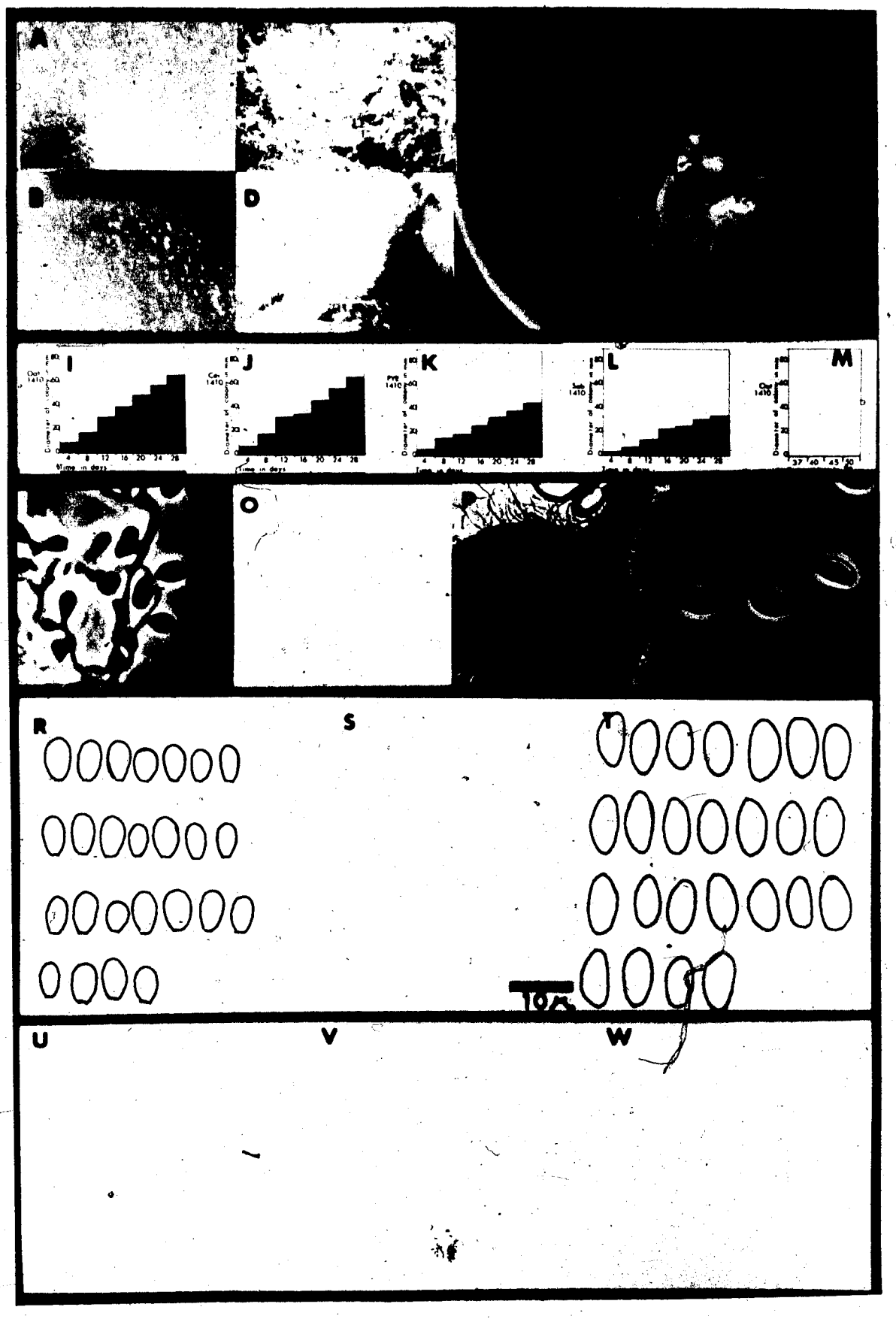

A
D
D
I
J
K
L
M
O
R
S
T
U
V
W

Plate #52: *Microascus desmosporus* UAMH 966

Isolated 1959

Received 1961 from CBS as *Microascus cirrosus* St. Domsch

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Dark grey/light
     2) Cer- Dark olive green/none
     3) PYE- Mod. mouse brown-grey/cream lt. olive green
     4) Sab- Lt. cream olive green/lt. cream olive green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 3-5 x 2-4 um — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- 97.5-163.5 um dia. — Figs. P,U
   - d. Ascospores- 4-6 x 2.5-4 um, red — Figs. Q,T,V,W
4. **Comments**

   Also one strain from the wood samples was included in the quantitative analysis.

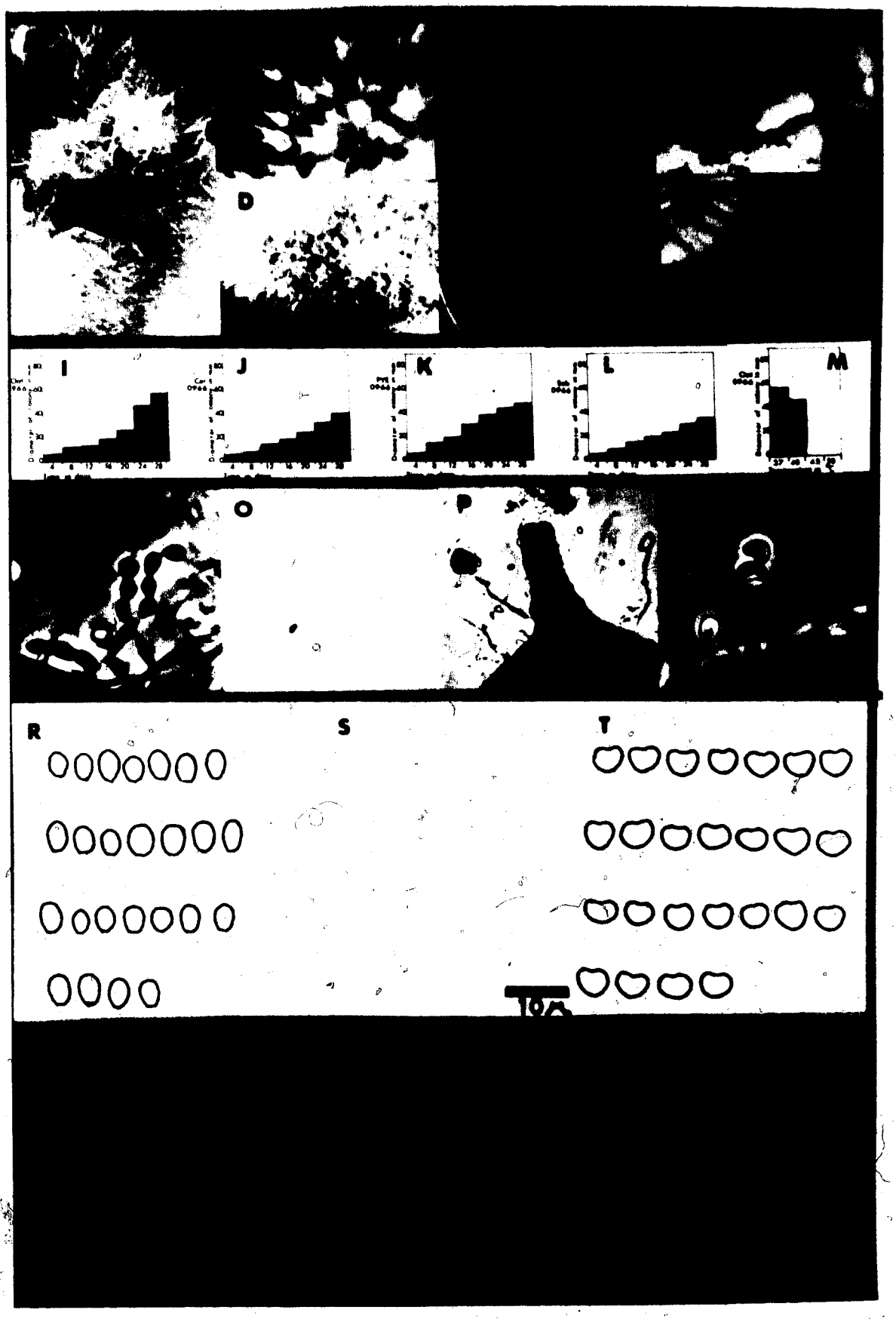

D
I
J
K
L
M
O
P
R
S
T

Plate #53: *Microascus intermedius* UAMH 2469

Isolated from hair, Edmonton, 1965 by J. W. Carmichael.

Entered 1965 as *Microascus intermedius* My 925-65

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Cream/light
      2) Cer- Dark lime green/none
      3) PYE- Mod. grey-olive green/cream lt. green
      4) Sab- Dark olive green/mod. olive green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- not seen — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- 132-192 µm dia. — Figs. P,U
   d. Ascospores- 4-6 x 1.5-2.5 µm, red — Figs. Q,T,V,W
4. **Comments**

Von Arx reclassified this species as *Pithoascus intermedius*; however, from the results of this study it should remain in *Microascus*.

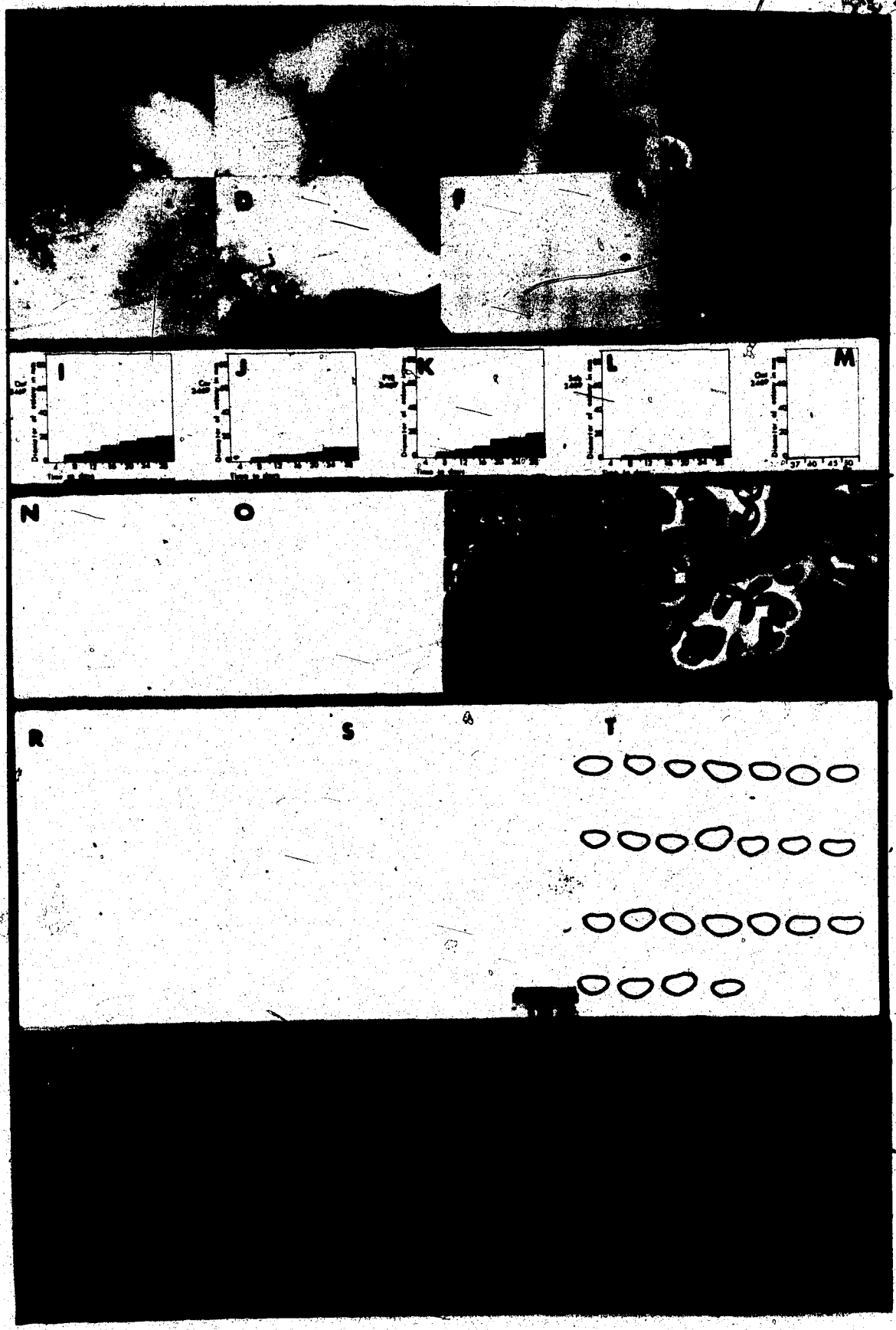

I
J
K
L
M
N
O
R
S
T

Plate #54: *Microascus longirostris* UAMH 408

Isolated from finger nails, Edmonton, 1955 by J. W. Carmichael

Entered 1955 as *Microascus longirostris* 5407

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Off white/light
     2) Cer- Off white/none
     3) PYE- Off white/cream
     4) Sab- Off white/tan
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- not seen — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- not seen — Figs. P,U
   - d. Ascospores- not seen — Figs. Q,T,V,W
4. **Comments**

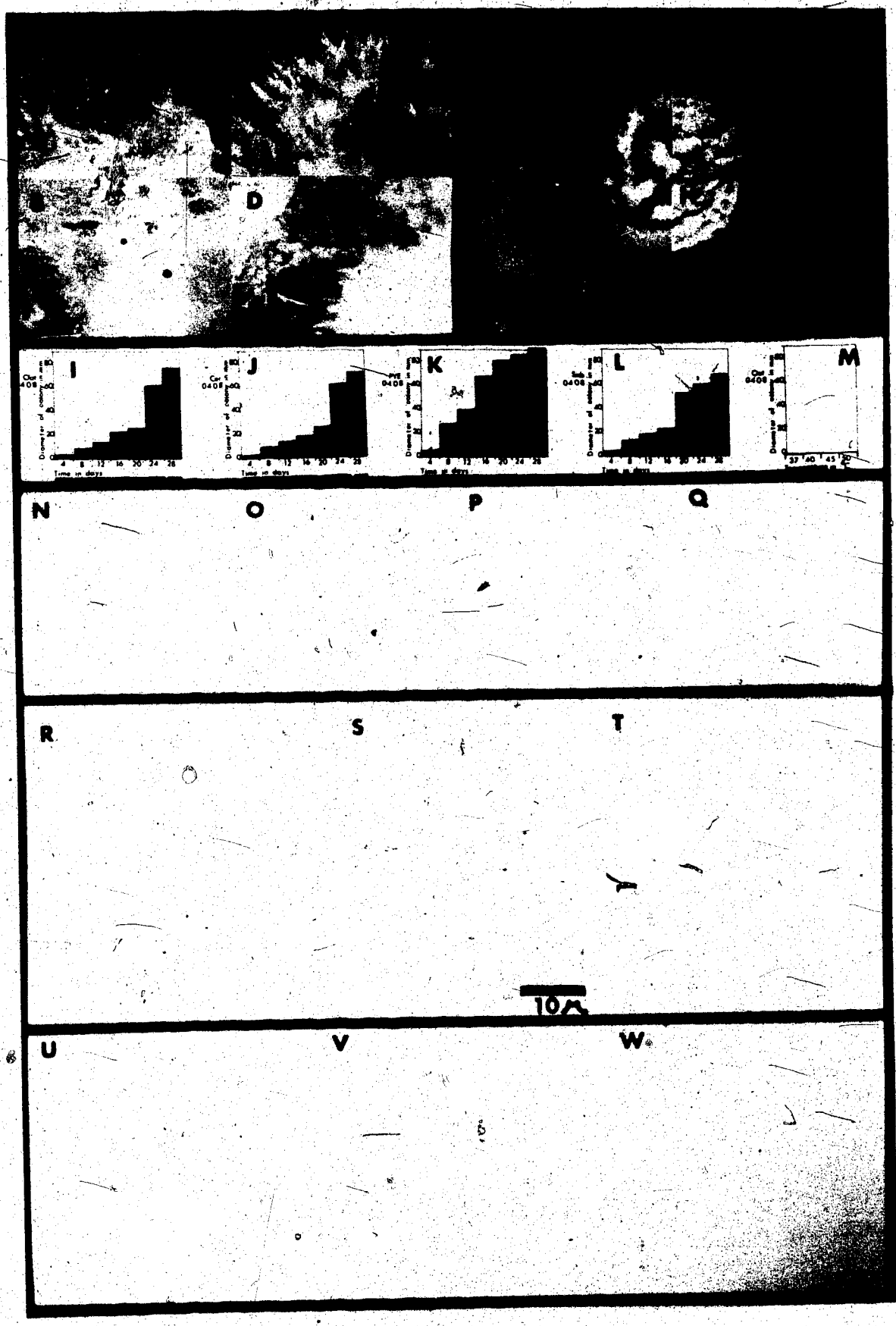

D
I
J
K
L
M
Time in days
N
O
P
Q
R
S
T
10
U
V
W

Plate #55: *Microascus manginii* UAMH 2642

Isolated from chicken litter, Guelph, 1966 by G. Barron

Received 1966 from Barron as *Microascus manginii* 10490

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Off white/light
     2) Cer- Lt. slimy grey center rest lt. grey/none
     3) PYE- Lt. grey/gold
     4) Sab- White/cream
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 6.5-8.5 x 5-8 *um* — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- 161-232.5 *um* dia. — Figs. P,U
   - d. Ascospores- 4.5-6 x 3-4 *um*, red — Figs. Q,T,V,W
4. **Comments**

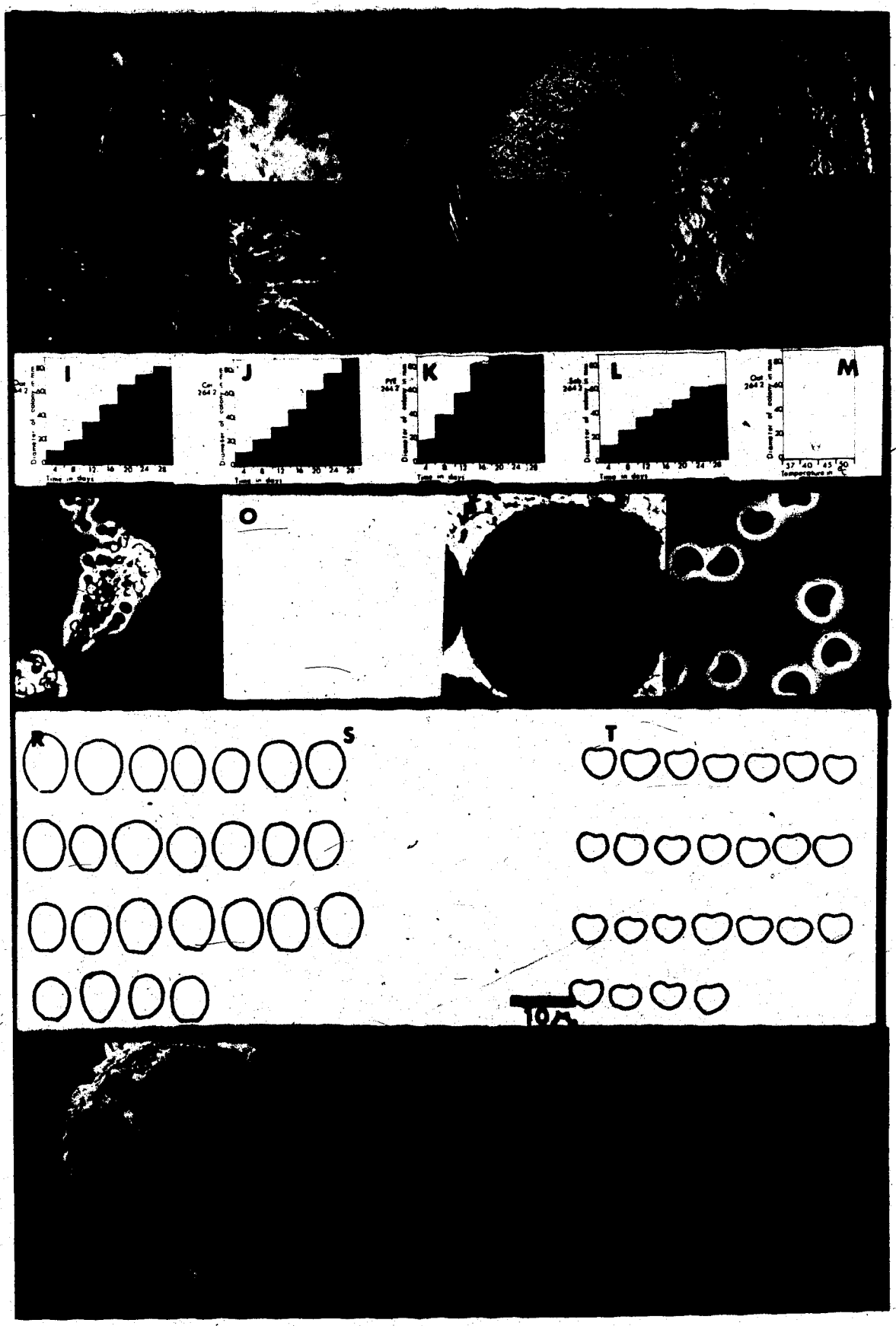

I
J
K
L
M
O
R
S
T

Plate #56: *Microascus singularis* UAMH 2637

Isolated 1966 by G. Barron

Received 1966 from Barron as *Microascus doguettii* 10484

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Cream/light
      2) Cer- Off white/none
      3) PYE- Cream green/gold brown
      4) Sab- Cream/cream
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- 4.5-6 x 2.5-3.5 µm — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- measurement not available — Figs. P,U
   d. Ascospores- 4.5-6 x 3-5 µm, red — Figs. Q,T,V,W
4. **Comments**

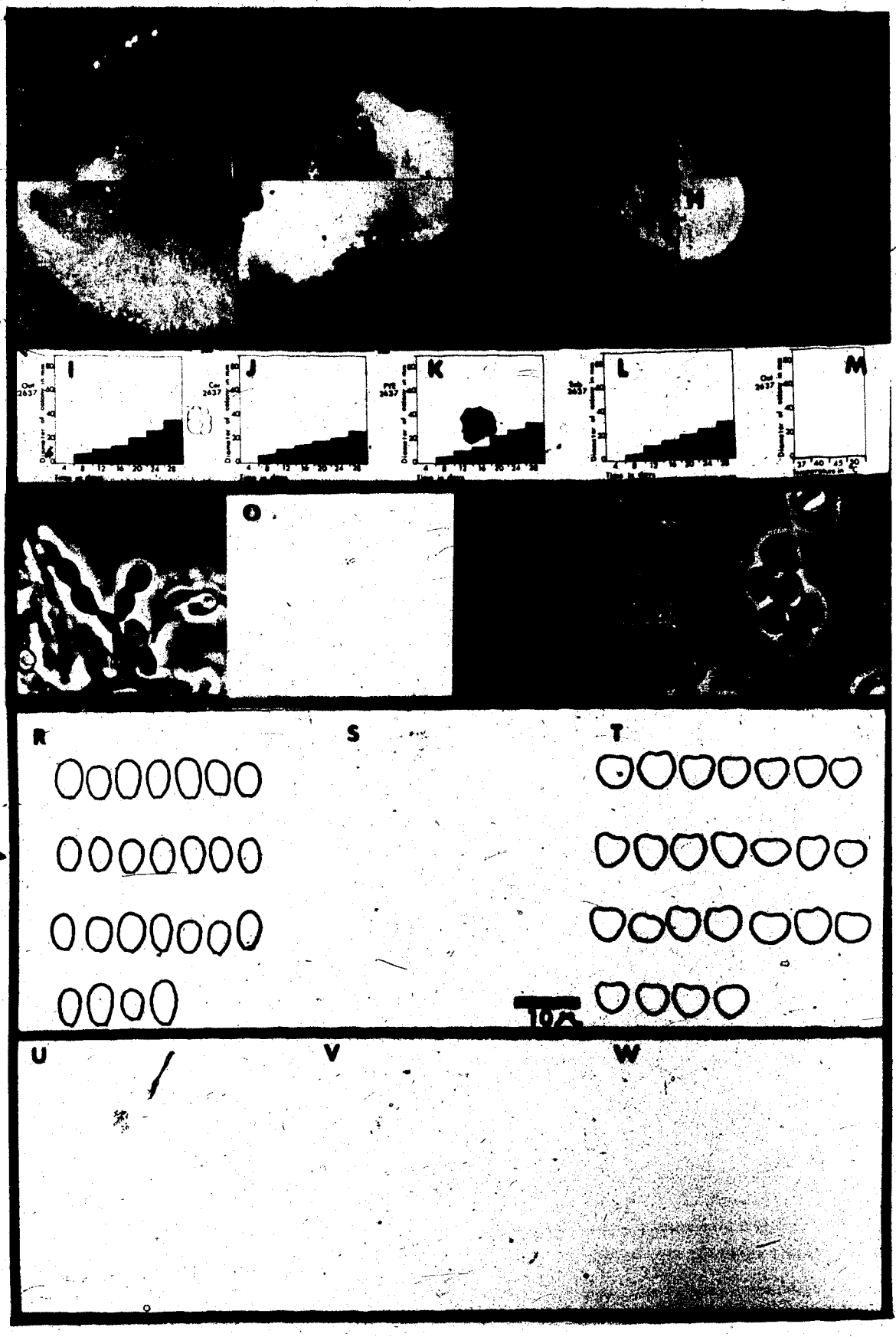

H
I
J
K
L
M
O
R
S
T
U
V
W

Plate #57: *Microascus trigonosporus* UAMH 655

Isolated

Received 1959 from CBS as *Microascus trigonosporus* CBS strain Whitehead 3

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Cream/light
     2) Cer- Lt. grey/none
     3) PYE- Cream/cream gold
     4) Sab- Cream/cream
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 3.5-5 x 2-2.5 *um* — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- measurement not available — Figs. P,U
   - d. Ascospores- 4-5.5 x 3-4 *um*, red — Figs. Q,T,V,W
4. **Comments**

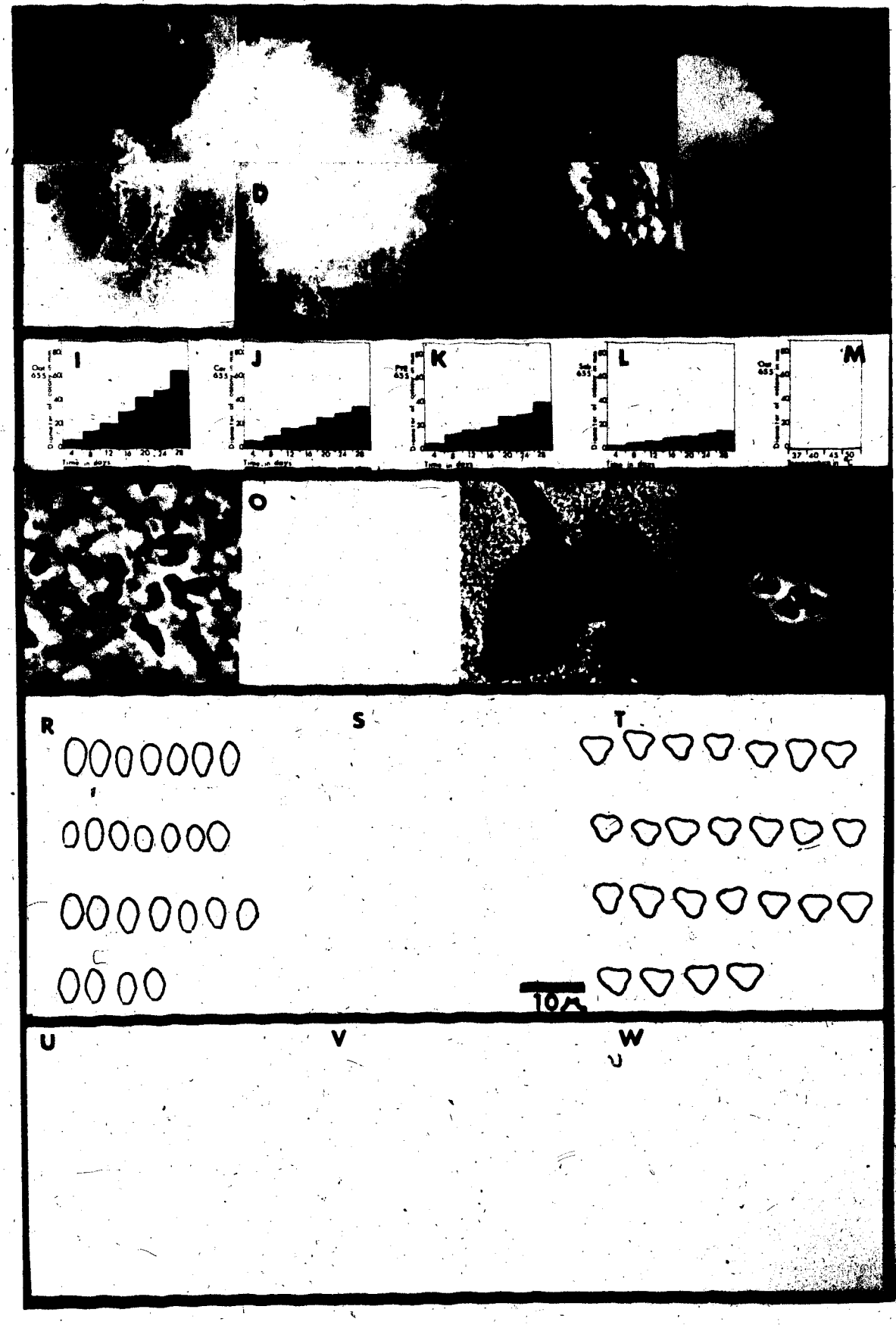

D
I
J
K
L
M
O
R
S
T
10
U
V
W

Plate #58: *Kernia nitida* UAMH 3060

Isolated 1954 by R. K. Benjamin

Received 1969 from Benjamin as *Kernia brachytricha*

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Cream/light
     2) Cer- Mod. grey/none
     3) PYE- Lt. cream green/gold
     4) Sab- Lt. grey/gold green
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- not seen — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- 86-118.5 *um* dia. — Figs. P,U
   - d. Ascospores- 4-5 x 2-3 *um*, golden — Figs. Q,T,V,W
4. **Comments**

Malloch (1971) reclassified the species *K. brachytricha* to be a synonym of *K. nitida*.

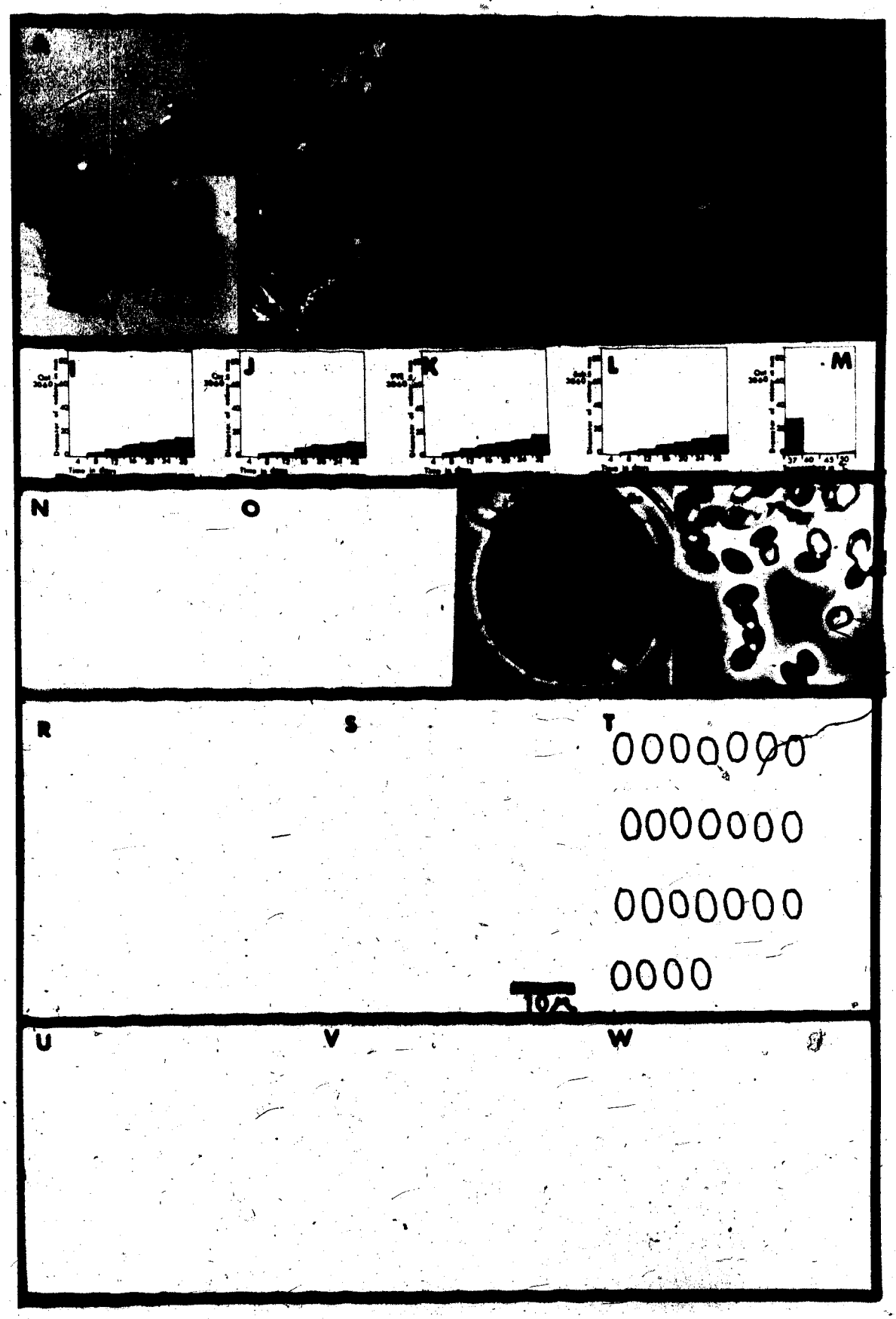

I
J
K
L
M
N
O
R
S
T
0000000
0000000
0000000
0000
U
V
W

Plate #59: *Lophotrichus ampullus* **UAMH 1762**

Isolated from dung, 1949 by Anastasiou

Received 1963 from Anastasiou as *Lophotrichus ampullus* Benj. 779

1. **Colonies**
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Dark grey/mod.dark
      2) Cer- Dark mouse brown/none
      3) PYE- Mod. grey/dark olive green
      4) Sab- Dark olive green/dark olive green
2. **Growth Rates**
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   a. Diffuse conidia- not seen — Figs. N,R
   b. Synnematous conidia-not seen — Figs. O,S
   c. Ascocarps- 170.5-231.5 um dia. — Figs. P,U
   d. Ascospores- 9-12.5 x 6.5-7.5 um,golden — Figs. Q,T,V,W
4. **Comments**

Fig. P illustrates the long beak and the hairs on the ascocarp.

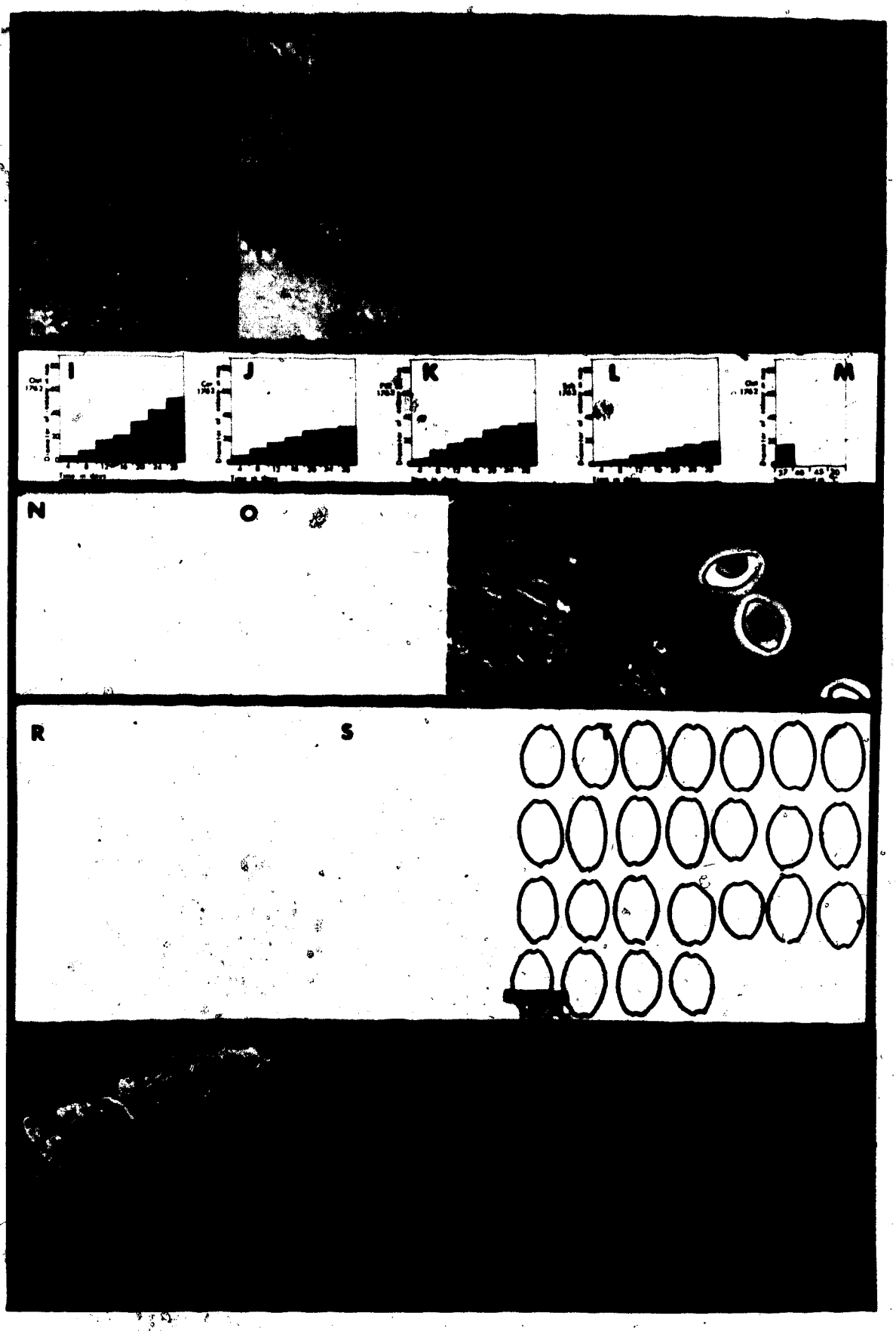

I
J
K
L
M
N
O
R
S

Plate #60: *Faurelina elongata* UAMH 4232

Isolated from goat dung by K. G. Mukerji

Received 1979 from CBS as *Faurelina elongata* CBS 126.78

1. Colonies
   a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   c. Colour at 28 days (Surface/Reverse)
      1) Oat- Dark/lt.
      2) Cer- Dark brown/none
      3) PYE- Cream lt. gold/tan
      4) Sab- Lt. cream green/cream
2. Growth Rates
   a. at 25°C on different media — Figs. I-L
   b. at different temperatures on Oat — Fig. M
3. Microscopic Characters
   a. Diffuse conjdia- 6.5-17.5 x 3.5-6.5 µm — Figs. N,R
   b. Synnematous conidia- not seen — Figs. O,S
   c. Ascocarps- measurement not available — Figs. P,U
   d. Ascospores- 4.5-7 x 2.5-4.5 µm,golden — Figs. Q,T,V,W
4. Comments

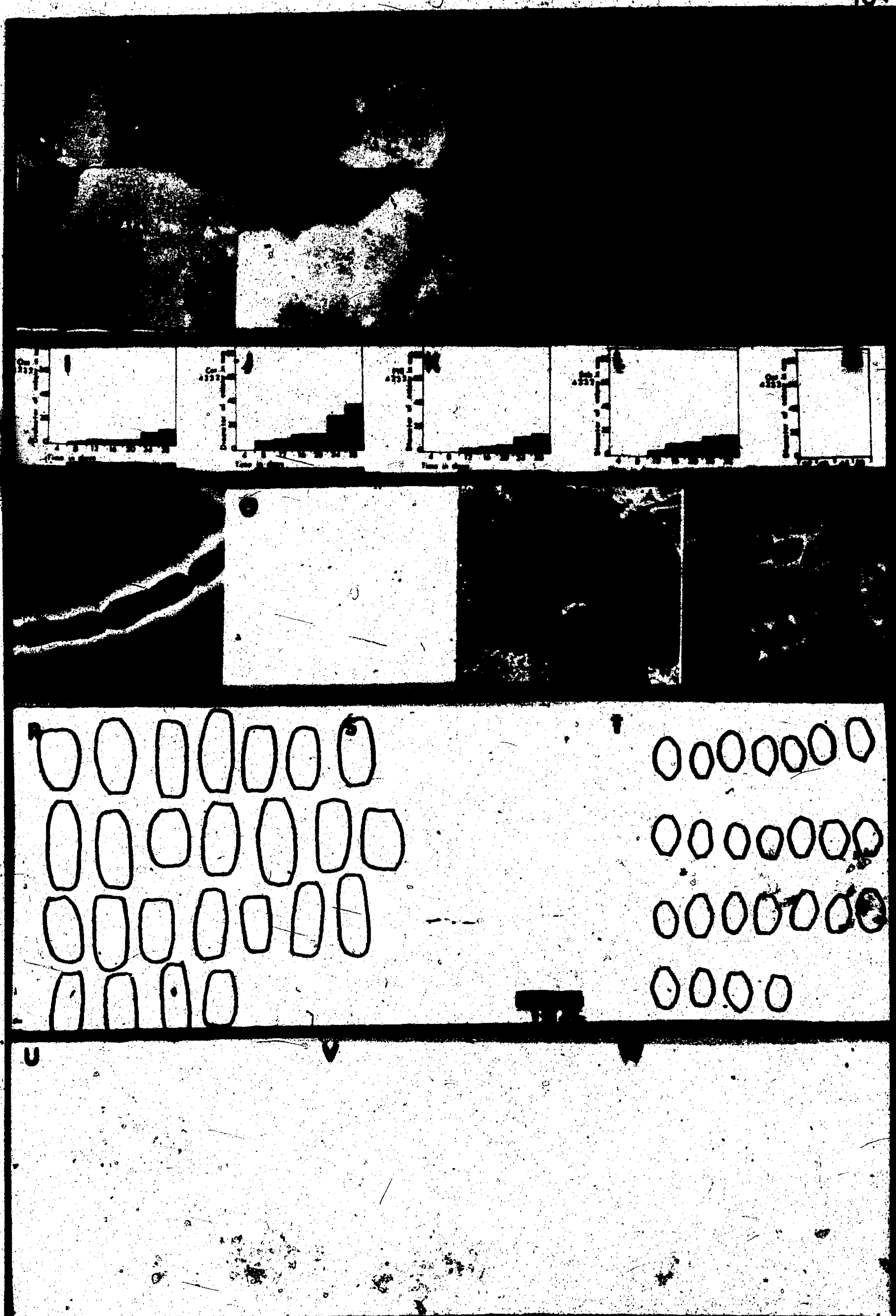

R
S
T
U
V

Plate #61: *Pithoascus langeronii* UAMH 4234

Isolated as a contaminant in *Petriellidium fimeti* culture, Netherlands, 1978 by von Arx

Received 1979 from CBS as *Pithoascus langeronii* CBS 203.78

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- White/light
     2) Cer- Cream tan/none
     3) PYE- White/cream yellow
     4) Sab- Pale cream yellow/yellow gold
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- 2.5-7.5 x 1-2 um — Figs. N,R
   - b. Chlamydospores- 3-5.5 x 2-3.5 um — Figs. O,S
   - c. Ascocarps- 74.5-91.5 um dia. — Figs. P,U
   - d. Ascospores- measurements not available — Figs. Q,T,V,W
4. **Comments**

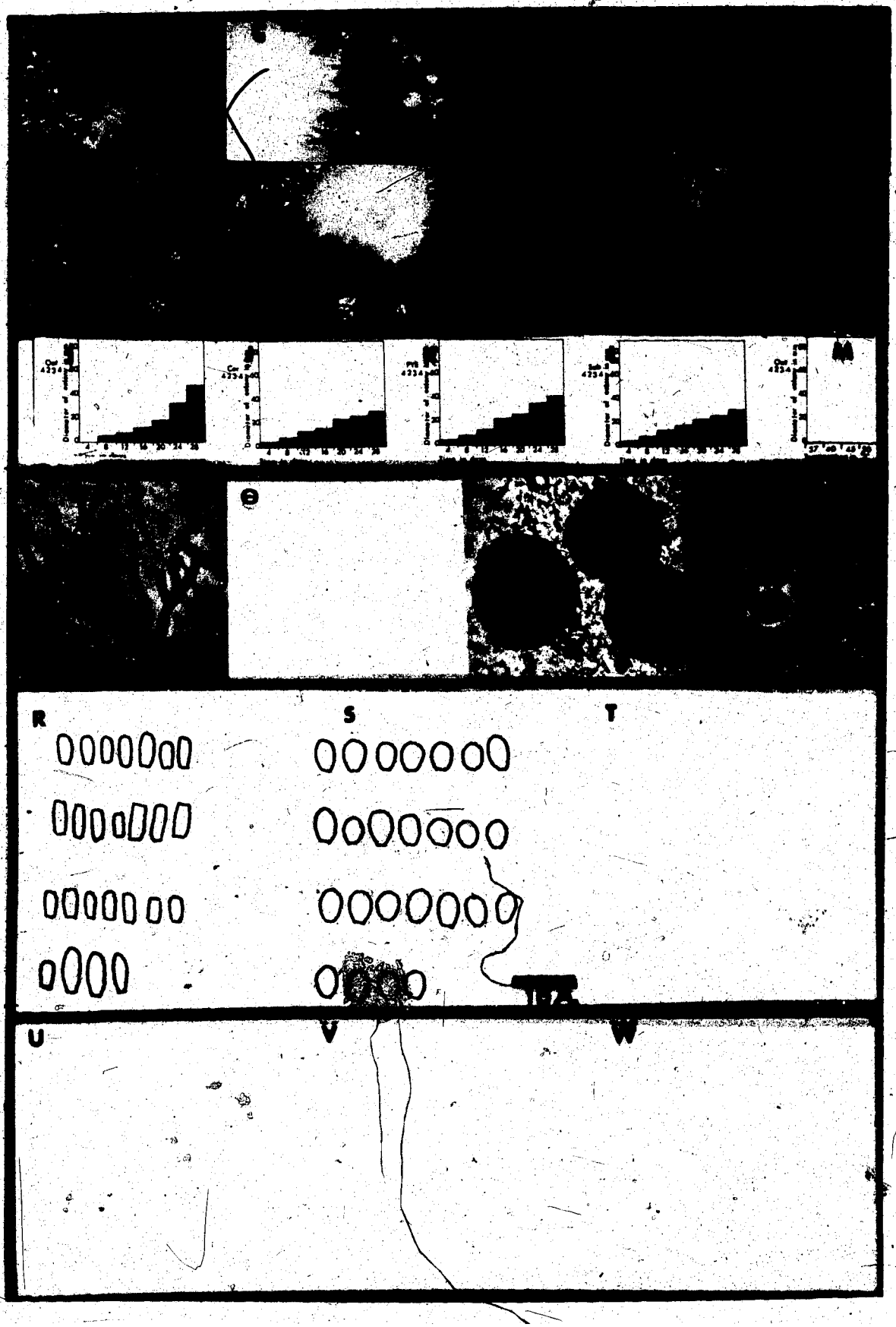

e
R
S
T
U
V
W

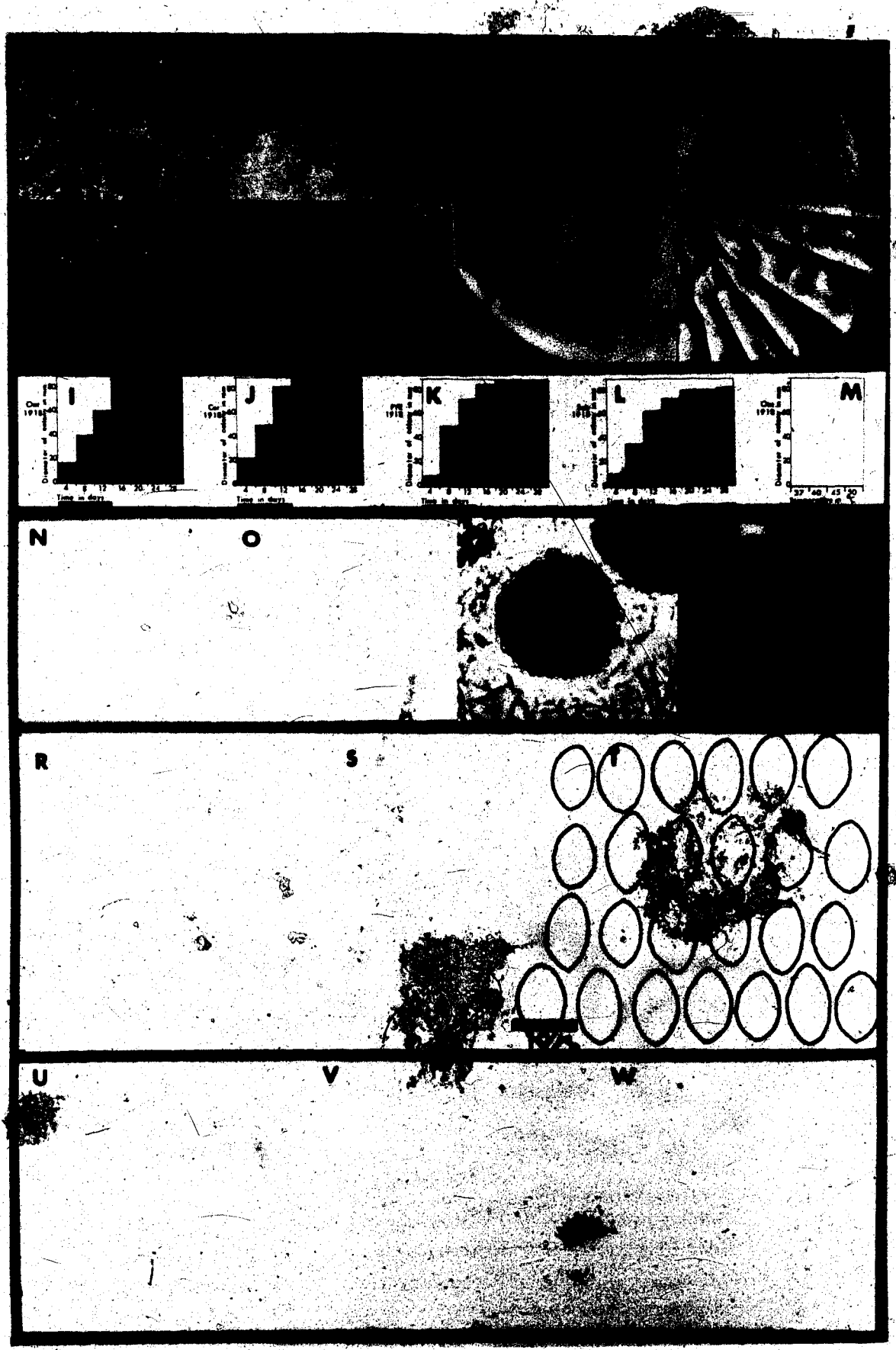
Plate #62: *Thielavia terricola* UAMH 1918

Isolated from soil, Japan, 1958 by Udagawa

Received 1964 from Emmons as *Thielavia terricola*

NHL 2269

1. **Colonies**
   - a. 4 days on Oat Cer PYE and Sab — Figs. A-D
   - b. 21 days on Oat Cer PYE and Sab — Figs. E-H
   - c. Colour at 28 days (Surface/Reverse)
     1) Oat- Off white/light
     2) Cer- Off white/none
     3) PYE- White/yellow
     4) Sab- Off white/gold
2. **Growth Rates**
   - a. at 25°C on different media — Figs. I-L
   - b. at different temperatures on Oat — Fig. M
3. **Microscopic Characters**
   - a. Diffuse conidia- not seen — Figs. N,R
   - b. Synnematous conidia- not seen — Figs. O,S
   - c. Ascocarps- 70-128 um dia. — Figs. P,U
   - d. Ascospores- 10-14.5 x 7-8.5 um,brown — Figs. Q,T,V,W
4. **Comments**


I
J
K
L
M
N
O
R
S
T
U
V
W

The illustrations were compiled in this format for convenience. Comparison of the strains of *P. boydii*, comparison of *P. boydii* to other species of *Petriellidium* and species of the other genera included in the Microascaceae and Pithoascaceae could be easily made.

G. Results of TAXMAP analyses

The first analysis, using all attributes for all 67 strains yielded inconclusive results due to the numerous cases where attribute values could not be scored because the structures were missing. For example, ascospore and ascocarp characters could not be scored for 31 strains which did not produce ascomata. Therefore the attributes were split into three groups: 1) vegetative growth attributes which were applicable to all strains, 2) conidial attributes which were applicable to most strains and 3) ascospore attributes which were applicable to about half of the strains. Then the relations among the strains were analysed in four separate groups: 1), all of the strains were compared on their vegetative and conidial attributes; 2), the *Petriellidium* strains alone were compared on their vegetative and conidial attributes; 3), all ascospore-producing strains were compared on their vegetative and ascospore attributes; 4), the *Petriellidium* ascospore-producing strains were compared on their vegetative and ascospore attributes. The only available strain of *P. africanum* (UAMH 4000) was included in the third and fourth analysis, even though it has not produced ascospores since it was received at UAMH. For each of the four analyses, two sets of results are presented, the first based on differentially weighted attributes, the second on equally weighted attributes (see page 23). In general, the differentially weighted analyses produced the most useful results, but since there is still no general

agreement on weighting, both are presented and compared.

The results of each analysis are represented first in the form of a table showing the cluster membership and some statistics pertaining to the clusters and then in the form of a taxometric map (Carmichael and Sneath 1969) illustrating the relationships among the clusters given in the table. The clusters are positioned on the map by triangulation from this and two nearest neighbours. The diameter of the circles in the maps represents the distance between the two most distant OTU's in the cluster. The number of OTU's in the cluster is not represented graphically, but can be seen in the tables. The straight lines represent undistorted distances between clusters, or between isolated OTU's. The points followed by a number represent isolated OTU's which are treated as clusters with no variation and the arrows indicate nearest neighbours (Carmichael and Sneath 1969).

1) Comparison of all strains on conidial and vegetative attributes

a) Results of analysis with differential weighting:

Table 5 and Figure 11

The largest cluster (#2) included 36 of the 38 *P. boydii* strains along with *P. fusoideum*, *P. angustum*, and *P. ellipsoideum*. The other two *P. boydii* strains, UAMH 2324 and UAMH 3749, and the remaining *Petriellidium* species were clustered as isolated points. The isolated *P. boydii* strains clusters 7 and 8 were nearest neighbours to each other and

to cluster #2. The reasons these two strains were isolated from the rest of the *P. boydii* strains was UAMH 2324 had a "sickly" appearance and growth and UAMH 3749 had a slow growth rate.

The *Petriella* strains were grouped into two clusters and an isolated strain. The first cluster contained the *Pe. sordida* strains plus *Pe. guttulata* and one of the four *Pe. setifera* strains. The second cluster included two *Pe. setifera* strains and *Pe. lindforsii*. The isolated cluster was a *Pe. setifera* strain.

The *Microascus* strains were mostly separated into isolated points. None clustered with another member of *Microascus*. *M. desmosporus* (wood isolate) was grouped with *Lophotrichus*. *M. longirostris* was grouped with *Thielavia* and *M. intermedius* with *Kernia* probably due to the lack of a conidial state.

The *Pithoascaceae* strains *Faurelina* and *Pithoascus* were clustered as isolated points.

It is noteworthy that in this analysis based on vegetative and conidial characters, the *Petriellidium* strains were nearest neighbours to each other except for *P. fimeti* and *P. africanum*.

Table 5
1)Comparison of all strains on conidial and vegetative attributes. a) Results of analysis with differential weighting.

MAP CLUSTER ANALYSIS: ALL SPECIES CONIDIAL CHARACTERS

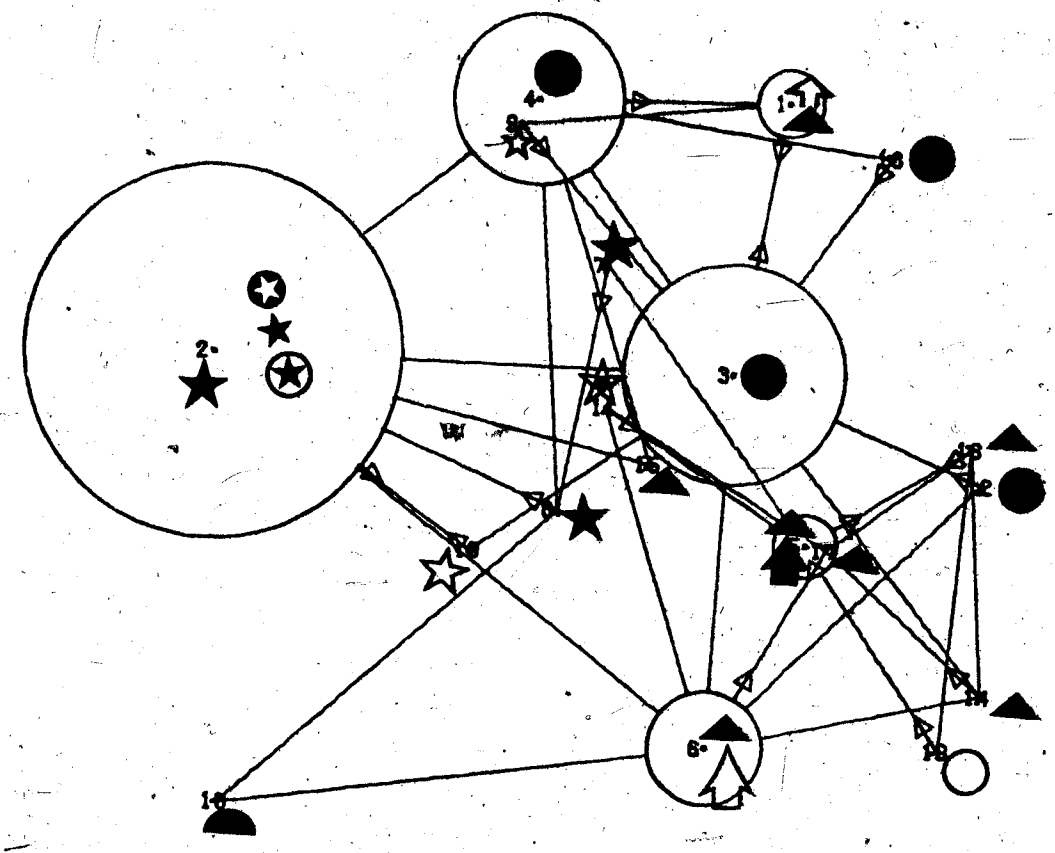
(MINIMUM NUCLEUS 0.122, MAXIMUM DROP 0.0497 BOTH ARE 100% OF NORMAL)

CLUSTER NO.	OTU NOS	DIST BEST LINK	OTU BEST LINK	AVE OF NEW LINKS	DROP IN AVE.	FAR OTU	DIST FAR OTU	FLAG	NAME OF OTU
1	56								TBA4305S
	57	0.0							TTE1915S
	58	0.04	57	0.047	0.047	56	0.05		ML00408P
	46	0.10	56	0.100	0.112	56	0.21	1000	PLI3985U
2	28								PBU4228P
	29	0.0							PBB4246P
	19	0.11	28	0.105	0.105	29	0.11		PBB3904P
	4	0.03	19	0.083	-0.022	29	0.11		PB01098F
	3	0.03	4	0.084	0.001	28	0.13		PB00800N
	21	0.04	3	0.098	0.014	28	0.18		PB04302P
	35	0.05	4	0.094	-0.003	29	0.15		PB02873P
	10	0.03	35	0.105	0.011	28	0.16		PB02507N
	13	0.02	10	0.093	-0.013	29	0.17		PB02230N
	6	0.03	13	0.109	0.016	29	0.20		PB61101B
	44	0.05	19	0.107	-0.001	5	0.15		PFU3997N
	30	0.05	31	0.112	0.004	29	0.20		PB04301P
	12	0.05	44	0.110	-0.001	5	0.18		PB03230N
	24	0.05	35	0.099	-0.012	26	0.15		PB03991B
	22	0.03	24	0.095	-0.004	28	0.17		PB02882P
	2	0.05	12	0.128	0.033	29	0.21		PB00153N
	23	0.04	2	0.124	-0.004	28	0.20		PB03990A
	1	0.05	2	0.122	-0.002	28	0.22		PB00902P
	5	0.02	1	0.125	0.003	29	0.23		PB01285P
	17	0.05	1	0.126	0.001	29	0.21		PB03077N
	7	0.02	17	0.131	0.005	28	0.23		PB01865N
	34	0.05	44	0.123	-0.008	5	0.18		PB04310P
	27	0.03	24	0.111	-0.012	29	0.17		PB04218P
	9	0.04	27	0.102	-0.009	29	0.18		PB02217F
	32	0.02	8	0.104	0.002	28	0.17		PB04303P
	14	0.04	27	0.130	0.026	29	0.20		PB02748M
	33	0.04	14	0.127	-0.003	29	0.22		PB04304P
	18	0.05	34	0.110	-0.016	5	0.17		PB02873M
	16	0.06	3	0.144	0.033	29	0.25		PB03750M
	25	0.06	8	0.124	-0.020	28	0.24		PB03992S
	36	0.06	34	0.113	-0.011	28	0.21		PB0521FS
	26	0.07	24	0.148	0.035	28	0.23		PB03985S
	40	0.01	26	0.153	0.005	28	0.24		PAN3884N
	31	0.07	18	0.151	-0.002	16	0.23		PB03881P
	37	0.07	36	0.155	0.014	28	0.29		PB05220M
	38	0.06	37	0.153	-0.012	40	0.23		PB0522LD
	20	0.08	18	0.170	0.017	40	0.28		PB03905P
	11	0.10	20	0.159	-0.011	37	0.23		PB03975P
	42	0.04	11	0.151	-0.008	5	0.22		PEL3987S
	41	0.11	40	0.245	0.095	20	0.39	1000	PDE3953S
3	53								PS03983U
	54	0.02							PS03985S
	52	0.10	54	0.092	0.082	53	0.10		PS01410U
	45	0.11	54	0.115	0.018	52	0.12		PGU3996M
	55	0.08	45	0.146	0.028	53	0.17		PSE6500U
	56	0.10	45	0.227	0.083	[illegible]	0.20	1004	TBA4305S
4	49								PSE1662C
	50	0.03							PSE1924S
	48	0.10	50	0.114	0.082	49	0.13		PLI3959U
	56	0.10	48	0.155	0.041	49	0.16	4	TBA4305S
	LINK TO CLUSTER -1								
5	59								MIN2469P
	63	0.05							KBR3080U
	60	0.12	57	0.142	0.100	63	0.17	1000	MS12837U
6	65								MS38WIDE
	64	0.09							LAM1782U
	61	0.12	65	0.206	0.118	64	0.28	1200	MTR0655U

ISOLATED OTU'S (SINGLE MEMBER CLUSTERS)

CLUSTER	OTU	LABEL
7	8	PB02226P
8	10	PB02748M
9	39	PAF4000S
10	41	PDE3953S
11	43	PF14257N
12	47	PMW2886W
13	51	PSE2702S
14	50	MDE0965U
15	58	MMA2042M
16	60	MS12537U
17	61	MTR0655U
18	62	FEL4232N
19	65	PLA4334C

Fig. 11
Taxometric map for comparison of all strains on conidial and vegetative attributes, differential weighting.



☆ Petriellidium africanum
★ Petriellidium angustum
★ Petriellidium boydii
☆ Petriellidium desertorum
✪ Petriellidium ellipsoideum
★ Petriellidium fimeti
✪ Petriellidium fusoideum

Kernia
Lophotrichus
Microascus
Petriella

Faurelina
Pithoascus

Thielavia

Table 6
1)Comparison of all strains on conidial and vegetative attributes. b) Results of analysis with equal weighting.

MAP CLUSTER ANALYSIS:-ALL SPECIES CONIDIAL CHARACTERS

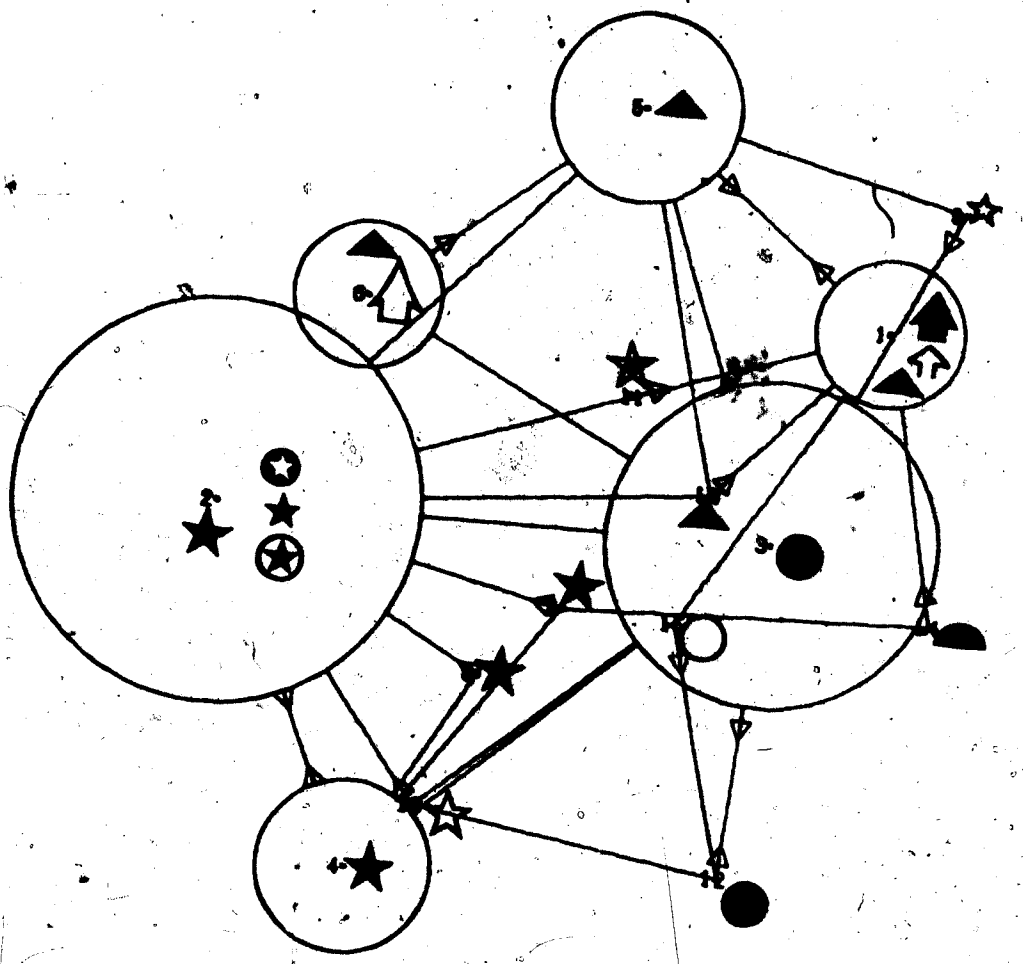
MINIMUM NUCLEUS 0.155, MAXIMUM DROP 0.0455 BOTH ARE 100% OF NORMAL
EQUALLY WEIGHTED ATTRIBUTES

CLUSTER NO.	OTU NOS	DIST BEST LINK	OTU BEST LINK	AVE OF NEW LINKS	DROP IN AVE.	FAR OTU	DIST FAR OTU	FLAG	NAME OF OTU
1	56								TSA4305S
	57	0.0							TTE1818S
	58	0.02	57	0.021	-0.021	56	0.02		ML00405P
	57	0.08	58	0.055	0.075	56	0.11		MIN2455P
	62	0.04	57	0.101	0.005	57	0.12		KBR3050U
	60	0.15	57	0.155	0.057	56	0.23	1000	MS12527U
2	26								PB04325P
	25	0.0							PB04245P
	4	0.13	25	0.128	0.128	26	0.13		PB01055P
	3	0.03	4	0.105	-0.022	26	0.15		PB06600N
	18	0.03	4	0.082	-0.023	26	0.13		PB03504P
	21	0.04	3	0.101	0.018	26	0.17		PB04202P
	44	0.05	18	0.101	0.000	26	0.17		PPU2557N
	12	0.09	44	0.094	-0.007	26	0.16		PB02230N
	21	0.05	18	0.120	0.025	26	0.15		PB03581P
	39	0.06	4	0.137	0.017	26	0.20		PB03972P
	10	0.03	35	0.135	0.005	26	0.23		PB02507N
	13	0.03	10	0.133	-0.012	26	0.22		PB03229N
	5	0.03	13	0.148	0.013	26	0.25		PB01101S
	24	0.05	35	0.135	-0.010	26	0.21		PB02551S
	22	0.03	24	0.128	-0.007	26	0.21		PB03662P
	30	0.05	24	0.140	0.012	26	0.25		PB04301P
	35	0.07	30	0.172	0.032	25	0.29		PB03555S
	40	0.01	25	0.172	-0.000	26	0.30		PAN2054N
	2	0.05	13	0.155	0.024	26	0.28		PB00152N
	15	0.03	2	0.201	0.005	25	0.30		PB02750N
	23	0.04	2	0.184	-0.016	26	0.29		PB03590A
	38	0.07	23	0.180	-0.004	26	0.30		PB0521FS
	37	0.07	35	0.221	0.041	26	0.37		PB05220N
	36	0.06	37	0.197	-0.023	26	0.30		PB0522LD
	1	0.05	2	0.177	-0.020	25	0.30		PB00002P
	6	0.02	1	0.175	-0.002	26	0.30		PB01205P
	17	0.04	1	0.171	-0.004	26	0.29		PB03672N
	7	0.02	17	0.174	0.003	26	0.31		PB01565N
	28	0.05	6	0.170	-0.004	25	0.32		PB03502S
	42	0.09	25	0.180	0.010	5	0.27		PEL3567S
	11	0.05	42	0.180	0.000	44	0.26		PB02575P
	14	0.09	35	0.160	-0.020	5	0.26	20	PB03748N
3	53								PS03563U
	54	0.02							PS03505S
	52	0.10	54	0.107	0.085	53	0.11		PS01410U
	46	0.05	52	0.124	0.018	53	0.16		PEU3550N
	45	0.11	45	0.164	0.040	53	0.21		PL13550U
	48	0.13	45	0.170	0.006	53	0.22		PSE0505U
	51	0.13	54	0.202	0.032	45	0.30		PSE2702S
	50	0.14	45	0.195	-0.007	52	0.24		PSE1524S
	49	0.03	50	0.175	-0.019	48	0.24		PSE1552C
	47	0.15	52	0.270	0.094	51	0.36	1200	PMU3560W
4	8								PB02217P
	32	0.02							PB04302P
	27	0.03	8	0.048	0.025	32	0.05		PB04218P
	44	0.03	27	0.047	0.002	32	0.06		PB03748N
	34	0.03	27	0.040	-0.007	8	0.05		PB04310P
	33	0.03	32	0.051	0.011	27	0.05		PB04304P
	18	0.05	32	0.065	0.015	33	0.08		PB03573N
	20	0.07	18	0.127	0.061	33	0.15		PB03505P
	36	0.08	14	0.123	-0.004	20	0.20	4	PB0521FS
	LINK TO CLUSTER -2								
5	60								MS12527U
	61	0.11							MTR0555U
	55	0.13	61	0.148	0.037	60	0.17		MOE0565U
	57	0.15	59	0.242	0.093	55	0.34	1004	MIN2550P
6	65								MS30W1DE
	64	0.13							LAM1752U
	61	0.15	65	0.250	0.117	64	0.35	1004	MTR0555U

ISOLATED OTU'S (SINGLE MEMBER CLUSTERS)

CLUSTER	OTU	LABEL
7	6	PB02224P
8	15	PB03748N
9	39	PAF4000S
10	41	PB03562S
11	43	PF14257N
12	47	PMU3560W
13	55	MMA2545N
14	62	FEL4552N
15	65	PLA4556C

Fig. 12
Taxometric map for comparison of all strains on conidial and vegetative attributes, equal weighting.



Petriellidium africanum
Petriellidium angustum
Petriellidium boydii
Petriellidium desertorum
Petriellidium ellipsoideum
Petriellidium fimeti
Petriellidium fusoideum

Kernia
Lophotrichus
Microascus
Petriella

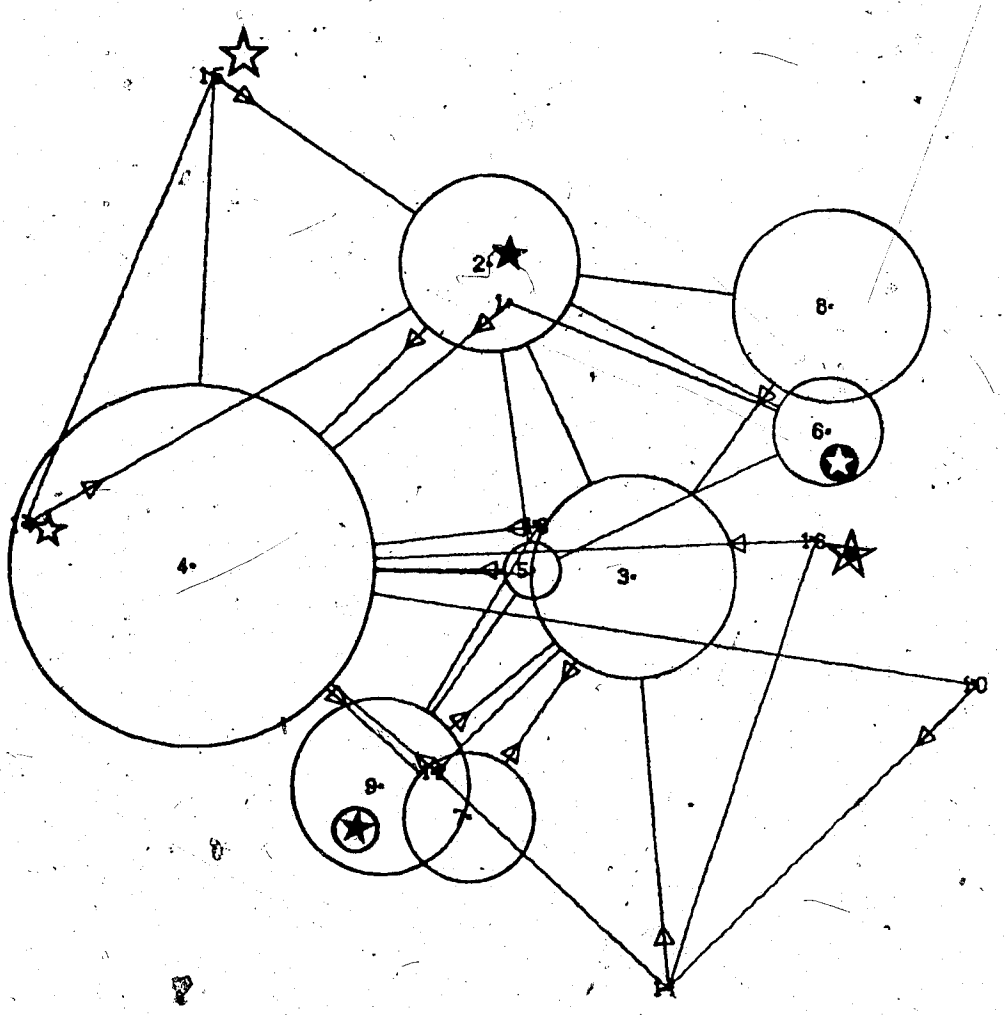
Faurelina
Pithoascus

Thielavia

Table 7
2) Comparison of *Petriellidium* strains on conidial and vegetative attributes. a) Results of analysis with differential weighting.

```
MAP CLUSTER ANALYSIS: PET SPECIES CONIDIAL CHARACTER.

(MINIMUM NUCLEUS 0.113; MAXIMUM DROP 0.0334 BOTH ARE 100% OF NORMAL)

CLUS OTU DIST OTU  AVGOF   DROP FAR DIST FLAG NAME OF OTU
TER  NOS BEST BEST  NEW     IN  OTU FAR
NO.      LINK LINK LINKS   AVG.     OTU
------------------------------------------------------------------
 1   28                                      PB04238P
     29 0.0                                  PB04248P

     19 0.12   29 0.123 0.123   28 0.12 1200 PB03906P
------------------------------------------------------------------
 2   26                                      PB03985S
     40 0.01                                 PAN3984?
     25 0.08   26 0.088 0.073   40 0.08      PB03892S

      6 0.08   25 0.141 0.053   40 0.18 1000 PB01288P
------------------------------------------------------------------
 3    8                                      PB02217P
     32 0.03                                 PB04303P
     27 0.05    8 0.080 0.034   32 0.07      PB04218P
     34 0.04   27 0.084-0.007    8 0.07      PB04310P
     14 0.05   27 0.074 0.020   32 0.10      PB03745M
     33 0.05   14 0.077 0.002   27 0.11      PB04306P

     44 0.07   34 0.115 0.038   33 0.15 1000 PFU3897M
------------------------------------------------------------------
 4    1                                      PB00002P
      6 0.03                                 PB01285P
      2 0.06    1 0.071 0.043    6 0.06      PB00183N
     23 0.06    2 0.087 0.027    6 0.13      PB03990A
     13 0.06    2 0.100 0.003    6 0.17      PB03239M
     10 0.03   13 0.084-0.007    6 0.13      PB02807N
      5 0.04   13 0.088 0.002    6 0.16      PB01101B
     35 0.04   40 0.088-0.008    6 0.14      PB03973P
      4 0.08   35 0.114 0.028    6 0.15      PB01098P
      3 0.03    4 0.118 0.004    2 0.16      PB00800N
     18 0.04    4 0.117-0.001    6 0.18      PB03904P
     31 0.06    3 0.118 0.001   23 0.19      PB04302P
     24 0.06   35 0.107-0.011    2 0.16      PB03981S
     22 0.04   24 0.089-0.006    2 0.14      PB03982P
     30 0.08   31 0.115 0.017   23 0.18      PB04301P

     44 0.07   19 0.152 0.037    1 0.22 1000 PFU3987M
------------------------------------------------------------------
 5    7                                      PB01885N
     17 0.03                                 PB03872M

      1 0.07   17 0.072 0.042    7 0.07    4 PB00002P
      LINK TO CLUSTER  -4
------------------------------------------------------------------
 6   11                                      PB02875P
     42 0.08                                 PEL3987S

     20 0.12   11 0.141 0.083   42 0.18 1200 PB03905P
------------------------------------------------------------------
 7   12                                      PB03230M
     44 0.07                                 PFU3987M
NEEDED .GT. FOUND FOR NEXT OTU **

     19 0.08   12 0.342 0.273   39 0.80 1004 PB03904P
------------------------------------------------------------------
 8   37                                      PB05220M
     38 0.08                                 PB0522LD
     36 0.09   37 0.097 0.017   38 0.10      PB0521FS

     25 0.08   38 0.132 0.035   38 0.18 1004 PB03932S
------------------------------------------------------------------
 9   16                                      PB03873M
     20 0.09                                 PB03905P

     12 0.10   16 0.131 0.037   20 0.17 1004 PB03230M
------------------------------------------------------------------

ISOLATED OTU'S (SINGLE MEMBER CLUSTERS)

CLUSTER OTU LABEL
    10    9 PB02324P
    11   15 PB03749M
    12   16 PB03750M
    13   21 PB03881P
    14   39 PAF4000S
    15   41 PDE3985S
    16   43 PF14257M
```

Fig. 13
Taxometric map for comparison of *Petriellidium* strains on conidial and vegetative attributes, differential weighting.



☆ Petriellidium africanum
★ Petriellidium angustum
★ Petriellidium boydii
☆ Petriellidium desertorum
✪ Petriellidium ellipsoideum
★ Petriellidium fimeti
✪ Petriellidium fusoideum

Kernia
Lophotrichus
Microascus
Petriella

Faurelina
Pithoascus

Thielavia

Table 8
2) Comparison of *Petriellidium* strains on conidial and vegetative attributes. b) Results of analysis with equal weighting.

MAP CLUSTER ANALYSIS:-PET SPECIES CONIDIAL CHARACTERS

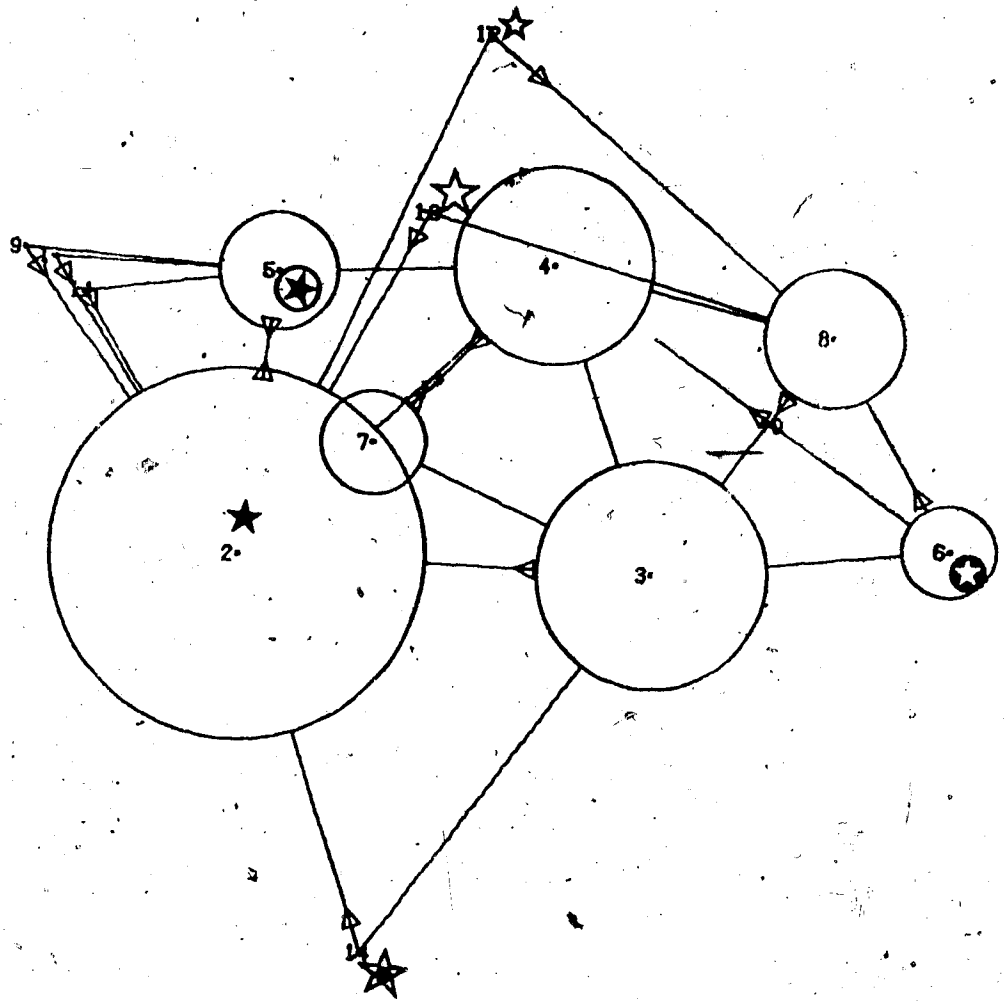
[MINIMUM NUCLEUS 0.126, MAXIMUM DROP 0.0372 BOTH ARE 100% OF NORMAL']
EQUALLY WEIGHTED ATTRIBUTES

CLUSTER NO.	OTU NOS	DIST BEST LINK	OTU BEST LINK	AVGDP NEW LINKS	DROP IN AVG.	FAR OTU	DIST FAR OTU	FLAG	NAME OF OTU
1	28								PB042368
	29	0.0							PB042488
	4	0.14	29	0.138 0.138	28	0.14	1200		PB01098P
2	28								PB039858
	40	0.02							PAN3884M
	30	0.10	28	0.108 0.090	40	0.12			PB043018
	24	0.08	30	0.112 0.003	40	0.14			PB039918
	22	0.08	24	0.130 0.018	40	0.18			PB039828
	35	0.09	24	0.156 0.025	40	0.22			PB038738
	10	0.06	39	0.145-0.010	40	0.23			PB02607N
	13	0.06	10	0.147 0.002	40	0.27			PB032388
	5	0.05	13	0.170 0.023	40	0.32			PB011018
	6	0.08	35	0.148-0.023	40	0.24			PB01098P
	2	0.04	6	0.137-0.010	40	0.21	30		PB00800N
3	1								PB00002P
	8	0.03							PB01288P
	17	0.05	1	0.073 0.047	8	0.09			PB03672M
	7	0.03	17	0.055-0.018	8	0.07			PB01885N
	2	0.06	1	0.115 0.060	7	0.14			PB00153N
	16	0.05	2	0.137 0.021	7	0.19			PB03760M
	23	0.06	2	0.117-0.020	8	0.19			PB03990A
	13	0.08	2	0.185 0.048	7	0.23	1004		PB032388
4	8								PB02217P
	32	0.03							PB043038
	33	0.04	32	0.046 0.018	8	0.05			PB043048
	27	0.05	8	0.076 0.032	33	0.10			PB04218P
	14	0.04	27	0.083-0.015	32	0.08			PB03748M
	34	0.04	14	0.059-0.004	33	0.08			PB043108
	15	0.07	32	0.087 0.038	33	0.11			PB03678M
	36	0.08	14	0.132 0.035	16	0.17			PB05218S
	37	0.08	36	0.184 0.052	32	0.23	1000		PB05228N
5	3								PB00800N
	31	0.05							PB043028
	19	0.07	3	0.061 0.018	31	0.09			PB03868P
	12	0.08	19	0.081 0.010	3	0.10			PB03230M
	44	0.07	12	0.084-0.007	3	0.10			PFU3997M
** NEEDED .GT. FOUND FOR NEXT OTU **									
	6	0.08	31	0.336 0.251	28	0.68	1004		PB01098P
6	11								PB02875P
	42	0.68							PEL38678
	26	0.11	42	0.142 0.054	11	0.18	1000		PB03882S
7	37								PB05228N
	38	0.09							PB05221D
** NEEDED .GT. FOUND FOR NEXT OTU **									
	36	0.10	38	0.387 0.298	43	0.68	1004		PB05218S
8	15								PB03749M
	25	0.12							PB03882S
	17	0.12	25	0.150 0.032	15	0.18	4		PB03872M
	LINK TO CLUSTER -3								

ISOLATED OTU'S (SINGLE MEMBER CLUSTERS)

CLUSTER	OTU	LABEL
9	9	PB023248
10	20	PB03880P
11	21	PB03881P
12	39	PAF40008
13	41	PDE38838
14	43	PF142878

Fig. 14
Taxometric map for comparison of *Petriellidium* strains on conidial and vegetative attributes, equal weighting.



☆ Petriellidium africanum
★ Petriellidium angustum
★ Petriellidium boydii
☆ Petriellidium desertorum
✪ Petriellidium ellipsoideum
★ Petriellidium fimeti
✱ Petriellidium fusoideum

Kernia
Lophotrichus
Microascus
Petriella
Faurelina
Pithoascus
Thielavia

Table 9
3) Comparison of all strains producing ascospores on ascospore and vegetative attributes. a) Results of analysis with differential weighting.

MAP CLUSTER ANALYSIS

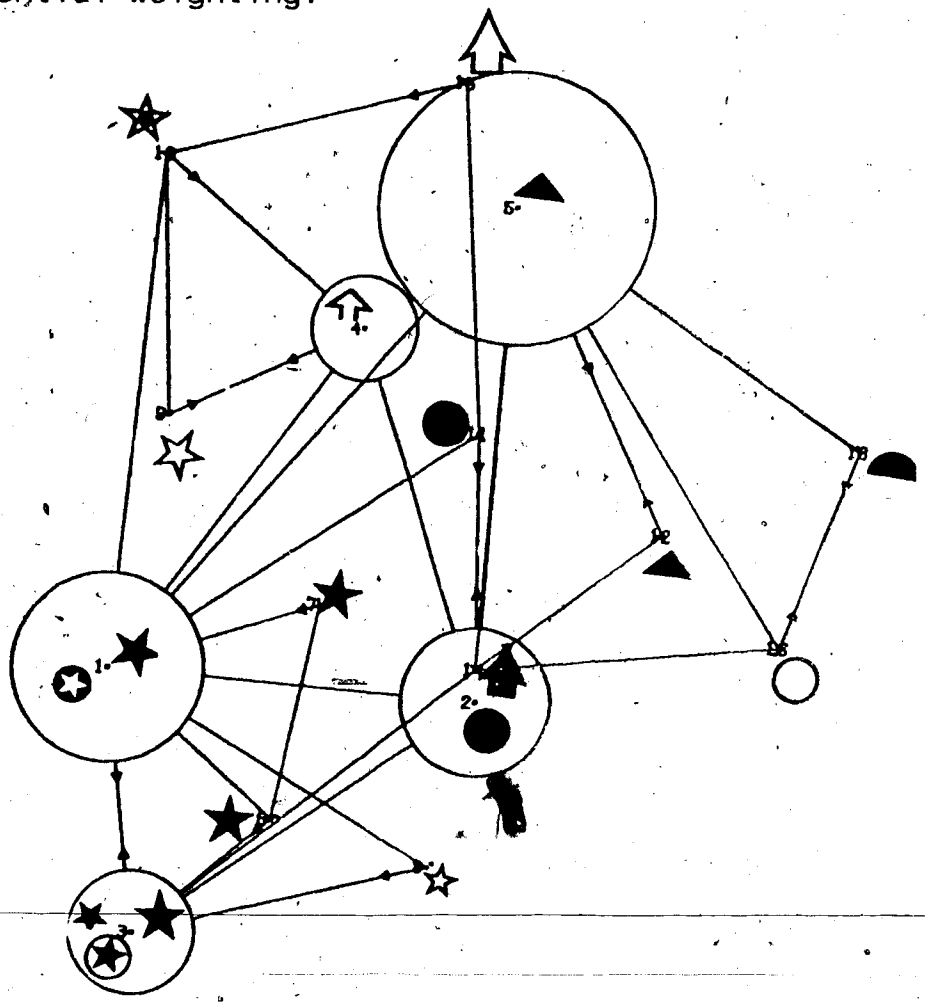
(MINIMUM NUCLEUS 0.130, MAXIMUM DROP 0.0438 BOTH ARE 100% OF NORMAL)

CLUSTER NO.	OTU NOS	DIST BEST LINK	OTU BEST LINK	AVGDP NEW LINKS	DROP IN AVG.	FAR OTU	DIST FAR OTU	FLAG	NAME OF OTU
1	8								
	12	0.03							PB022179
	13	0.04	8	0.056	0.031	12	0.07		PB04303P
	4	0.05	5	0.085	0.011	13	0.08		PB04304P
	5	0.05	4	0.093	0.028	13	0.12		PB01265P
	8	0.04	5	0.075-0.018		13	0.11		PB01885N
	6	0.05	5	0.062	0.007	4	0.11		PB03572M
	1	0.05	4	0.085	0.004	5	0.12		PB03573M
	15	0.07	5	0.103	0.017	13	0.15		PB00002P
	11	0.07	12	0.100-0.033		13	0.13		PEL39875
	7	0.05	11	0.105	0.005	15	0.14		PB04302P
	2	0.05	7	0.093-0.010		15	0.12		PB03239M
									PB01153N
	20	0.05	11	0.148	0.052	4	0.15	1000	PFU3997M
2	22								
	23	0.04							PSE1582C
	21	0.11	23	0.111	0.071	22	0.11		PSE15245
									PL13988U
	24	0.15	21	0.159	0.048	23	0.15	1200	PSD1410U
3	10								
	16	0.05							PB03892S
	20	0.05	16	0.087	0.031	10	0.10		PAN3984H
									PFU3997M
	11	0.05	20	0.129	0.042	10	0.15	4	PB04302P
	LINK TO CLUSTER -1								
4	35								
	36	0.05							TBA43058
									TTE19185
	17	0.12	36	0.152	0.071	35	0.15	1000	PDE38835
5	26								
	30	0.10							MMA2642M
									MTR08550
	28	0.11	28	0.121	0.018	30	0.13		MSI2537U
	25	0.13	26	0.145	0.024	29	0.17		MSJ8WIDE
	29	0.14	25	0.152	0.018	28	0.21		MDE0966U
	27	0.17	29	0.225	0.063	25	0.25	1200	MIN2488P

ISOLATED OTU'S (SINGLE MEMBER CLUSTERS)

CLUSTER	OTU	LABEL
6	3	PB01101B
7	14	PBD521FS
8	18	PAF40005
9	17	PDE38835
10	18	PFI4257M
11	24	PSD1410U
12	27	MIN2488P
13	31	PEL4232M
14	32	KBR3050U
15	33	LAM1782U
16	34	PLA4236C

Fig. 15
Taxometric map for comparison of all strains producing ascospores on ascospore and vegetative attributes, differential weighting.



Petriellidium africanum
Petriellidium angustum
Petriellidium boydii
Petriellidium desertorum
Petriellidium ellipsoideum
Petriellidium fimeti
Petriellidium fusoideum

Kernia
Lophotrichus
Microascus
Petriella

Faurelina
Pithoascus

Thielavia

Table 10
3) Comparison of all strains producing ascospores on ascospore and vegetative attributes. b) Results of analysis with equal weighting.

MAP CLUSTER ANALYSIS

(MINIMUM NUCLEUS 0.142, MAXIMUM DROP 0.0461 BOTH ARE 100% OF NORMAL)
EQUALLY WEIGHTED ATTRIBUTES

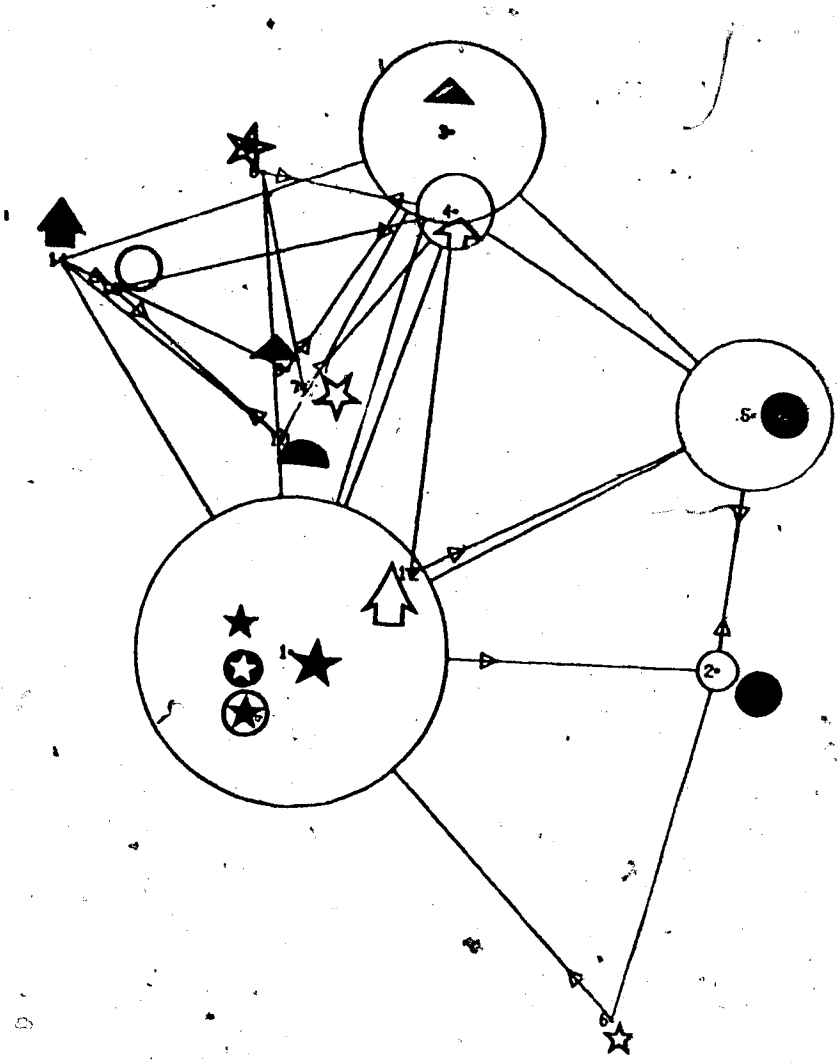
CLUSTER NO.	OTU NOS	DIST BEST LINK	OTU BEST LINK	AVGOF NEW LINKS	DROP IN AVG.	FAR OTU	DIST FAR OTU	FLAG	NAME OF OTU
1	5								PB02217P
	12	0.02							PB04303P
	13	0.03	5	0.041	0.022	12	0.05		PB04304P
	9	0.08	12	0.074	0.033	13	0.09		PB03873M
	4	0.07	5	0.080	0.018	9	0.12		PB01285P
	8	0.05	4	0.088	-0.003	13	0.11		PB03872M
	6	0.04	8	0.048	0.003	13	0.12		PB01855N
	1	0.05	4	0.050	0.001	9	0.13		PB00002P
	18	0.08	8	0.100	0.010	13	0.14		PEL3987S
	11	0.10	12	0.128	0.028	18	0.18		PB04302P
	7	0.07	11	0.143	0.014	16	0.17		PB03238M
	20	0.07	11	0.164	0.021	4	0.21		PFU3997M
	2	0.08	7	0.121	-0.043	20	0.18		PB00153K
	3	0.09	7	0.162	0.040	5	0.21		PB01101S
	16	0.10	20	0.168	0.026	13	0.20		[illegible]84M
	10	0.08	16	0.149	-0.040	13	[illegible]		[illegible]8092S
	14	0.11	6	0.167	0.018	18	[illegible]		[illegible]32IFS
	23	0.23	1	0.332	0.184	[illegible]	[illegible]	[illegible]	[illegible]S
2	22								[illegible]C
	23	0.04							PS[illegible]4
	24	0.15	22	0.182	0.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]410U
3	26								MMA2642M
	29	0.07							MSI2837U
	30	0.10	28	0.109	0.043	28	0.12		MTR0855U
	28	0.12	26	0.143	0.034	26	0.17		MDE0885U
	25	0.12	26	0.148	0.005	30	0.17		MS38WIDE
	27	0.13	29	0.221	0.073	25	0.25	1200	MIN2469P
4	35								TBA4305S
	36	0.07							TTE1916S
	19	0.15	36	0.157	0.085	35	0.17	1200	PFI4257M
5	21								PLI3989U
	24	0.14							PS01410U
	22	0.15	24	0.158	0.014	21	0.16	4	PSE1962C

LINK TO CLUSTER -2

ISOLATED OTU'S (SINGLE MEMBER CLUSTERS)

CLUSTER	OTU	LABEL
6	15	PAF4000S
7	17	PDE3983S
8	19	PFI4257M
9	27	MIN2469P
10	31	PEL4232M
11	32	KER3060U
12	33	LAM1762U
13	34	PLA4234C

Fig. 16
Taxometric map for comparison of all strains producing ascospores on ascospore and vegetative attributes, equal weighting.



☆ Petriellidium africanum
★ Petriellidium angustum
★ Petriellidium boydii
☆ Petriellidium desertorum
✪ Petriellidium ellipsoidum
★ Petriellidium fimeti
✪ Petriellidium fusoideum

Kernia
Lophotrichus
Microascus
Petriella
Faurelina
Pithoascus
Thielavia

Table 11
4)Comparison of *Petriellidium* strains producing ascospores on ascospore and vegetative attributes. a) Results of analysis with differential weighting.

MAP, CLUSTER ANALYSIS:-PET. SPECIES ASCO CHARACTERS APPLICABLE TO ALL

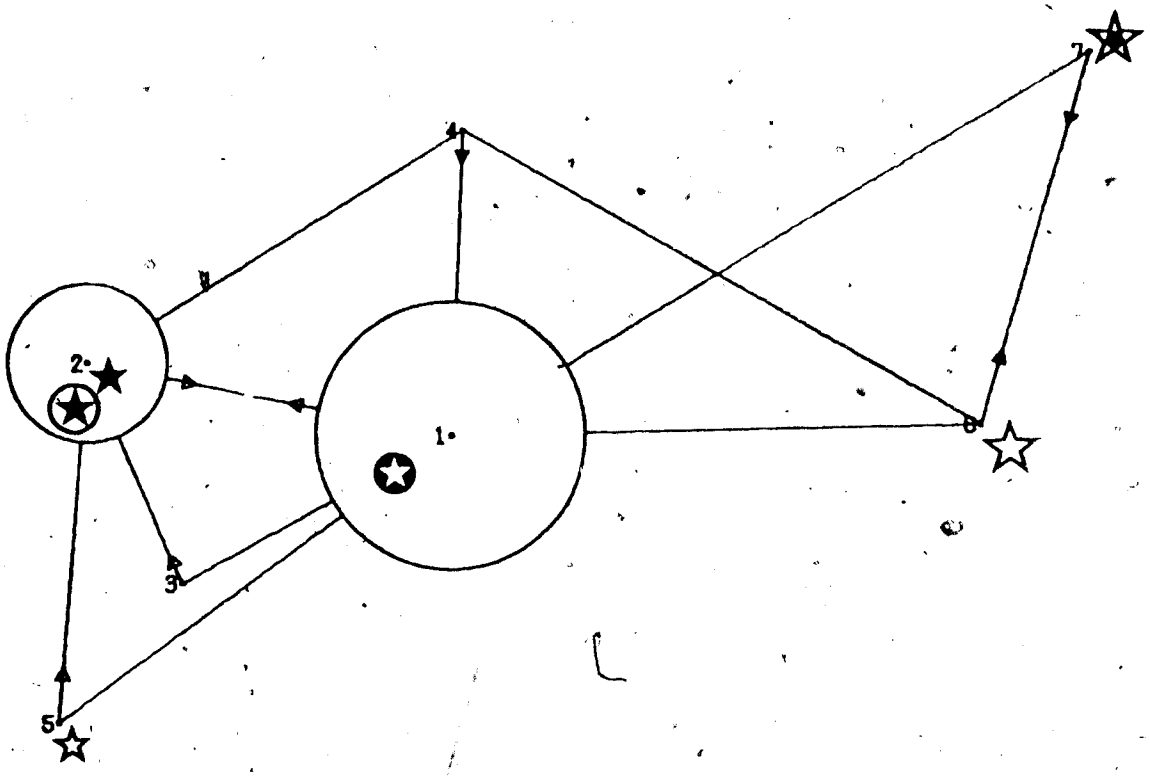
(MINIMUM NUCLEUS 0.112, MAXIMUM DROP 0.0440 BOTH ARE 100% OF NORMAL)

CLUSTER NO.	OTU NOS	DIST BEST LINK	OTU BEST LINK	AVGOF NEW LINKS	DROP IN AVG.	FAR OTU	DIST FAR OTU	FLAG	NAME OF OTU
1	8								PB022I7P
	12	0.03							PB04303P
	4	0.08	8	0.088	0.043	12	0.08		PB01288P
	13	0.08	8	0.085	0.018	4	0.10		PB04304P
	1	0.07	4	0.103	0.018	12	0.12		PB00002P
	5	0.08	4	0.120	0.017	13	0.18		PB01885N
	6	0.08	5	0.103-0.018		13	0.15		PB03872M
	9	0.08	8	0.118	0.012	1	0.16		PB03873M
	10	0.08	6	0.128	0.014	13	0.19		PEL38878
	11	0.08	12	0.125-0.004		16	0.16		PB04302P
	2	0.08	11	0.131	0.005	16	0.17		PB03238M
	3	0.07	7	0.120-0.011		13	0.15		PB00183N
	20	0.11	11	0.186	0.055	13	0.23	1000	PFU3997M
2	10								PB039825
	16	0.07							PAN3884M
	20	0.08	15	0.193	0.035	10	0.11		PFU3997M
	11	0.11	20	0.182	0.058	10	0.20	1004	PB04302P

ISOLATED OTU'S (SINGLE MEMBER CLUSTERS)

CLUSTER	OTU	LABEL
3	3	PB011018
4	14	PB0521FS
5	15	PAF40005
6	17	PDE38838
7	18	PF142B7M

Fig. 17
Taxometric map for comparison of *Petriellidium* strains producing ascospores on ascospore and vegetative attributes, differential weighting.



Petriellidium africanum
Petriellidium angustum
Petriellidium boydii
Petriellidium desertorum
Petriellidium ellipsoideum
Petriellidium fimeti
Petriellidium fusoideum

Kernia
Lophotrichus
Microascus
Petriella

Faurelina
Pithoascus

Thielavia

Table 12
4) Comparison of *Petriellidium* strains producing ascospores on ascospore and vegetative attributes. b) Results of analysis with equal weighting.

UP CLUSTER ANALYSIS PET SPECIES ASCO CHARACTERS APPLICABLE TO ALL

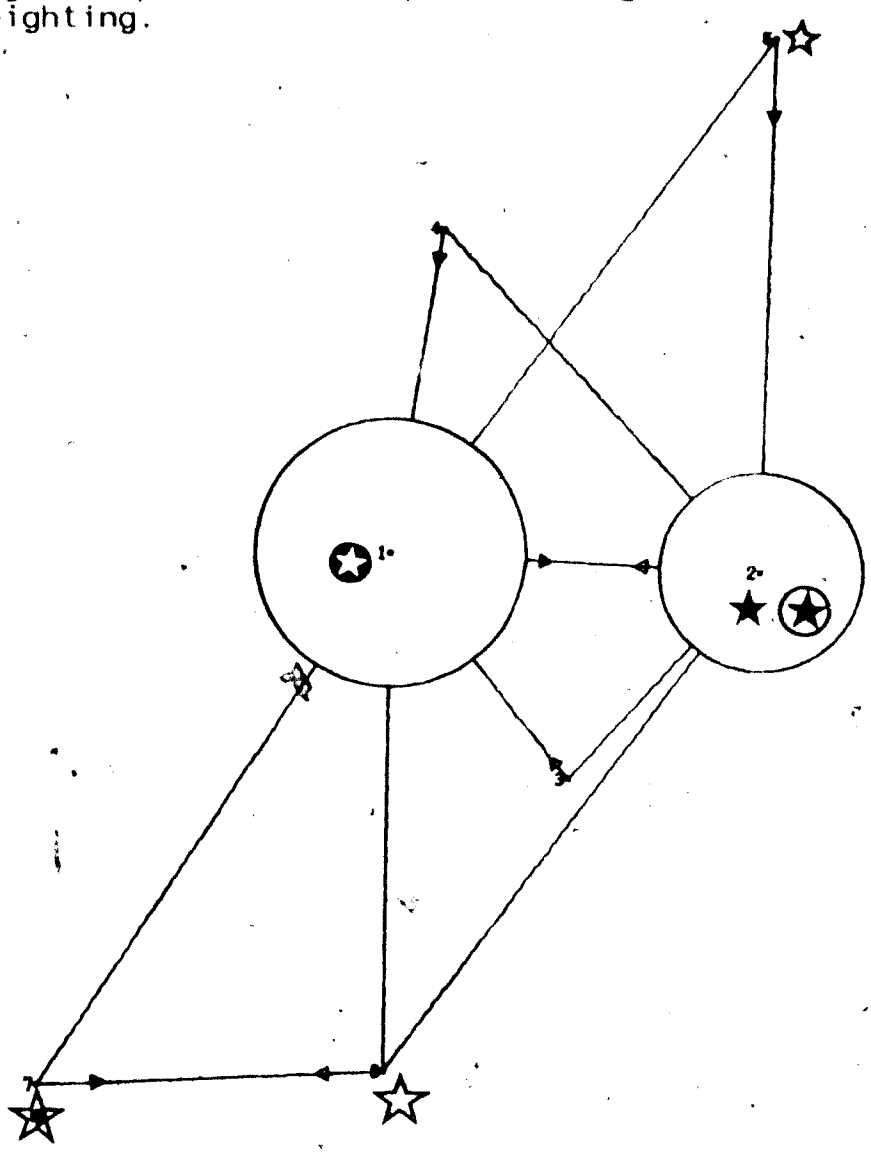
(MINIMUM NUCLEUS 0.118, MAXIMUM DROP 0.0421 BOTH ARE 100% OF NORMAL)
EQUALLY WEIGHTED ATTRIBUTES

CLUSTER NO.	OTU NOS	DIST BEST LINK	OTU BEST LINK	AVGDF NEW LINKS	DROP IN AVG.	PAR OTU	DIST PAR OTU	FLAG	NAME OF OTU
1	6								PB022117P
	12	0.02							PB040603P
	13	0.04	6	0.054	0.033	12	0.06		PB043304P
	4	0.07	6	0.085	0.031	13	0.10		PB012685P
	1	0.05	4	0.108	0.021	12	0.13		PB000602P
	8	0.08	4	0.118	0.013	13	0.15		PB03872M
	5	0.04	6	0.110	-0.008	13	0.18		PB018659N
	18	0.07	6	0.121	0.011	13	0.17		PBL39878
	9	0.06	6	0.117	-0.004	1	0.16		PB03873M
	11	0.11	12	0.148	0.030	5	0.18		PB043302P
	7	0.06	11	0.182	0.014	4	0.18		PB03238M
	2	0.08	7	0.136	-0.028	5	0.19		PB001853N
	20	0.08	11	0.193	0.056	4	0.24	1000	PFU3887M
2	10								PB039928
	18	0.08							PAN3984M
	20	0.11	18	0.124	0.036	10	0.14		PFU3887M
	11	0.08	20	0.188	0.040	10	0.22	6	PB043302P
	LINK TO CLUSTER -1								

ISOLATED OTU'S-(SINGLE MEMBER CLUSTERS)

CLUSTER	OTU	LABEL
3	3	PB011018
4	14	PB0521FS
5	15	PAF40005
6	17	PDE39935
7	19	PF14267M

Fig. 18
Taxometric map for comparison of *Petriellidium* strains producing ascospores on ascospore and vegetative attributes, equal weighting.



Petriellidium africanum
Petriellidium angustum
Petriellidium boydii
Petriellidium desertorum
Petriellidium ellipsoideum
Petriellidium fimeti
Petriellidium fusoideum

Kernia
Lophotrichus
Microascus
Petriella
Faurelina
Pithoascus
Thielavia

b) Results of analysis with equal weighting.

Table 6 and Figure 12

The equally weighted analysis was similar to the differentially weighted analysis except that the *P. boydii* strains were separated more. The largest cluster contained 28 of the 38 strains, with three other species *P. angustum*, *P. ellipsoideum* and *P. fusoideum*. A second cluster contained eight *P. boydii* strains, the remaining two P. boydii strains UAMH 2324 and UAMH 3749 were isolated points, probably for the previously mentioned reasons. The rest of the *Petriellidium* species, *P. africanum*, *P. destorum* and *P. fimeti* were isolated points.

The *Petriella* strains were now contained within one cluster with only one isolated strain *Pe. musispora*.

The *Miscoascus* strains are grouped together in two clusters, one containing three species; *M. desmosporus*, *M.singularis* and *M. trigonosporus*, the other containing *M. longirostris* and *M. intermedius* plus the *Thielavia* and *Kernia* strains. Of the remaining *Microascus* species, *M. manginii* was an isolated point and *M. desmosporus* (wood) was clustered with *Lophotrichus*.

The *Pithoascaceae* strains *Faurelina* and *Pithoascus* were clustered as isolated points.

As in the differentially weighted analysis based on vegetative and conidial characters, the *Petriellidium* strains were nearest neighbours to each other except for *P. fimeti* and *P. africanum*.

2) Comparison of *Petriellidium* strains on conidial and vegetative analysis

a) Results of analysis with differential weighting.

Table 7 and Figure 13

All the strains were quite similar, none of the pairs being less than 67% similar (relative distance = 0.33).

The *P. boydii* strains were separated into six clusters of two or more strains (one cluster also included *P. angustum*). The main cluster contained 15 of the 38 strains. Three clusters contained at least one other species *P. angustum*, *P. ellipsoideum* or *P. fusoideum*. There were four isolated strains, UAMH 2324, 3749, 3750 and 3981. The remaining three *Petriellidium* species, *P. africanum*, *P. desertorum* and *P. fimeti* were isolated points.

The differentially weighted analysis based on vegetative and conidial attributes for the *Petriellidium* strains separated the *P. boydii* strains considerably. It is interesting to note that this analysis does not distinguish *P. angustum*, *P. ellipsoideum* or *P. fusoideum* from the *P. boydii* strains.

b) Results of the analysis with equal weighting

Table 8 and Figure 14

As in the differentially weighted analysis, all the strains were quite similar, none of the pairs being less than 67% similar.

The *P. boydii* strains were separated into seven clusters of two or more strains and three isolated points.

The main cluster contained 9 of the 38 strains with *P. ellipsoideum*. The two *Petriellidium* species, *P. angustum* and *P. fusoideum* were contained in clusters with at least one *P. boydii* strain. The remaining *Petriellidium* species, *P. africanum*, *P. desertorum* and *P. fimeti* were isolated points.

3) Comparison of all strains producing ascospores on ascospore and vegetative attributes

a) Results of analysis with differential weighting

Table 9 and Figure 15

The *Petriellidium boydii* strains were clustered into two clusters. The largest cluster contained 11 of the 14 *P. boydii* strains and *P. ellipsoideum*; the other cluster contained one *P. boydii* strain plus *P. angustum* and *P. fusoideum*. The remaining two *P. boydii* strains, UAMH 1101 and UAMH 4408 plus the remaining *Petriellidium* species, *P. africanum*, *P. desertorum* and *P. fimeti* were clustered as isolated points.

The *Petriella* strains were clustered as one cluster containing two species, *Pe. setifera* and *Pe. lindforsii* plus one isolated point *Pe. sordida*.

The *Microascus* strains were clustered as one cluster containing four species, *M. desmosporus*, *M. manginii*, *M. singularis* and *M. trigonosporus* and one isolated point *M. intermedius*.

The two *Thielavia* species were clustered together.

The remaining *Microascaceae; Kernia* and *Lophotrichus* along with *Pithoascaceae; Pithoascus* and *Faurelina* were clustered as isolated points.

It is noteworthy that in this analysis based on ascospore and vegetative attributes, the *Petriellidium* strains were nearest neighbours except *P. desertorum* and *P. fimeti*.

b) Results of analysis with equal weighting

Table 10 and Figure 16

The *P. boydii* strains were clustered as one cluster along with three *Petriellidium* species, *P. angustum, P. ellipsoideum* and *P. fusoideum*. The remaining *Petriellidium* species, *P. africanum, P. desertorum* and *P. fimeti* were clustered as isolated points.

The *Petriella* strains were grouped into two clusters; one cluster consisting of the *Pe. setifera* strains and the other included the remaining species *Pe. lindforsii* plus *Pe. sordida*.

The remaining genera were grouped as in the differentially weighted analysis.

As in the differentially weighted analysis based on ascospore and vegetative attributes, the *Petriellidium* strains were nearest neighbours except *P. desertorum* and *P. fimeti*.

4) Comparison of *Petriellidium* strains producing ascospores on ascospore and vegetative attributes

Table 11 and Figure 17

a) Results of analysis with differential weighting

The *P. boydii* strains were distributed among one main cluster, including 11 of the 14 strains plus *P. ellipsoideum*, a second cluster containing one *P. boydii* strain, (UAMH 3992), plus *P. angustum* and *P. fusoideum*, and two isolated points (UAMH 1101 and UAMH 4408). The nearest neighbour to UAMH 1101 is the *P. angustum* cluster. The remaining *Petriellidium* species, *P. africanum*, *P. desertorum* and *P. fimeti* were isolated points.

This differentially weighted analysis of *Petriellidium* ascospore producing strains based on ascospore and vegetative attributes could not differentiate *P. boydii* and *P. ellipsoideum* or *P. angustum* and *P. fusoideum*. It also included a *P. boydii* strain with the *P. angustum-fusoideum* cluster.

b) Results of analysis with equal weighting

Table 12 and Figure 18

The analysis was the same as the weighted analysis. except the isolated point UAMH 1101 is nearest neighbour with the *P. boydii* cluster.

IV. Taxonomic conclusions

A. Genera of the Microascaceae

Near the end of this study, Benny and Kimbrough (1980) proposed a revision of the orders and families of the Plectomycetes. Their key to the genera of the Microascaceae is reproduced in Table 13. The inclusion of *Arthrographis* under part A of the key appears to be an accidental substitution for *Sporothrix*. In all other respects, their key is supported by this study. The TAXMAP analyses generally grouped the species in conformity with the genera recognized in Benny and Kimborough's key. Their separation of *Pithoascus* and *Faurelina* as a separate family, the *Pithoascaceae*, is also supported by the isolated position of these two genera in the analyses. In 1973, von Arx transferred *Microascus intermedius* to *Pithoascus*, but this reclassification is not supported by this study.

B. Species of *Petriellidium*

The results obtained in this study did not agree with Von Arx's classification scheme for *Petriellidium*. *P. ellipsoideum* was judged to be conspecific with *P. boydii*, and *P. fusoideum* conspecific with *P. angustum*. The TAXMAP analysis supported this conclusion. The remaining species, *P. africanum*, *P. desertorum* and *P. fimeti* were found to be good species.

Table 13 Benny and Kimbrough (1980) Classification of the Microascaceae.

A. Ascocarps with a wall of *textura epidermoidea;* ascospores with two germ pores; anamorphs include *Graphium, Scedosporium,* and *Arthrographis*.....B

AA. Ascocarps with pseudoparenchymatous walls composed of angular, dark cells.....C

B(A). Ascocarps ostiolate; ascospores reddish brown, often asymmetrical.....*Petriella*
Type species: *P. sordida* (Zukal) Barron & Gilman, *in* Barron, Cain, and Gilman, Can. J. Bot. 39: 839. 1961. Six species known (see Barron *et al.*, 1961a; Malloch, 1970a).

BB(A). Ascocarps usually not ostiolate; ascospores usually yellowish, rarely, reddish, symmetrical.....*Petriellidium*
Type species: *P. boydii* (Shear) Malloch, Mycologia 62: 738. 1970. Six species known (see von Arx, 1973c).

C(AA). Ascospores embedded in a hyphal "capillitium" at maturity, each with a prominant germ pore.....*Enterocarpus*
Type species: *E. uniporus* Locquin-Linard, Rev. Mycol. 41: 513. 1977. Two species.

CC(AA). Ascospores small, not embedded in a "capillitium," or with two germ pores.....D

D(CC). Ascocarps ostiolate; ascospores asymmetrical, with one germ pore.....*Microascus*
Type species: *M. longirostris* Zukal, Verh. Zool.-Bot. Ges., Wien 35: 339. 1885. Twelve species known (see von Arx, 1975c for key to species; additional species described by Ram, 1971; Udagawa and Furuya, 1978; see also Barron *et al.*, 1961b; Morton and Smith, 1963).

DD(CC). Not as above.....E

E(CC). Ascocarps nonostiolate, with or without tufts of hairs; ascospores with one or two germ pores, hyaline, reddish, yellowish, or brownish.....*Kernia*
Type species: *K. nitidia* (Sacc.) Nieuwland, Amer. Midl. Nat. 4: 379. 1916. Five species known (see Malloch and Cain, 1971c for key to species). Syn.: *Magnusia* Sacc. *non Magnusia* Klotzsch (see Benjamin, 1956b).

EE(CC). Ascocarps usually ostiolate, with an apical tuft of thick-walled hairs; ascospores with two germ pores, yellowish or brownish.....*Lophotricus*
Type genus: *L. ampullus* Benjamin, Mycologia 41: 347. 1949. Five species known (see Seth, 1971 for key to species; additonal species described by Morinaga *et al.*, 1978).

P. angustum was found to be quite similar to *P. boydii*, but differed by smaller, narrower ascospores. The *Scedosporium* states of these two species are indistinguishable. The TAXMAP analysis supported these observations. An important question is raised: is *P. angustum* pathogenic? Since its *Scedosporium* anamorph cannot be distinguished from *P. boydii*, this question needs to be answered by pathogenicity studies (Lupan and Cazin 1973, Bell 1978). The four strains of *P. angustum* studied here were all from saprophytic sources.

Strains UAMH 1101 and UAMH 3992 were found to be misidentified as *P. boydii* and were transferred to *P. angustum*. The remaining strains previously identified as *P. boydii* were found to be correctly identified.

P. fimeti UAMH 4257 did not produce a conidial state. It is not known whether the conidial states von Arx (1978) described for this species have been lost through subculturing or whether they represented a contaminant. *P. fimeti* was mixed with *Pithoascus langeronii* when received from CBS.

Key to the species of *Petriellidium*

Two keys to the genus *Petriellidium* are being presented; the first based on ascospore size, the second on conidium size. The key based on the *Scedosporium* anamorph is necessary because *Petriellidium* species do not always produce the ascogenous state, or if produced the ascospores may be immature and accurate measurements may unobtainable.

P. africanum is not included in the first key because it did not produce ascospores in this study. The presence or absence of the *Graphium* conidial state is not used in the keys due to its irregular and unpredictable occurrence.

Key to the species of *Petriellidium* based on ascospore size

(1)Ascospores larger than 9 um x 6 um.....*P. desertorum* & *P. fimeti*

(1)Ascospores smaller.....2

(2)Ascospores 6-8.5 x 3.5-5.5um.....*P.boydii*

(2)Ascospores 5-6.5 x 2-4um.....*P. angustum*

Key to the species of *Petriellidium* based on conidium size

(1)*Scedosporium* conidia present.....2

(1)*Scedosporium* conidia not present.....*P. fimeti*

(2)*Scedosporium* conidia 5-10.5 x 2.5-6 um..*P. boydii* or *P. angustum*

(2)*Scedosporium* conidia smaller 3

(3)conidia 3.5-6 x 1-2.5 um no large chlamydospores. *P. africanum*

(3)conidia 4-8 x 1.5-4 um large chlamydospores present..... *P. desertorum*

P. desertorum and *P. fimeti* cannot be distinguished on ascospore sizes, however the *Scedosporium* conidia are not

seen in *P. fimeti*. *P. boydii* and *P. angustum* cannot be distinguished on their *Scedosporium* conidia but their ascospore sizes differ.

C. Nomenclator of *P. boydii*

Negroni and Fischer's type of *Pseudallescheria shearii* UAMH 3973 was examined in this study and found to be a typical *P. boydii* anamorph. Although they misidentified their fungus, they did create a legitimate generic name for *Allescheria boydii*. However, previous investigators have not accepted or used *Pseudallescheria*. When Malloch (1970) reclassified *Allescheria boydii* to *Petriellidium boydii*, he missed Negroni and Fischer's genus *Pseudallescheria*, which should have been retained. In my opinion the name *Petriellidium* should now be conserved for two reasons; 1) Negroni and Fischer's type strain no longer produces the ascogenous state and therefore some doubt remains about its identification, and 2) researchers and medical mycologists have accepted the name *Petriellidium* as a replacement for *Allescheria*. Changing the name would only result in needless confusion. It would also enshrine a name based originally on a misidentification.

D. Composite description of *P. boydii* and *P. angustum*

P. boydii (Shear) Malloch 1970

Colonies on Oatmeal at first whitish becoming mouse brown or grey, reverse light to dark, colony texture matted

fur. Mycelium hyaline, irregularly branched. Ascomata present or absent, spherical, non-ostiolate, usually submerged, brown-black in colour, translucent, wall of *textura epidermoidae*, 55.5-182 *um* in diameter. Asci spherical to ovoid, evanescent, eight-spored. Ascospores ellipsoidal, symmetrical, golden, with two polar germ pores, 6-8.5 x 3.5-5.5 *um*. Conidia of two types. Diffuse conidia (*Scedosporium*) state, normally present, clavate to ovoid, hyaline at first, then dilute yellow brown, borne singly or successively, directly from the sides of the hyphae or from the tip of annellidic conidiogenous cells, accumulating in small easily dispersed masses, 5-10.5 x 2.5-6.5 *um*. Synnematous conidia (*Graphium*) frequently absent, clavate to cylindrical, hyaline at first, then to dilute yellow brown, produced successively from annellate conidiogenous cells, accumulating in a slime ball at the tip of the synnema, 3-11.5 (22.5) x 1.5-3.5 (6.5) *um*.

This description was based on a combination of the characters of all *P. boydii* strains studied.

P. angustum Malloch and Cain 1972

Colonies on Oatmeal at first whitish, becoming light to dark mouse brown, reverse light to dark, colony texture matted fur. Mycelium hyaline, irregularly branched. Ascomata spherical, non-ostiolate, submerged, brown-black, transparent to translucent, wall of *textura epidermoidae*, 40-143 *um* in diameter. Asci spherical to ovoid, evanescent,

eight-spored. Ascospores ellipsoidal, symmetrical, golden with two polar germ pores, 5-7 x 2-4 um. Conidia of two types identical to those described above for *P. boydii*.

This description is based on the four *P. angustum* strains examined.

V. Bibliography

Ainsworth G. C. 1971. 'Ainsworth and Bisby's Dictionary of the Fungi', 6th ed., Commonwealth Mycological Institute, Kew, Surrey

Ainsworth G. C. and P. K. C. Austwick. 1973. 'Fungal Diseases of Animals', 2nd ed., Commonwealth Argicultural Bureaux, Slough, England.

Ajello L. 1952. The isolation of *Allescheria boydii* Shear, an etiologic agent of mycetoma from soil. *Amer. Jour. Trop. Med. Hyg.* 1: 227-238.

Arx J. A. von. 1973. The genera *Petriellidium* and *Pithoascus* (Microascaceae). *Persoonia* 7: 367-375.

Arx J. A. von. 1978. Notes on Microascaceae with the description of two new species. *Persoonia* 10: 23-31.

Austwick P. K. C. 1976. Environmental aspects of *Mortierella wolfii* infections in cattle. *N. Z. J. Agric. Res.* 19: 25-33.

Bakerspigel A. 1971. Fungi isolated from keratomycosis in Ontario, Canada 1. *Monosporium apiospermum* (*Allescheria*

boydii). *Sabouraudia* 9: 109-112.

Barron G. L., R. F. Cain and J. C. Gilman. 1961. The genus *Microascus*. *Can. J. Bot.* 39: 1609-1631.

Barron G. L., R. F. Cain and J. C. Gilman. 1961 A revision of the genus *Petriellia*. *Can. J. Bot.* 39: 838-845.

Bell R. G. 1976. The development in beef cattle manure of *Petriellidium boydii* (Shear) Malloch, a potential pathogen for man and cattle. *Can. J. Microbiol.* 22: 552-556.

Bell R. G. 1978. Comparative virulence and immunodiffusion analysis of *Petriellidium boydii* (Shear) Malloch strains isolated from feedlot manure and a human mycetoma. *Can. J. Microbiol.* 24: 856-863.

Benny G. L. and J. W. Kimbrough. 1980. A synopsis of the orders and families of Plectomycetes with keys to the genera. *Mycotaxon* 12: 1-91.

Bousley P. H. 1977. Isolation of *Allescheria boydii* from pleural fluid. *J. Clin. Microbiol.* 5: 244.

Bozarth R. 1979 The physico-chemical properties of Mycoviruses. in 'Viruses and Plasmids in Fungi', ed. P.

Lemke Marcel Dekker Inc. N. Y.

Brumpt E. 1922. 'Precis de Parasitologie.' Masson et Cie. Paris. pp.1114, 1145-1146.

Carmichael J. W., J. A. George and R. S. Julius. 1968. Finding natural clusters. *Systematic Zoology* 17:144-150.

Carmichael J. W. and P. H. A. Sneath. 1969. Taxometric maps. *Systematic Zoology* 18:402-415.

Carmichael J. W. 1980. 'The *TAXMAP*TMAP classification program.' University of Alberta. 6pp.

Carmichael J. W., W. B. Kendrick, I. L. Conners and L. Sigler. 1980. 'Genera of Hyphomycetes' The University of Aberta Press. Edmonton. Canada.

Castellani A. and A. J. Chalmers. 1919. 'Manual of Tropical Medicine.' 3rd ed. W. Wood and Co. New York.

Cazin J. Jr. and D. W. Decker. 1964. Carbohydrate nutrition and sporulation of *Allescheria boydii*. *J. Bacteriol.* 88: 1624-1628.

Ciferri R. 1960. 'Manuale di Micologic Medica'. Tomo 2, Casa editrice Renzo, Cortina, Pavia.

Conant N. F., D. T. Smith, R. D. Baker and J. L. Callaway. 1971. 'Manual of Clinical Mycology.' 3rd. ed. W. B. Saunders Co. Toronto

Conti-Diaz I. A. 1965. Temperatures maximales de agentes de micetomas y chromoblastomicosis. *Ann. Fac. Med. Univ. Republica Montevideo* 50: 190-196.

Corlett. M. 1966. Developmental studies in the Microascaceae. *Can. J. Bot.* 44:79-88.

Crane J. L. and J. D. Schoknecht. 1973. Conidiogenesis in *Ceratocystis ulmi*, *Ceratocystis piceae* and *Graphium penicillioides*. *Amer. J. Bot.* 60: 346-354.

Creitz J. and H. W. Harris. 1955. Isolation of *Allescheria boydii* from sputum. *Amer. Rev. of T. B.* 71: 126-130.

Dodge C. W. 1935. 'Medical Mycology.' C. V. Mosby. St. Louis.

Dowding E. S. 1935. *Monosporium apiospermum*, a fungus causing Madura foot in Canada. *Can. Med. Assoc. J.* 33: 28-32.

El-Ani A. S. 1974. *Allescheria boydii*. Wild type and a variant from human pulmonary allescheriosis. *Mycologia*

66: 661-668.

Emmons C. W. 1944. *Allescheria boydii* and *Monosporium apiospermum*. *Mycologia* 36: 188-193.

Faurel L. and M. Locquin. 1972. A propos de la decouverte d'un second representant de la famille des Chadefaudiellacees (champignons Ascomycetes). *C. R. Acad. Sc. Paris* 255: 2853-2856

Gluckman S. J., K Reis and E Abrutyn. 1977. *Allescheria (Petriellidium) boydii* sinusitis in a compromised host. *J. Clin. Microbiol.* 5: 481-484.

Gordon M. A. 1957. Nutrition and sporulation of *Allescheria boydii*. *J. Bacteriol.* 73: 199-205.

Hawksworth D. L. 1974. 'Mycologist's Handbook.' Commonwealth Mycological Institute, Kew, England.

Hironaga M. and S. Watanabe. 1980. Annellated conidiogenous cells in *Petriellidium boydii* (*Scedosporium apiospermum*). *Sabouraudia* 18:261-268.

Hughes S. J. 1958. Revisiones hyphomycetum aliquot cum appendice de nominibus rejiciendis. *Can. J. Bot.* 36: 727-836.

Jones J. W. and H. S. Alden. 1931. Maduromycotic mycetoma (Madura foot). *JAMA*. 96: 256-260.

Kirk P. W. 1967. A comparision of saline tolerance and sporulation in marine and clinical isolates of *Allescheria boydii*. *Mycopathol. Mycol. appl.* 33: 65-75.

Locquin-Linard M. 1975. *Faurelina*, nouveau genre d'Ascomycetes (*Chadefaudiellaceae* ?) *Revue de Mycologie* 39:125-130.

Locquin-Linard M. 1977. A propos des genres non ostioles places dans la famille des Microascaceae (Ascomycetes) Creation d'un nouveau genre *Enterocarpus*. *Revue de Mycologie* 41: 509-523.

Louria D. B., P. H. Lieberman, H. S. Collins and A. Blevins. 1966. Pulmonary mycetoma due to *Allescheria boydii*. *Arch. Intern. Med.* 117: 748-751.

Lupan D. M. and J. Cazin Jr. 1973. Pathogenicity of *Allescheria boydii* for mice. *Infect. Immun.* 8: 743-751.

Luttrell E. S. 1951. Taxonomy of the Pyrenomycetes. *Univ. Missouri Stud., Sci. Ser.* 24:1-120.

McGinnis M. R. 1980. Recent taxonomic developments and

changes in medical mycology. *Ann. Rev. Microbiol.* 34: 109-135.

MacKinnon J. E. 1951. Los agentes de maduromicosis des los generos *Monosporium, Allescheria, Cephalosporium* y otras de dudosa identidad . *An. Fac. Med. Montevideo* 36: 153-180.

MacKinnon J. E. 1954. A contribution to the study of the causal organisms of maduromycosis. *Trans. Roy. Soc. Trop. Med. Hyg.* 48: 470-479.

Malloch D. 1970. New concepts in the Microascaceae illustrated by two new species. *Mycologia* 62: 727-740.

Malloch D. and R. F. Cain. 1971. The genus *Kernia*. *Can. J. Bot.* 49: 855-867.

Malloch D. and R. F. Cain. 1972. New species and combinations of cleistothecial Ascomycetes. *Can. J. Bot.* 50: 61-72.

Malloch D. and R. F. Cain. 1973. The genus *Thielavia*. *Mycologia* 65: 1055-1077.

Mason E. W. 1941. Annotated account of fungi received at the Imperial Mycological Institute List II. The Imperial

Mycological Institute. Kew, Surrey.

Meyer E. and R. D. Herrod. 1961. *Allescheria boydii* isolated from a patient with chronic prostatitis. *Am. J. Clin. Pathol.* 35:155-159.

Mirsa S. P., G. Y. Shende, S. N. Yerwadekar, A. A. Padhye and M. J. Thirumalachar. 1966. *Allescheria boydii* and *Emmonsia ciferrina* isolated from patients with chronic pulmonary infections. *Hindustan Antibiot. Bull.* 9: 99-103.

Mohr J. A. and G. Muchmore. 1968. Maduromycosis due to *Allescheria boydii*. *JAMA* 204: 125-126.

Negroni P. and I. Fischer. 1944. *Pseudallescheria shearí* n. gen., n. sp. aislada de un paramicetoma de la rodilla. *Rev. Inst. Bact. Buenos Aires* 12: 195-204.

Padhye A. A. and M. J. Thirumalachar. 1968. Distribution of *Allescheria boydii* Shear, in soil of Maharashtra State. *Hindustan Antibiot. Bull.* 10: 200-201.

Pawar V. H., A. A. Padhye and M. J. Thirumalachar. 1965. Isolation of *Monosporium apiospermum* from marine soil in Bombay. *Hindustan Antibiot. Bull.* 6:50-53.

Rippon J. W. 1974. 'Medical Mycology.' W. B. Saunders Co. Toronto.

Rippon J. W. and J. W. Carmichael. 1976. Petriellidiosis (Allescheriosis): four unusual cases and review of the literature. *Mycopathologia* 58: 117-124.

Rippon J. W. 1981. Petriellidiosis: the great imitator. *Clin. Microbiol. Newsletter* 3:57-59.

Saccardo P. A. 1911. in *Notae mycologicicae* series XIII Annales mycologici 9: 254-255.

Saccardo 1913. 'Sylloge Fungorum' (XXII Suppl. univ. Par. IX). pp.1287-1288.

Shear C. L. 1922. Life history of an undescribed Ascomycete isolated from a granular mycetoma of man. *Mycologia* 14: 239-243.

Siebenmann F. 1889. 'Die Schimmel Mycosen des Menschlichen Ohres.' ed. von J. F. Bergmann, Wiesbaden, Verlag.

Udagawa S. and K. Furuya. 1973. The genus *Leuconeurospora*. *J. Jap. Bot.* 48:111-116.

Walker D. H., T. Adamec and M. Krigman. 1978. Disseminated

Petriellidiosis (Allescheriosis). *Arch. Pathol. Lab. Med.* 102: 158-160.

Weber H. 1979. Ultrastructural evidence for viruses in Ascomycetes and Fungi Imperfecti. in 'Viruses and Plasmids in fungi', ed. P. Lemke, Marcel Dekker Inc., N. Y.

Whiteside W. C. 1962. Morphological studies in the *Chaetomiaceae* III. *Mycologia* 54: 611-620.

Winston D. J., M. C. Jordan and J. Rhodes. 1977. *Allescheria boydii* infections in the immunosuppressed host. *Am. J. Med.* 63: 830-835.