



arte

Art and Expression

VOL. 05
MARCH 2024

ART

INTEGRATED
MEDIA

PART I

ARTe: Art & Expression
Presents

ART INTEGRATED MEDIA

PART I

Volume 5
Published: March 2024

Published by:
©UiTM Perak Press

eISSN 2805-5071



Cawangan Perak



PROGRAM SENI HALUS
KOLEJ PENGAJIAN SENI KREATIF
UiTM CAWANGAN PERAK

© Unit Penerbitan UiTM Perak, 2024

All rights reserved. No part of this publication may be reproduced, copied, stored in any retrieval system or transmitted in any form or by any means; electronic, mechanical, photocopying, recording or otherwise; without permission on writing from the director of Unit Penerbitan UiTM Perak, Universiti Teknologi MARA, Perak Branch, 32610 Seri Iskandar Perak, Malaysia.

Perpustakaan Negara Malaysia

Cataloguing in Publication Data

No eISSN: 2805-5071

Cover Design: Nur Muhammad Amin Hashim Amir
Typesetting : Nur Muhammad Amin Hashim Amir¹
Mohd Nafis Saad²



Editorial Board

PATRON OF HONOR

Dr. Nur Hisham Ibrahim (Assoc. Prof.)
(Rector, Universiti Teknologi MARA, Perak Branch, Malaysia)

ADVISOR

Dr. Aznan Omar¹
(Head of the Faculty, Universiti Teknologi MARA, Perak Branch, Malaysia)
Dr. Mohd Fawazie Arshad²
(Program Coordinator, Department of Fine Art, Universiti Teknologi MARA, Perak Branch, Malaysia)
Hilal Mazlan³
(Curator, Al-Biruni Galeri, Universiti Teknologi MARA, Perak Branch, Malaysia)

CHAIRMAN

Mahizan Hijaz Mohammad¹
(Department of Fine Art, Universiti Teknologi MARA, Perak Branch, Malaysia)
Dr. Azian Tahir (Assoc. Prof.)²
(Department of Fine Art, Universiti Teknologi MARA, Perak Branch, Malaysia)

CHIEF EDITORS

Dr. Syed Alwi Syed Abu Bakar¹
(Department of Fine Art, Universiti Teknologi MARA, Perak Branch, Malaysia)
Dr. Aznan Omar²
(Curator, Al-Biruni Galeri, Universiti Teknologi MARA, Perak Branch, Malaysia)

EDITORS

SECRETARY

Siti Humaini Said Ahmad @ Syed Ahmad¹
(Universiti Teknologi MARA, Perak Branch, Malaysia)

Rosmidahanim Razali²
(Universiti Teknologi MARA, Perak Branch, Malaysia)

TREASURER

Noor Enfendi Desa¹
(Universiti Teknologi MARA, Perak Branch, Malaysia)

Ruzamira Abdul Razak²
(Universiti Teknologi MARA, Perak Branch, Malaysia)

CHIEF OF PANEL REVIEW

Dr. Azian Tahir (Assoc. Prof.)
(Universiti Teknologi MARA, Perak Branch, Malaysia)

CHIEF OF TRANSLATION

En Mahizan Hijaz Mohammad
(Universiti Teknologi MARA, Perak Branch, Malaysia)

LANGUAGE EDITORS

Ong Elly
(Universiti Teknologi MARA, Perak Branch, Malaysia)

Dr. Paul Gnanaselvam A/L Pakirathan
(Universiti Teknologi MARA, Perak Branch, Malaysia)

Nurul Munirah Azamri
(Universiti Teknologi MARA, Perak Branch, Malaysia)

CHIEF OF PUBLIC RELATION

Wan Nurhasyimah Wan Mohd Apani
(Universiti Teknologi MARA, Perak Branch, Malaysia)

CHIEF OF DOCUMENTATION

Nur Adibah Nadiyah Mohd Aripin¹
(Universiti Teknologi MARA, Perak Branch, Malaysia)

Florene Ejot Masanat @ Meramat²
(Universiti Teknologi MARA, Perak Branch, Malaysia)

CHIEF OF PROMOTION

Muhammad Salehuddin Zakaria
(Universiti Teknologi MARA, Perak Branch, Malaysia)

CHIEF OF TECHNICAL

Hairulnisak Merman¹
(Universiti Teknologi MARA, Perak Branch, Malaysia)

Anwar Fikri Abdullah²
(Universiti Teknologi MARA, Perak Branch, Malaysia)

CHIEF OF DESIGN

Nur Muhammad Amin Hashim Amir¹
(Universiti Teknologi MARA, Perak Branch, Malaysia)

Mohd Nafis Saad²
(Universiti Teknologi MARA, Perak Branch, Malaysia)

EXPLORING THE ARTISTRY OF *PENICILLIUM DIGITATUM*

a chapter by

NURSYUHADAH OTHMAN*, SYARIFAH AB RASHID, ROZ AZINUR CHE LAMIN & NUR 'AINUN MOKHTAR

Faculty of Pharmacy, Universiti Teknologi MARA, Cawangan Pulau Pinang, Kampus Bertam 13200 Kepala Batas, Pulau Pinang,
School of Biological Sciences, Universiti Sains Malaysia, 11800 Minden Pulau Pinang,
syu3010@gmail.com*

Introduction to *Penicillium* sp.

The discovery of penicillin as an antimicrobial agent derived from *Penicillium* sp. by Alexander Fleming opens has resulted in the salvation of millions of lives. The unexpected discovery of 'mould juice' penicillin was found effective to combat the gram-negative bacteria as he mentioned;

"When I woke up just after dawn on September 28, 1928, I certainly didn't plan to revolutionise all medicine by discovering the world's first antibiotic, or bacteria killer. But I suppose that was exactly what I did" (Tan & Tatsumura, 2015).

This discovery has created the opportunities for the researcher to enhance the development of the antimicrobial agents derived from the fungus, and to date, *Penicillium* sp. is utilised in numerous biotechnological applications.

Penicillium digitatum, a species belonging to the genus *Penicillium*, is one of the pathogens that infects around 90% of citrus fruits, leading to crop losses (Yao et al., 2023). Despite the toxicity effect of the *Penicillium digitatum*, this fungus had many potentials in biotechnology and medicine research. This chapter presents the morphology of *Penicillium digitatum*. Moreover, a brief discussion on the biotechnological and medicinal applications of *Penicillium digitatum* will be briefly discussed at the end of this chapter.

Morphology and structure

Penicillium digitatum is a mesophilic fungus (grows best at moderate temperatures), with a temperature range from 6°C to 37°C with optimum growth at 24°C (Lin et al., 2020).

The images of *Penicillium digitatum* depicted in this article were taken at various magnifications that showcase intricate details, providing a visual

journey into the hidden world of this citrus green mold. Figure 1 shows the morphology of *Penicillium digitatum* that was grown in a potato dextrose agar plate. *Penicillium digitatum* is also known as green-mold as it produces a velvety, olive-coloured surrounded by a white mycelium.

Figure 2 further shows the microscopic image of *Penicillium digitatum*. Under light microscope, the arrangement of brush-like *Penicillium digitatum* could be observed. *Penicillium digitatum* demonstrates a filamentous vegetative growth pattern, with thin, septate hyphae. *P. digitatum* that reproduces asexually by producing asexual spores or conidia that arise from either aerial hyphae or network of hyphae (Lin et al., 2020). Conidiophore is able to divide into two (biverticillate) or three (terverticillate) branches. Metulae are located at the end of each rami. The conidia exist as a smooth and oval shaped (Lin et al., 2020).

The images of *Penicillium digitatum* were also captured using scanning electron microscope as shown in Figures 3 and 4. Figure 3 shows the growth of *Penicillium digitatum* in a colony. While focusing on the higher magnification as shown in Figure 4, the single *Penicillium digitatum* was captured and shows the similar image as described previously.



Figure 1: *Penicillium digitatum* on the potato dextrose agar.

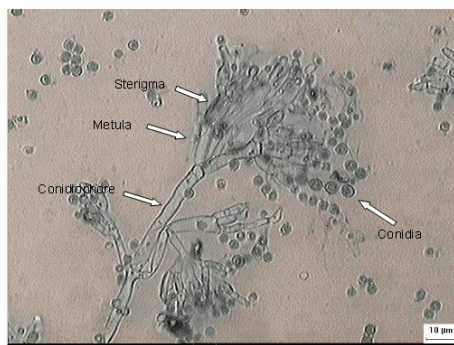


Figure 2: *Penicillium digitatum* on the potato dextrose agar under 400x magnification.

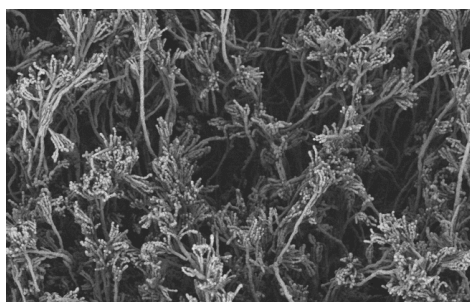


Figure 3: A colony of *Penicillium digitatum* viewed under scanning electron microscope with 310x magnification

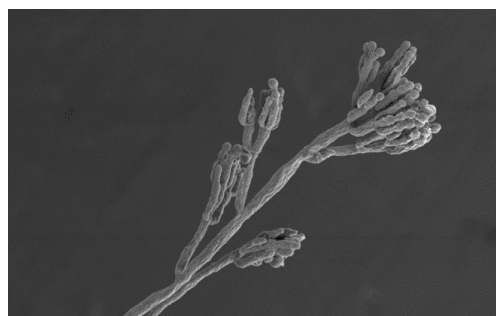


Figure 4: Focused image of *Penicillium digitatum* under scanning electron microscope with 1000 x magnification.

Biotechnological and Medicinal Applications

Beyond its role as a pathogen, *Penicillium digitatum* is a rich source of enzymes with diverse applications in biotechnology which offers insights into novel biocatalysts and bioprocesses, fostering sustainable practices in various industrial sectors (Onofre et al., 2016). The unique

chemical compounds synthesized by *Penicillium digitatum* may be beneficial in combating fungal infection and, opening new potentials for drug discovery in the realm of infectious diseases (Tran et al., 2022).

Conclusion

In summary, from its ancient mentions in historical texts to its pivotal role in Alexander Fleming's ground-breaking work, *Penicillium digitatum* has evolved from a mere natural inhabitant to a symbol of scientific achievement and a life-saving medical tool. The pictures enhance our understanding of the intricate details that define the morphology and structure of *Penicillium digitatum*. Moreover, *Penicillium digitatum* emerges as a valuable resource in biotechnology and medicine which illustrates the dynamic interplay between the microscopic world of *Penicillium* sp. and the broader landscape of scientific, industrial, and medical advancements.

References

- Lin, S. H., Luo, P., Yuan, E., Zhu, X., Zhang, B., & Wu, X. (2020). Physiological and Proteomic analysis of *Penicillium Digitatum* in response to X33 antifungal extract treatment. *Frontiers in Microbiology*, 11(November), 1–13. <https://doi.org/10.3389/fmicb.2020.584331>
- Onofre, S. S., Abatti, D., Refosco, D., Tessaro, A. A., Pnofre, J. A. B., & Tessaro, A. B. (2016). Characterization of α -amylase produced by the endophytic strain of *Penicillium Digitatum* in solid state fermentation (SSF) and submerged fermentation (SMF). *African Journal of Biotechnology*, 15(28), 1511–1519.
- Tan, S. Y., & Tatsumura, Y. (2015). Alexander Fleming (1881–1955): Discoverer of penicillin. *Singapore Medical Journal*, 56(7), 366–367. <https://doi.org/10.11622/smedj.2015105>
- Tran, H. M., Le, D. H., Nguyen, V. A. T., Vu, T. X., Thanh, N. T. K., Giang, D. H., Dat, N. T., Pham, H. T., Muller, M., Nguyen, H. Q., & Tran, V. T. (2022). *Penicillium Digitatum* as a Model Fungus for Detecting Antifungal Activity of Botanicals: An Evaluation on Vietnamese Medicinal Plant Extracts. *Journal of Fungi*, 8(9), 1–15. <https://doi.org/10.3390/jof8090956>

Yao, Z., Cheng, F., Ming, T., Sun, C., Ran, Q., Zhang, C., Shen, C., Zhang, R., & Peng, C. (2023). *Eriobotrya japonica* (Thunb.) Lindl leaves: Reviewing their specialized metabolites and pharmacology. *Biochemical Systematics and Ecology*, 110, 104707. <https://doi.org/https://doi.org/10.1016/j.bse.2023.104707>

ART
INTEGRATED
MEDIA PART I

arte

Art and Expression

eISSN 2805-5071



9 772805 507008