

THE FIRST DISCOVERY OF THE BIOLUMINESCENT MUSHROOM AND RESEARCH ON BIOLOGY OF THE NEW FUNGI: *OMPHALOTUS AF.ILLUDENT*

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ABSTRACT

Bioluminescence has great popular appeal for its great applied potentiality. Bioluminescence of fungi is recently researched and the researches of bioluminescence of mushroom is modern project in the world. There isn't any research of bioluminescent fungi in VietNam. In this study, we collected a bioluminescent fungi in the tropical forest in East – South VietNam and indentified it taxonomically. Its name is *Omphalotus af. Illudent*. Its characteristic is very different from the other luminescent mushroom. In fact, not only the whole body of it but also its spore emits light. Simultaneously, we applied to taxonomic approach in identifying shape, measure, colour, structure of pileus, hymenium, spores and then investigated the effect of temprature, light, pH and the nutrient elements on mycelial growth, its luminescence (its capability to emit light), culture of natural bioluminescent fungi. Understanding of the effect of culture conditions on mycelial growth and researching on the mechanism of its bioluminescence is necessary for the further applications of bioluminescent fungi as biosensor.

I. PREFACE

Besides bioluminescence of firefly and jelly-fish ...Many of the luminescent systems of mushroom have been recently interested in by the scientist in the world. There a few strains of mushroom having ability to emit light at each part of their body. Especially, the mushroom we are interested in is very different from other luminescent mushroom. It is able to emit light from its whole body (pileus, gill, stem, spores). It is necessary that we research on this mushroom further.

Its characteristic in emitting light continuously and intensity of its luminosity is much stronger than the other luminescent organisms do. It is a predominant characteristic of it. It is the important advantage for the scientific applications on determining ecological poisonousness in environment. The studies on bioluminescence in the world (in Scotland) show that the luminescent fungi play a important role as biosensor.

There are 4 kinds of bioluminescent well-known mushroom in the world. The best spreaded mushroom such as *Armillaria mellea*, *Mycena citricolor*, *Panellus stipticus*, *Omphalotus olearius*. Recently, we have isolated and classified a new mushroom and its taxonomic name is *Omphalotus af.illudent* to complement a new strain or a new lux gen source into bioluminescent mushroom collection of Mycetology in the world.

II. OBJECT AND CLASSIFYING METHOD

1. **Object**: a luminescent mushroom at decayed rubber.
 - Collect fruitbody_materials for studying.
 - Describe shape for classifying
 - Isolate and keep breed for studying.
2. **Classify method**

2.1 Isolate

Among fruitbody collected, we should choose the fresh and tender fruitbody, sterilize outside of it with alcohol 70°. After cutting fruitbody open with bistoury to share mushroom into two parts, we pick a piece of tissue up from its stem to transplant into the nutrient media (PGA) and incubation it in optimal temperature. All of manipulation and tools for separating this mushroom should be kept in pure condition around spirit lamp.

2.2 Classify method

Depend on characteristic of pileus, gill and spore in shape, size, color, structure...We can identify taxonomically:

- + Observe the outside form of fruitbody.
- + Observe the innerlength form to understand the way which carpophore and gill attach to stem, structure of stem.
- + Observe the operated form of cross cut gill under microscope in magnitude 100 (X10) to 400 (X40).
- + Observe the shape, size of spore under microscope magnitude 400 (X40).

The way to get spore: Choose a young fruitbody, excise its base and share into two part. One part cover on a white sterilized paper and the other cover on black sterilized paper, then put sterilized bercher on them. After 12 hours duration, we observe colour of spore on each paper. Depend on the key of taxonomy, **Jean Marie Polese (2000)[1]** to classify this mushroom.

- + Observe the luminosity of its pileus, filament and spore.

III. RERULT – DISCUSS

1. Classification

1.1 Outside form

- Carpophore in funnel form, curved top, white color, tender, diameter 2,5 – 5cm.
- Characteristic of stem:round, short, no collar, length 7-9cm.



Fig 2: gill and fruitbody

1.2 Observe the innerlength form to understand the way which carpophore and gill attach to stem, structure of stem.

- Cap connect to stem make V shape.
- Round and short stem. Stem has no collar. Length 7- 9cm.
- Gill is large and lengthen to its stem. Its width 0,20- 0,25cm. Each centimet has 40- 50 gills.
- Spore is the same egg, white colour, diameter 1,8- 2 x 1,2- 1,3 μm . In the dark, it is able to emit light in its whole body (pileus, stem, gill, spore).

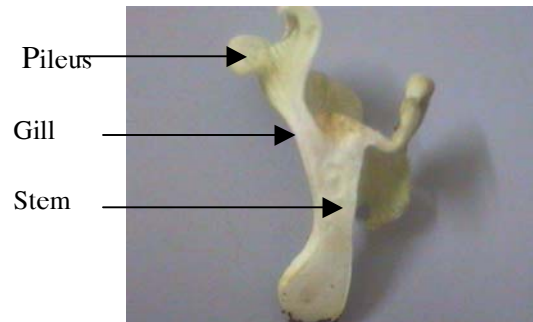


Fig 3: Cross cut mushroom

1.3 Observe the operated form of cross cut gill under microscope in magnitude 100 (X10) và 400 (X40).

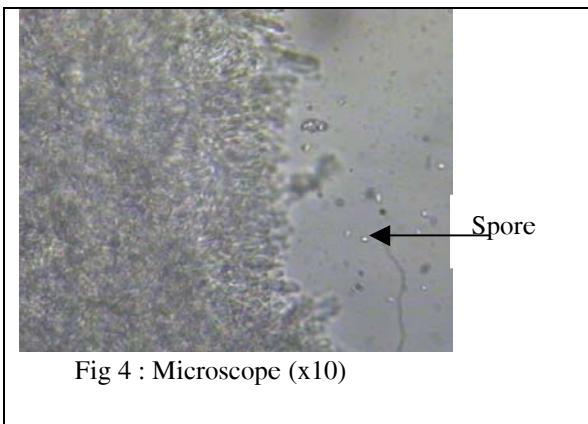


Fig 4 : Microscope (x10)

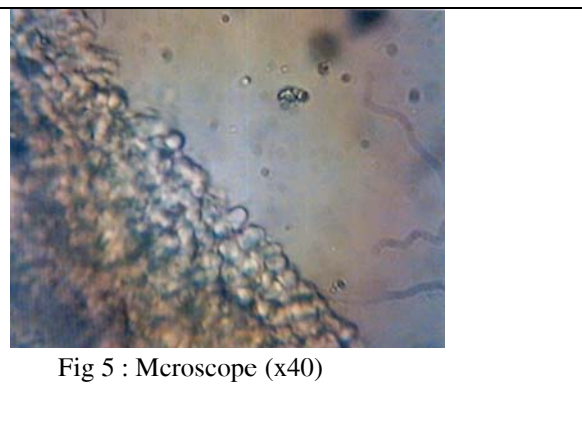


Fig 5 : Mcroscope (x40)

Observe the operated form (shape, size) of spore under microscope in magnitude 400 (X40). Result follow:

- Spore is the same egg, white.
- Diameter 1,8- 2 x 1,2- 1,3 μm .
- Dying its spore with iod solution, spore isn't dyed iod. In iod solution, it isn't changed into another colour.

1.4 Its capability in emitting light.

The mushroom collected has scientific name as *Omphalotus af. Illudents*. This mushroom is one kind of tropical mushroom, easy to grow, and give fruitbody in artificial conditions. It is able to emit light continuously in filament and fruitbody. The light it emitted is greenish. With its predominate characteristics, this should be used as the ideal material for further researching on bioluminescence.

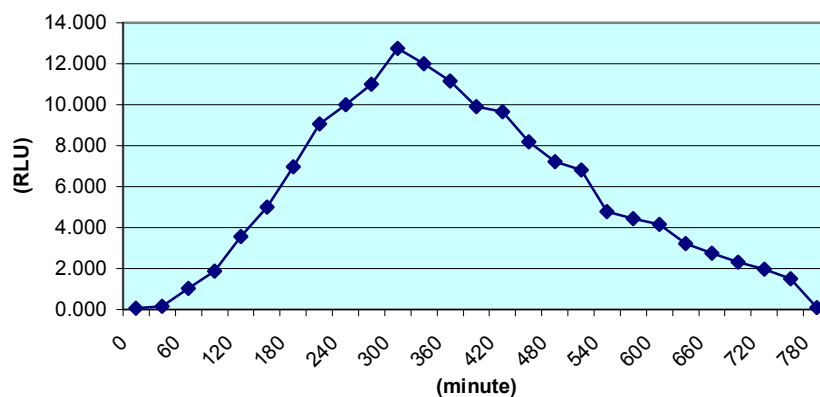
Its capability in emitting light:

- In the dark, it is able to emit light in filament form and in fruitbody form. All of its whole body (pileus, stem, gill, spore) emit light.
- The light it emits is phosphorescent green.

1.4.1 *Detecting luminosity of filament system*

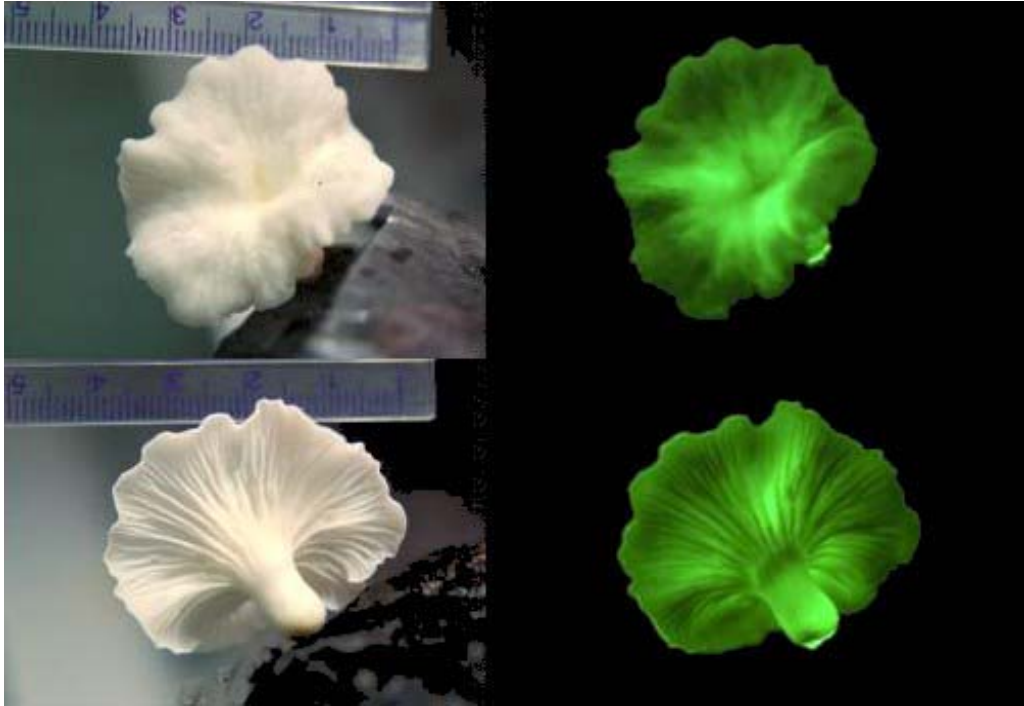
Detecting luminescent of filament in open air follow time duration. This is present at chart 5. About 5hours in open air, filament emit light maximum, after that luminosity gradually lessen until light extinguish at the 13rd hour.

Chart 5: Luminescent Intensity of filament follow time duration



1.4.2 *Detecting luminosity of fruitbody*

Although we are successful in growth this mushroom, we have no condition as well as equipments to examine cycle of its luminosity. Fig1 and 2 present fruitbody in day time and in night time (luminescent).



Fruit-body of luminescent mushroom
(*Omphalotus af. Illudent*) in daylight

Fruit-body of luminescent mushroom
(*Omphalotus af. Illudent*) in darkness

Depend on taxonomy of **Jean Marie Polese (2000)**^{1/}, the characteristic of its shape we can conclude:

Conclusion

- Specie: *Omphalotus af. Illudent*
- Family: Paxillaceae
- Order : Boletales
- Class : Basidiomycetes
- Phylum: Basidiomycotina

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