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Taxonomic Investigations on Korean Higher Fungi(III)

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韓國產 高等菌類의 分類學的 硏究(Ⅲ)

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著者등은 1976年 7月 17日부터 同年 11月 14日까지의 期間동안 서울과 경기도內 5개지역(서울 : 관악산, 경기도 : 수원, 광릉, 갈매리, 오산리)으로부터 100여種의 韓國產 高等菌類를 채집하였으며, 이중 31種을 分類 確認하였다. 分類된 31種中 9種 즉 ① *Scutellinia scutellata* (St. Amans) Lam ② *Peziza vesiculsa* Fr. ③ *Helvella atra* Fr. ④ *Neobulgaria pura* (Pers.) Petrak ⑤ *Trametes coccinea* Fr. ⑥ *Amanita melleiceps* Hongo ⑦ *Cotylidia burtina* (Pt.) Imaz. ⑧ *Sarcodontia copelandii* (Pat.) Imaz. *comb nov.* ⑨ *Sphaerobolus stellatus* Pers.은 한국 미기록種이며, 이외에 2種 ① *Lycoperdon D.M.C-2* 및 ② *Tuber melanosporum*도 잠정적으로 미기록種이라 사료된다.

한편 *Neobulgaria pira* Pers.가 속해있는 科인 *Helotiaceae*와 *Sphaerobolus stellatus* Pers.가 속해있는 科인 *Sphaerobolaceae*는 各各 한국 미기록科이다. 이에 저자등은 이들에게 신칭을 붙여 各各의 外部형태와 현미경적 특징에 대하여 기술하고, 이들의 사진과 함께 보고 하는 바이다.

Introduction

Since Okada[1] made the first scientific description of 11 species of the *Polyporaceae* of Korea in 1932, many taxonomic studies have been made on higher fungi in Korea. However, it was only in 1959 that the first illustrated book of Korean mushrooms was published by Lee, Lee and Lim[2], and it was in 1972 that Kim(one of the authors) and Lim reported a list of 386 recorded species of higher fungi in Korea, of which 30 species were *Ascomycetes*. This list was the first complete one which contained all the recorded species of Korean higher fungi. In the same year, Lee and Jeong reported another list of 386 species of Korean Basidiomycetes. After these two lists had been reported, Kim(one of the authors) and Lim added two species, and Lee and Hong added three and six species, respectively, in 1973. Recently Lee and Cho added nine species and Kim, Kim, Park and Hongo added 37 species. These two lists and all the reports thereafter show that less than 500 species of higher fungi have been found and reported in Korea.

However, considering the fact that more than 23,000 species of higher fungi have been reported throughout the world and more than 5,000 species of higher fungi have been reported in Japan, it can be presumed that there remain many unrecorded species of higher fungi in Korea, and this led us to undertake the investigations on Korean higher fungi.

Experimental

The higher fungi growing widely in Korea were collected at five locations in Seoul and the Gyeong Gi Province(Seoul: Mt. Gwan-ak; Gyeong Gi Province: Suwon, Gwang-neung, Osan-ri, Gal-mai-ri) during the period of four months from July 17 to November 14, 1976. Of more than 100 species collected, 31 species were carefully examined and identified, comparing with those described in the references. Most of these species were photographed using the close-up rings when they were fresh and the spores were also photographed through a microscope. Some other microscopic structures were photographed when necessary. Most

of them were dried at room temperature to make specimens and the rests were submerged in EtOH and are stored at the Department of Microbial Chemistry, College of Pharmacy, Seoul National University.

List of the Identified Species.

Class Ascomycetes

Family Pezizaceae(주발버섯과)

① *Scutellinia scutellata* (St. Amans) Lam.(신칭 : 꼬마접시버섯)

② *Peziza vesiculosa* Fr.(신칭 : 갈래나팔주발버섯)

Family Helvellaceae (안장버섯과)

③ *Helvella atra* Fr.(신칭 : 꼬마안장버섯)

Family Helotiaceae(신칭 : 못버섯과)

④ *Neobulgaria pura* (Pers.) Petrak.(신칭 : 수정밥풀버섯)

Class Basidiomycetes

Subclass Heterobasidiae

Order Auriculariales

Family Auriculariaceae

⑤ *Auricularia auriculajudae* (Fr.)Quel.(목이)

Order Dacryomycetales

Family Dacryomycetaceae(붉은목이과)

⑥ *Guepinia spathularia* (Schw.)Fr.(혀버섯)

Subclass Homobasidiae

Order Aphyllophorales

Family Polyporaceae(구멍장이버섯科)

⑦ *Ganoderma lucidum* (Fr.) Karst(불노초)

⑧ *Trametes coccinea* Fr.(신칭 : 빨간주걱버섯)

Family Mucronoporaceae (겨우살이버섯과)

⑨ *Coltricia cinnamonea* (Fr.)Murr. (톱니겨우살이버섯)

Order Agaricales

Family Tricholomataceae(송이버섯科)

⑩ *Laccaria amethystea* (Merat.)Murr.(졸각버섯)

⑪ *Pleurotus ostreatus* (Fr.)Quel. (느타리)

⑫ *Schizophyllum commune* Fr.(치마버섯)

Family Amanitaceae 광대버섯科

⑬ *Amanita melleiceps* Hongo (신칭 : 노랑광대버섯)

⑭ *Amanita caesarea* (Fr.)Quel.(달걀버섯)

Family Coprinaceae(먹물버섯科)

⑮ *Coprinus atramentarius* (Fr.) Fr.(먹물버섯)

⑯ *Coprinus comatus* (Fr.) S.F. Gray(솜먹물버섯)

⑰ *Coprinus micaceus* (Fr.) Fr.

Family Cortinariaceae(끈적버섯과)

⑱ *Inocybe rimosa*(Fr.) Quél.

Family Strobilomyceae(귀신그물버섯科)

⑲ *Strobilomyces floccopus* (Fr.)Karst (귀신그물버섯)

Family Corticiaceae(꽃송이버섯과)

⑳ *Cotylidia burtina* (Pt.) Imaz.(신칭 : 종이비늘버섯)

Family Hydnaceae(껍질버섯科)

㉑ *Sarcodontia copelandii* (Pat.) Imaz. *comb. nov.* (신칭 : 꺼꾸로 바늘버섯)

Order Gastromycetales

Family Sphaerobolaceae (신칭 : 별꽃버섯과)

㉒ *Sphaerobolus stellatus* Pers. (신칭 : 꼬마노랑별꽃버섯)

Family Phallaceae

㉓ *Phallus impudicus* Pers.(말뚝버섯)

㉔ *Phallus regulosus* (Fisch.) Kunt.(붉은 말뚝버섯)

Family Clathraceae. (바구니버섯과)

㉕ *Linderia bicolumnata* Lloyd(계발톱버섯)

Family Lycoperdaceae(말불버섯과)

㉖ *Lycoperdon D.M.C*-2(신칭 : 곰보진흙구슬버섯)

Family Nidulariaceae(찻잔버섯과)

㉗ *Crucibulum vulgare* Tul.(찻잔버섯)

Family Sclerodermataceae (어리알버섯과)

㉘ *Scleroderma cepa* Pers.(양파버섯)

㉙ *Scleroderma verrucosum* (Bull.) Pers. (가시어리알버섯)

Family Colostomataceae(연지버섯과)

㉚ *Astraeus hygrometricus* (Pers.) Morg. (먼지바섯).

㉛ *Tuber melanosporum*(신칭 : 진흙덩이버섯)

The Unrecorded Species

1) *Scutellinia scutellata* (St. Amans) Lam.
(신칭 : 꼬마접시버섯)

Imazeki, R. *et al.*: *Coloured Illustrations of Fungi of Japan*, Vol. Ⅱ, p. 127(1968); Imazeki, R. *et al.*: *Common Fungi of Japan in Color*, p. 21(1975); Kawamura, S.: *Icones of Japanese Fungi*, Vol. Ⅶ, p. 750(1970); Rinaldi, A. and Tyndalo, V.: *The Com-*

plete Book of Mushrooms, p.235(1974).

Carpophore, 0.3~0.8cm. broad, watch-glass shaped, inside luminous scarlet to red orange, outside yellowish to reddish white, margin and the outside covered with brown pubeses.

The pubeses 0.5~2mm long, pointed like needles, thick dark-brown colored wall.

Flesh, yellowish white, easily broken to minute pieces when pressed under a slide glass. Spores 16~18μ×11~12μ, white, elliptical, smooth, with small projections all over the surface and several (three to seven) oil drops inside. Ascus 200~230×12~14μ, eight spored, cylindric. Paraphysis, 3.5~5.0μ wide, clavate.

Habitat: gregariously on moist soil rich in organic substances

Locality: K.S. CHUNG's house at Gal-mai-ri, Gyeong-gi-do.

Date of Collection: August. 10 and 12, 1976.

2) *Peziza vesiculosa* FR.(신칭 : 갈래나팔주발버섯)

IMAZEKI, R. *et al.: Coloured Illustrations of Fungi of Japan*, Vol. I. p. 124(1969).

Carpophore 6~9cm high, 8~10cm broad, poly-funnel-shaped, or trumpet-shaped with a flaring, rather thin margin, outside yellowish white, with dark brown base, inside brown to ochraceous brown. Flesh yellowish white, tough and corky.

Hyphae specially arranged to show the toughress of the flesh. Spores and asci were not observed. Pores about 20 per 1mm.

Habitat: On the ground

Locality : K.S. CHUNG's house at Gal-mai-ri, Gyeong-gi-do

Date of Collection: September 15, 1976.

3) *Helvella atra* FR.(신칭 : 꼬마안장버섯)

IAMZEKI, R. *et al.: Coloured Illustrations of Fungi of Japan*, Vol. I, p. 127(1969).

Pileus 1~2cm broad, 1~1.5mm thick, more or less saddle-shaped, smooth, with a free margin, somewhat hygrohhanous, ochraceous gray to blackish when moist, black when dry (inside grayish pale yellow to somewhat creamy). Stipe pale yellowish gray to pale yellowish white, 1.2~2.5cm×(2~4×1~2)mm, flat near the base, rather cylindrical near the pileus, hollow, with small projections all over the stipe except the base which is white and smooth. Flesh white, easily torn to pieces when pressed between slide-glasses. Asci cylindrical, eight-spored, 250~350×16~18μ. Ascospores ellipsoid, 18~21×72~14μ, double walled, smooth, white.

Habitat: gregarious in woods (on the ground near the needle-leaf-tree).

Locality: Gwang-neung, Gyeong-gi-do

Date of Collection: August 3, 1976.

4) *Neobulgaria pura* (PERS.) PETRAK.

(신칭 : 수정밤풀버섯)

IMAZEKI, R. *et al.: Common Fungi of Japan in Color*, p. 23(1975).

Carpophore somewhat transparent(especially when young), pinkish to slightly purple when young, rather ochraceous in mature, 0.3~1.5cm broad, half-sphere-shaped. Flesh, easily torn to pieces when pressed between slide-glasses. Asci, 60~80×7~8μ, eight-spored, somewhat clavate. Paraphysis clavate, 1.5~2μ thick. Spores elliptical, 7~9×3.5~4μ, containing two oil drops inside, white, smooth, nonamyloid.

Habitat: on rotten wood.

Locality: K.S. CHUNG's house at Gal-mai-ri, Gyeong-gi-do.

Date of Collection: November 14, 1976.

8) *Trametes coccinea* FR.(신칭 : 빨간주걱버섯)

IMAZ., R. *et al.: Common Fungi of Japan in Color*, p. 44(1975).

Carpophore scarlet, 1.5~2cm broad, rather flat. Flesh, tough, corky. Under part rather light scarlet. Spores not observed. Pores 6~8 per 1mm.

Habitat: gregariously attached to the rotten wood.

Locality: Gal-mai-ri. Gyeong-gi-do.

Date of Collection: August, 1976.

12) *Amanita melleiceps* HONGO(신칭 : 노랑광대버섯)

IMAZEKI, R. *et al.: Common Fungi of Japan in Color*, p. 82(1975).

Pileus 3~6cm, convex then expanding, striate, yellow margined somewhat viscid, pale straw-yellow to whitish yellow in the center, usually bearing white volval fragments, ochraceous to brownish when dry. Flesh, thin, white. Lamellae free, rather crowded, creamy. Stipe 3~7cm×0.5~1cm, hollow. Spores

somewhat ellipsoid or ovoid, white, smooth, 7.5~11×5.5~8μ, nonamyloid, containing a large oil drop.

Habitat: Scattered in woods.

Locality: Su-won, Gyeong-gi-do

Date of Collection: July 24, 1976.

20) *Cotylidia burtina* (Pk.)Imaz.

(신칭 : 종이비늘버섯)

Imazeki, R. *et al.: Coloured Illustrations of Fungi of Japan*, Vol. II, p. 123(1968)

Imazeki, R. *et al.: Common Fungi of Japan in Color*, p. 36(1975).

Pileus 0.5~2cm, pale brownish ochraceous to yellowish or whitish ochraceous, having silky luster; depressed or somewhat cup-shaped (rarely dumbbell shaped) with radial and concentrical, dark brown to brownish figure and lobbed, uneven(teeth-shaped) margin, and with radial grooves, usually attached to each other to make one broad, but to be easily distinguished, pileus. Flesh, white, about 0.5mm thin, leathery, easily torn radially but not concentrically. No lamellae. Under part of the pileus smooth, wrinkled, pale yellowish white to pale ochraceous white (creamy). Stipe concentric or excentric, 0.5~1.5cm high, 0.1~0.2cm thick, cylindrical when moist, rather flat when dry, dark brown or brownish ochraceous, tough, sometimes branched. Spores globose, white, smooth, 2.5~3.5μ.

Habitat: gregariously on the ground in woods.

Locality: O-san-ri, Gwan-ak Mt.

Date of Collection: August 21 and 23, September 8, 1976.

21) *Sarcodontia copelandii*(Pat.) Imazeki *comb. nov.*

(신칭 : 꺼꾸로바늘버섯)

Imazeki, R. *et al.: Coloured Illustrations of Fungi of Japan*, Vol. Ⅱ, p. 127(1968).

Plant attached broadly to a roten wood covering almost all the surface of the stump, with crowded needle-shaped or somewhat spatulate projections (0.5~1.2cm long), which are pointing downwards; white to creamy when young, somewhat ochraceous(especially in case of projection) in age. Flesh, leathery to corky (It's very difficult to tear it from the wood with pincers), white to creamy, 1~3mm thick. No cystidia. Spores globose, white, nonamyloid, smooth, with an oil drop inside 5~6.5μ.

Habitat: attached to a rotten stump.

Locality: K.S. Chung's house at Gal-mai-ri, Gyeong-gi-do.

Date of Collection: September 2, 1976.

22) *Sphaerobulus stellatus* Pers.

(신칭 : 꼬마노랑별꽃버섯)

Imazeki, R. *et al.: Common Fungi of Japan in Color*, p. 124(1975); Rinaldi, A. and Tyndalo, V.: *The Complete Book of Mushrooms*, p.227(1974).

Globose, 1.5~2.5mm, yellow; then it opens, starlike, showing a small, protruding, yellow (soon becoming cinereous), shining, beautiful sphere (1~2mm in diameter) that is flung away after a few hours remaining cinereous, starlike, out-shell. Spores, white, 9~11×6~7μ thick-walled, somewhat angular to ovoid or ellipsoid.

Remark: This species is small and its color changes from yellow to cinereous so rapidly, and the sphere flings away so quickly (a few hours after the opening of the outer-shell)that it is difficult to find it with yellow sphere. The authors found them when they just opened their outer-shells, but next morning it was found that most of them had only cinereous outer-shells.

Habitat: gregariously on a rotten wood.

Locality: K.S. Chung's house at Gal-mai.-ri, Gyeong-gi-do.

Date of Collection: September 8 and 9, 1976.

26) *Lycoperdon D.M.C*-2(신칭 : 곰보진흙구슬버섯)

Plant globose, 0.3~0.6cm in diameter, brown to somewhat reddish brown with minute verrucae all over the surface, somewhat elastic. Flesh, easily broken, giving the feeling of a lump of wet clay; ochraceous brown when moist, turning into a somewhat grayish ochraceous brown powder (the spores) when dry. Spore deposits grayish ochraceous. Spores globose, echinulate, 6.0~6.5μ, pale yellowish.

Habitat: gregarious on a stump or a rotten wood.

Locality: Su-won, Gal-mai-ri, Gyeong-gi-do.

Date of Collection: July 24, and Aug. 21, 1976.

Discussion: This species is provisionally considered to be an unrecorded species to Korea. It was observed that the wood has become scarlet

when the authors discovered one layer of the wood.

31) *Tuber melanosporum* (신청 : 진흙덩이버섯)

RINALDI, A. *et al.*: *The Complete Book of Mushrooms*, p. 240(1974).

Plant 1.5~3cm in diameter compressed globose with flat, papery, white to pale ochraceous base which is attached to the rotten part of on oak tree or on the stump of a poplar; dark brown to dark ochraceous or blackish brown with somewhat uneven surface. Flesh, same colored as the outer-layer at maturity, somewhat lighter coloured when young; easily broken as if a lump of clay which is not completely dry; turning into a dark blackish brown powder (the spores). Spores pale yellowish brown, echinulate;; 6.5~7.5μ, globose, when moist; 8.5~10×5~6μ, shaped like a rugby-ball when dry.

Discussion: This species is provisionally considered to be *Tuber melanosporum*, unrecorded species to Korea, consulting the reference. However, the authors can not make sure, for lack of other more detailed references.

Habitat: on the rotten wood.

Locality: K.S. CHUNG's house at Gal-mai-ri, Gyeong-gi-do.

Date of Collection: September 9 and 24, 1976.

Conclusion

Thirty-one species of the more than 100 mushrooms collected were identified and it was recognized that the following nine species were new to Korea, ① *Scutellinia scutellata* (St. AMANS) LAM. ② *Peziza vesiculosa* FR. ③ *Helvella atra* FR. ④ *Neovulgaria pura* (PERS.) PETRAK ⑤ *Trametes coccinea* FR. ⑥ *Amanita melleiceps* HONGO ⑦ *Cotylidia burtina* (PK.) IMAZ. ⑧ *Sarcodontia copelandii* (PAT) IMAZ. *comb. nov.* ⑨ *Shaerobolus stellatus* PERS. Other two species, *Lycoperdon D.M.C-2* and *Tuber melanosporum*, are provisionally considered to be new species to Korea. And the two families, *Helotiaceae* and *Sphaerobolaceae*, were also recognized to be new to Korea. (1976. 7.30 접수)

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PLATE A

Fig. 1.

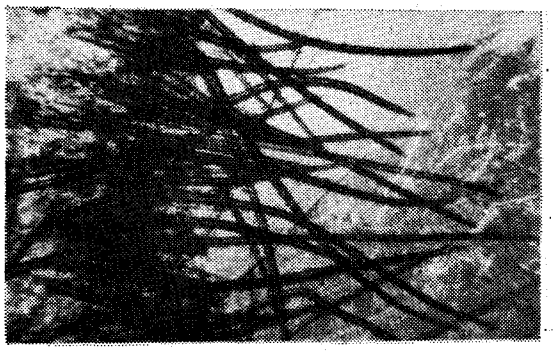


Fig. 2.

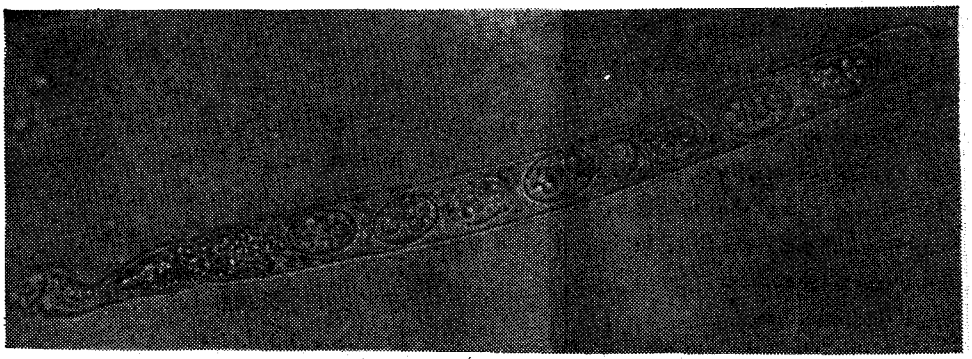


Fig. 3.

Fig. 4.

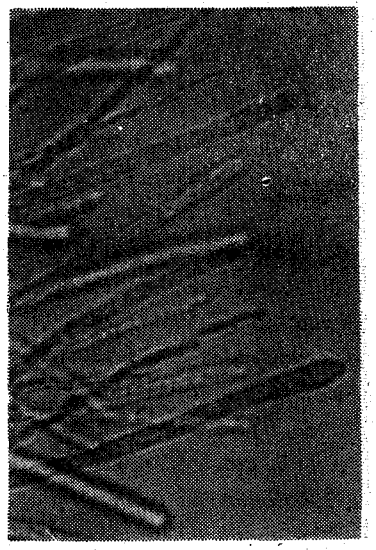
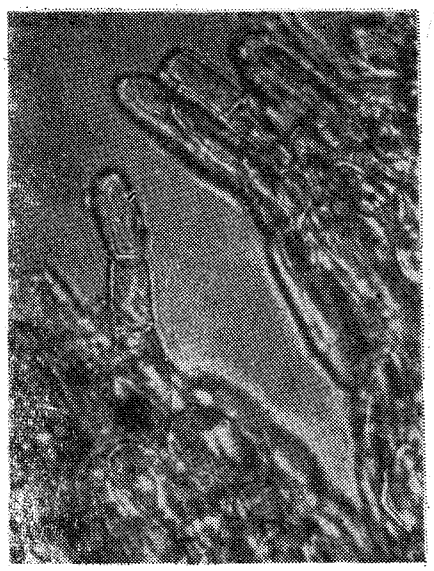


Fig. 6.

Fig. 5.

PLATE B



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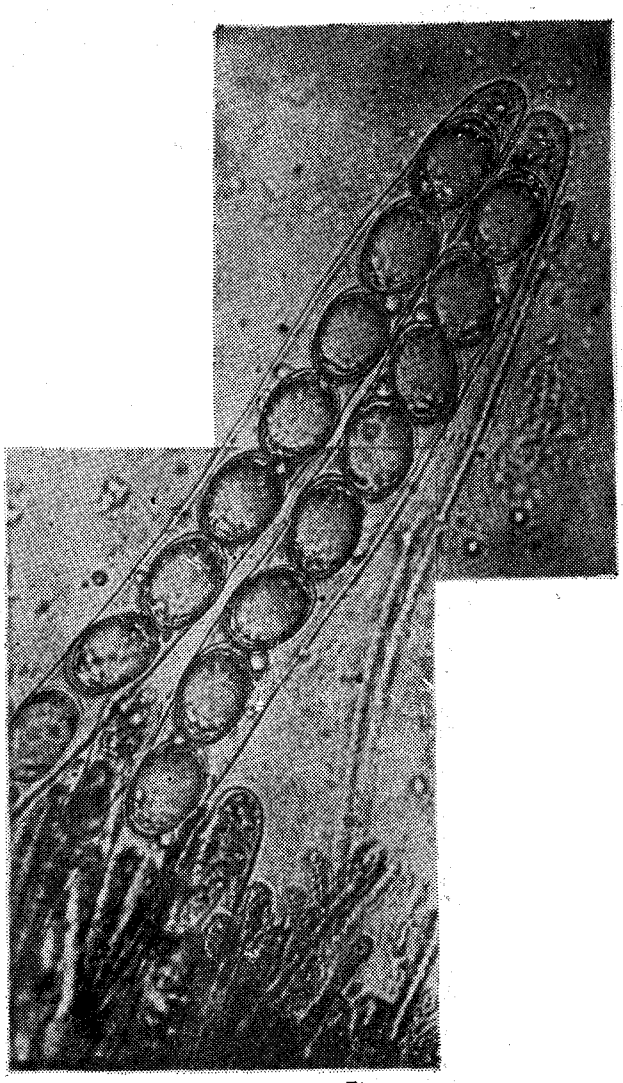


Fig. 9.

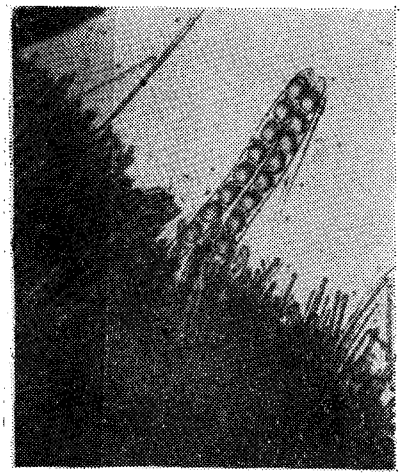


Fig. 8.

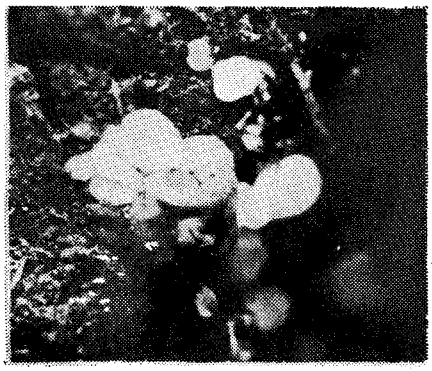


Fig. 10.

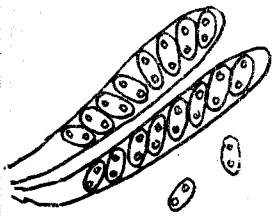


Fig. 11.

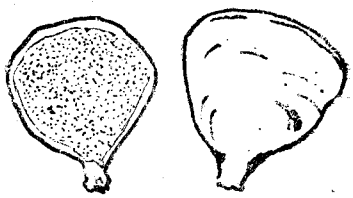


Fig. 12

PLATE C

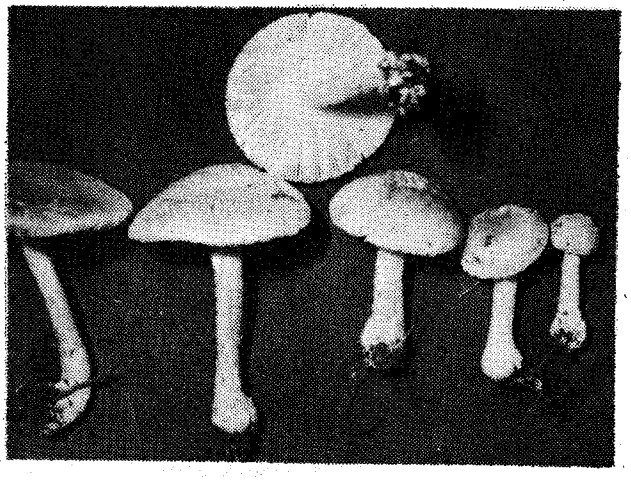


Fig. 13.

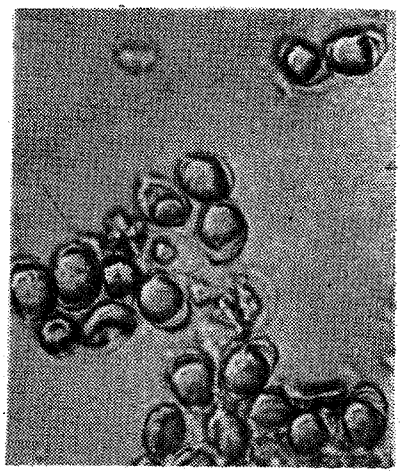


Fig. 14.

Fig. 15

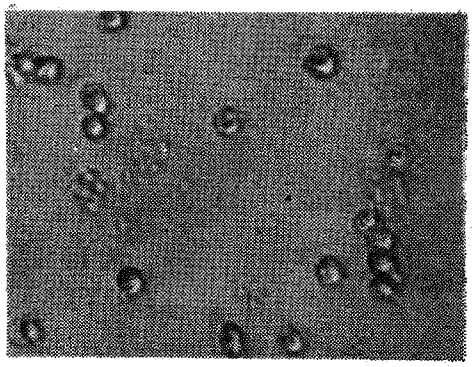
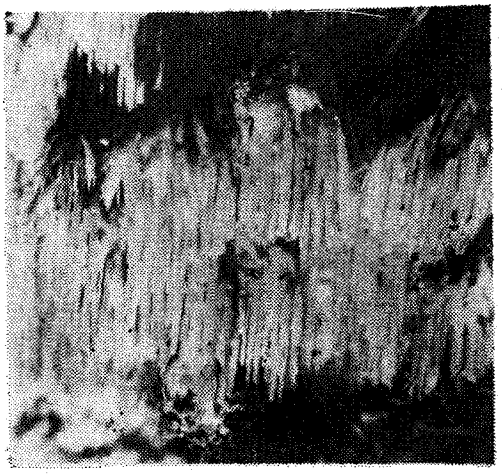


Fig. 16.



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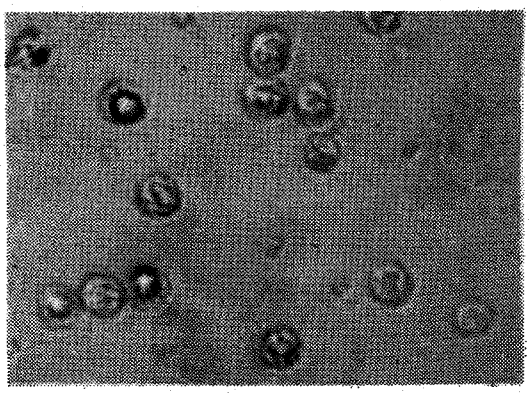


Fig. 18.

PLATE D

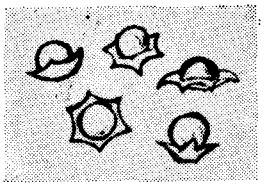


Fig. 19.

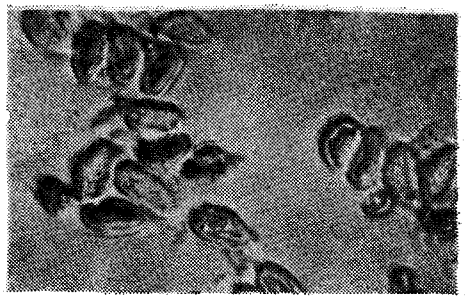
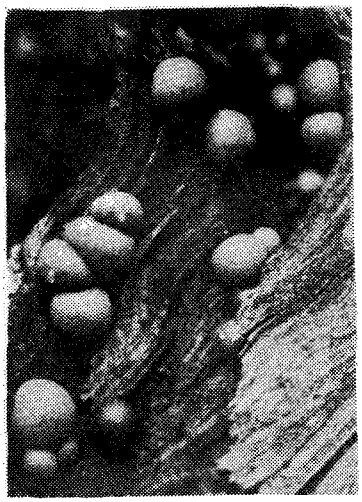


Fig. 20



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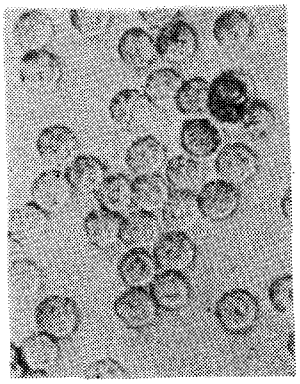

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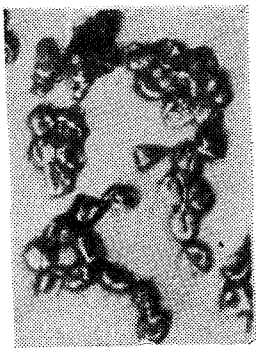

Fig. 23.

Fig. 24

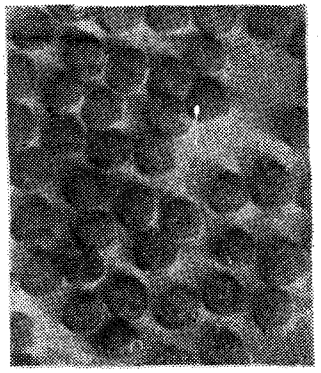

Fig. 25

Fig. 26.

Explanations of the Figures

Plate A. Figs. 1~3. *Scutellinia scutellata* 1) Carpophores(×2.5). 2)Pubeses.(×170). 3) Ascus and Spores. (×670).

Fig. 4. *Peziza vesiculosa.*

Figs. 5~9, *Helvella atra.* 5) Carpophores.

Plate B. 6) Hyphal ends from pileus. (×670).

7) Hyphal ends from stipe. (×670). 8) Asci and hyphal ends. (×170). 9) Asci and Spores. (×670).

Figs. 10~11. *Neobulgaria pura.* 10) Carpophores.(×2.0). 11) Asci with spores.(×500).

Fig. 12. *Trametes coccinea.*

Plate C. Figs. 13~14. *Amanita melleiceps.* 13) Carpophores. (×1/3). 14) Spores.(×900).

Figs. 15~16. *Cotylidia burtina.* 15) Carpophores. (×4/5). 16) Spores. (×900).

Figs. 17~18. *Sarcodontia copelandii.* 17) Carpophores. (×1.5). 18) Spores. (×900).

Plate D. Figs. 19~20. *Sphaerobolus stellatus.* 19) Carpophores. (×3). 20) Spores. (×900).

Figs 21~23. *Lycoperdon D.M.C.*-2. 21) Carpophores. (×1.3). 22) Spores (moist). (×900). 23) Spores (dry). (×900).

Figs. 24~26. *Tuber melanosporum.* 24) Carpophores(×0.44). 25) Spores (moist).(×900). 26) Spores (dry). (×900).