A STUDY OF CERTAIN MEMBERS OF THE SOUTH AFRICAN XYLARIACEAE, WITH REFERENCE TO THE USE OF CULTURAL CHARACTERS IN CLASSIFICATION.

A thesis submitted to Rhodes University
for the Degree of Master of Science

by

Philip M.D. Martin.

October, 1960.

TABLE OF CONTENTS.

(Species)	(Stromal)	(Cultural)
Hypoxylon ferrugineo-rufum.		
var. 1.	338B.	438, 439A&B, 440A.
var. 2.	-	439C, 440B.
Hypoxylon gilletianum.	258.	-
Hypoxylon haemotostroma.	328, 329, 340C&D, 341D&E.	417- 421, 454A&C.
Hypoxylon hypomiltum.	336.	433, 443, 444, 446.
Hypoxylon luridum.	330, 331, 332A, 333D.	422-7, 437A.
Hypoxylon mediterraneum.	67-9, 77E.	207, 210-6, 223F, 225D.
Hypoxylon merrillii.	61-3, 66A, 77C.	201-6, 208, 209A&B. 223D, 225B.
Hypoxylon michelianum.	239, 243, 257C.	263-271.
Hypoxylon microcarpum.	247-9, 257D.	272, 278-282.
Hypoxylon nummularium.	64, 65, 66B, 77D.	209C, 217-222, 223E.
Hypoxylon ochraceo-fulrum.	337, 338A, 341A.	441, 442,
Hypoxylon piceum.	334, 335.	434, 435, 437B, 445, 453C.
Hypoxylon plumbeum.	292, 293, 298A.	348-351, 357B, 453E.
Hypoxylon purpureum.	321, 322, 332B, 333E.	403-6, 437D.
Hypoxylon rubiginosum.	314-9, 320A, 333B.	391-401, 402C, 436, 453H.
Hypoxylon stygium.	244-6, 257B.	273-7, 290B.
Hypoxylon tenue.	325, 326, 327A, 341B.	407-411.
Hypoxylon truncatum.	251, 252, 254-6, 257E.	283, 286, 287, 291A.
Hypoxylon vividum.	339, 340A&B, 341F.	447-452, 453G.
Hypoxylon vogesiacum.	308-311,333A.	382-8, 402B, 453I.
Hypoxylon 2C.	323, 324, 327B, 341C.	412-6, 437C.
Hypoxylon 13A.	58, 59, 60A, 78D.	182-8, 193B, 223H.
Hypoxylon 18A.	294, 297C, 298C.	344-7, 357A.
Hypoxylon 18B.	295, 296, 297A&B, 298B.	352-6, 357C, 453D.
Hypoxylon 18D.	302, 306C, 307A.	368-370, 371A, 453A
Hypoxylon 18E.	304, 306A, 307B.	378-380, 381A&B.
Hypoxylon 18F.	301, 306B, 307E.	362-6, 368B&C.
Hypoxylon 18G.	-	428-432, 453F, 454D.
Hypoxylon 19.	299, 300, 305, 307D.	358-361, 402A.

(Species)	(Stromal)	(Cultural)
Hypoxylon 38.	312, 313, 333C.	389, 390.
Nummularia kalchbrennera.	74, 75, 76B, 78E.	223J, 225E, 226-231, 232B.
Nummularia succenturiata.	53, 54, 77B.	167-171, 172A&C, 223C.
Nummularia uni-apiculata.	55, 56, 76A, 78A.	190-2, 193A, 223G.
Penzigia berteri.	490B, 492, 493.	530-4, 541A&D, 560A.
Penzigia compuncta.	490C, 494-6.	521E, 535-540, 541E.
Penzigia discolor.	478, 479, 482, 483E.	511B, 517-520, 523.
Penzigia 1.	471, 483C.	497-501, 521A,522A&B.
Penzigia 2A.	472, 473, 480, 483B.	502, 503, 511C.
Penzigia 3.	476, 477, 483D.	512-6, 521C&D,522C&D.
Penzigia 4.	474, 475, 481, 483A.	504-510, 511A, 521B.
Rosellinia apiculata.	11-13, 14C.	79-83.
Rosellinia aquila.	24-28, 29A&B.	175-181.
Rosellinia corticalis.	7D, 19-21.	142-7, 148C.
Rosellinia mammoidea.	7C, 15-18.	131-141, 148A&B.
Rosellinia moroides.	8, 9, 14B.	100-103, 117B-D.
Rosellinia nitens.	250-253.	284, 288, 289, 290C&D, 291B.
Rosellinia obtusissima.	4, 5, 6B, 7B.	108-116, 117A, 224B.
Rosellinia protuberans.	1-3, 6A, 7A,	118-123.
Rosellinia pulveracea.	10, 14A.	124-130, 224A.
Rosellinia thelena.	23, 29C.	173, 174.
Rosellinia 3A.	234, 238, 257A,	259-262, 290A.
Xylaria apiculata.	548A, 549A.	-
Xylaria arbuscula.	543, 549A.	559C.
Xylaria castorea.	544, 549B.	554-7, 559A.
Xylaria fioriana.	542, 548B, 549E.	550-3, 558, 559B,560C.
Xylaria leprosa.	545-7, 549C.	-

Rosellinia, Hypoxylon (Endoxylon) and the Nummularium group.	Figs. 1 - 233.	Volume II, Part 1
Annulatum group.	Figs. 234 - 291.	Part 2
Rubiginosum group.	Figs. 292 - 454.	Part 2
Daldinia, Penzigia and Xylaria.	Figs. 455 - 560.	Part 3

Appendix III.

Tables and Graphs. (Part 3).

In order of appearance:-

Table I, A - D:	Proof that breadth is constant for different lengths of spore.
Table II:	Determination of correlation coefficient between breadth and length of spores of Hypoxylon mediterraneum.
Table III:	Calculation of χ^2 to show that the Growth Rate of Hypoxylon is approximately constant with advancing age.
Table IV:	Degree of significant difference between spore dimensions of the Rosellinia - Endoxylon - Nummularium group.
IVA - C:	Data and calculations.
IVD:	% spores per length group determined for certain species.
Table V:	Degree of significant difference between Growth Rates of the Rosellinia - Endoxylon - Nummularium group.
VA - D:	Data and calculations.
Table VI:	Degree of significant difference between spore dimensions of the Annulatum group of Hypoxylon.
VIA - C:	Data and calculations.
Table VII:	Degree of significant difference between Growth Rates of the Annulatum group of Hypoxylon.
VIIA - D:	Data and calculations.
Table VIII:	Degree of significant difference between spore dimensions of the Rubiginosum group of Hypoxylon.
VIIIA - C:	Data and calculations.

Table IX: Degree of significant difference between Growth Rates of the Rubiginosum group of Hypoxylon.

IXA - D: Data and calculations.

Table X: Degree of significant difference between spore dimensions of Daldinia concentrica and Daldinia eschscholzii.

Table XI: Degree of significant difference between spore dimensions of the Penzigia group, (including Hypoxylon deustum).

XIA - C: Data and calculations.

Table XII: Degree of significant difference between Growth Rates of the Penzigia group, (including Hypoxylon deustum).

XIIA - D: Data and calculations.

Graphs.

A: Growth Rates of 8 Hypoxylon species at 25°C.

Sporographs and Temperature - Growth Rate Curves:-

B - F: The Rosellinia - Endoxylon - Nummularium group.

G: The Annulatum group.

H - J: The Rubiginosum group.

K: Daldinia.

L: Penzigia.

Volume II, Part 1.

Appendix II.

Diagrams and Plates.

Figures 1 - 233 (*Rosellinia*, and the *Endoxylon* and *Nummularium* Species Groups).

Diagram A. The main stromal types in the Xylariaceae.

Explanation of Diagram A.

N.B. The diagrams are not drawn to scale.

Representation of tissues.

solid black	carbonous stromal tissue.
dotted	dark, uncarbonized brittle, stromal tissue.
dotted with pale grey shade	dark, corky stromal tissue.
white	white, fleshy stromal tissue.
pencil shading on exterior of stroma	persistent conidial layer forming an extra dark celled tissue.
cross-hatched	carbonous wall of perithecium.
single hatched	dark, uncarbonized wall of perithecium.
horizontal lines	cortex of host.
vertical lines	wood.

Diagrams:-

a. Typical Rosellinia Species, e.g. Rosellinia pulveracea.

b. Rosellinia with biperitheciate stroma, e.g. Rosellinia mammoidea.

c. Typical member of Endoxylon group of Hypoxylon e.g. Hypoxylon glomeratum.

Note essential similarity of these forms.

d. Typical member of the red group of Hypoxylon (Miller's group 1 with umbilicate ostioles). The stroma is practically homogeneous (with exceptions), and is brittle in texture, though a dense outer crust may be present.

e. Annulate group of Hypoxylon e.g. Hypoxylon truncatum, where stroma is entirely carbonous. Perithecia project through the stroma.

f. Nummularia: including those species transferred from Hypoxylon (Miller 1928)

g. Daldinia.

h. Penzigia - unspecialized type e.g. Penzigia discolor which is nearly sessile.

i. Penzigia - advanced type with distinct stipe, e.g. Penzigia Compuncta.

j. Xylaria fioriana showing sessile & stipitate types of stroma.

k. Typical Xylaria, e.g. Xylaria apiculata, with cylindric form and well developed stipe.

THE MAIN STROMAL TYPES IN THE XYLARIACEAE

DIAGRAM A

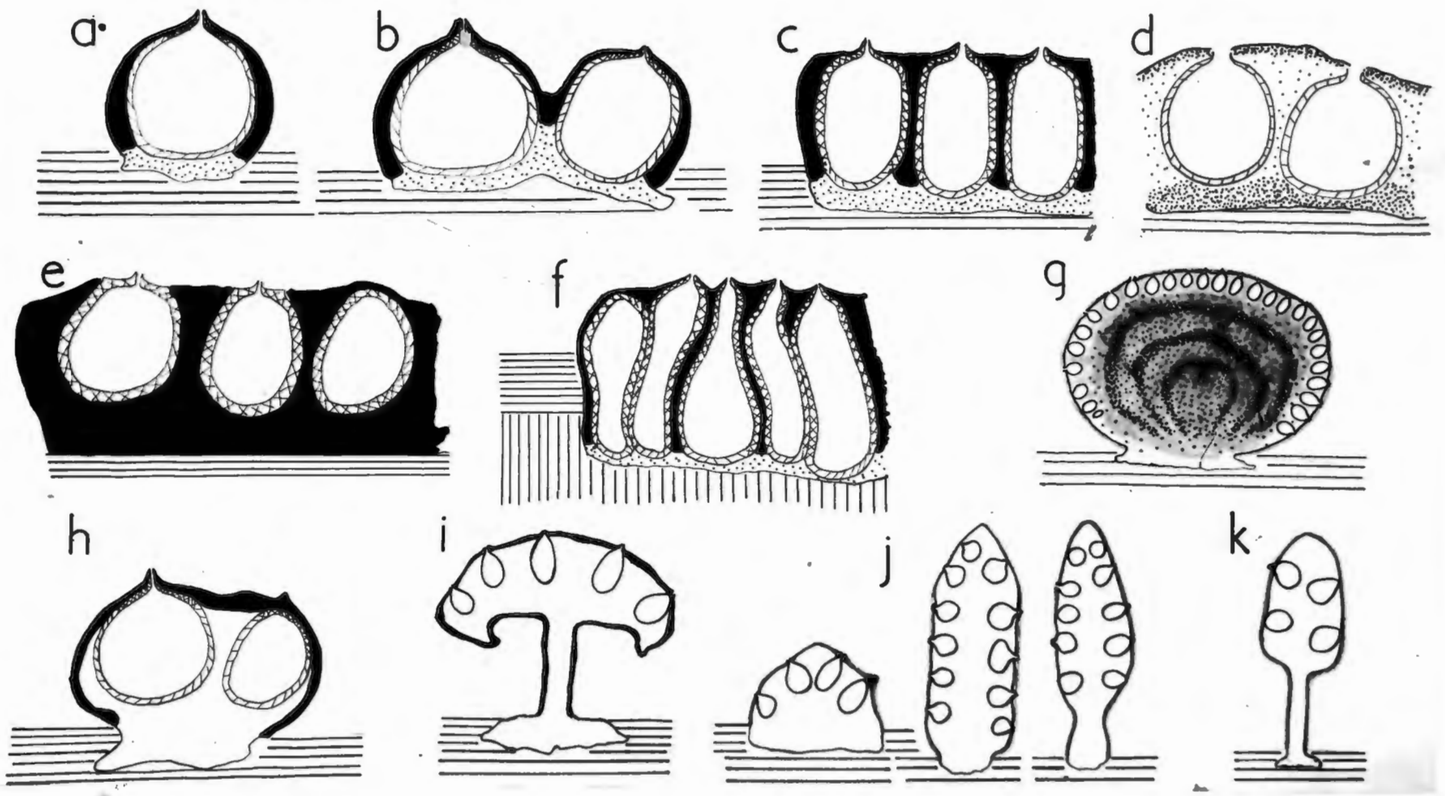


Plate 1. Incipient stroma of Hypoxylon vividum, 4-5 weeks old, showing superficial felty growth, mainly pale orange in colour but with some dark hyphae (d.s.m.)

Plate 2. Hypoxylon piceum; age unknown. The young stroma shows developing perithecia (p) at a very early stage; each perithecium with an ostiolar sphere (ost. sph.)
h.b. = host bark.

PLATE 1.

PLATE 2.

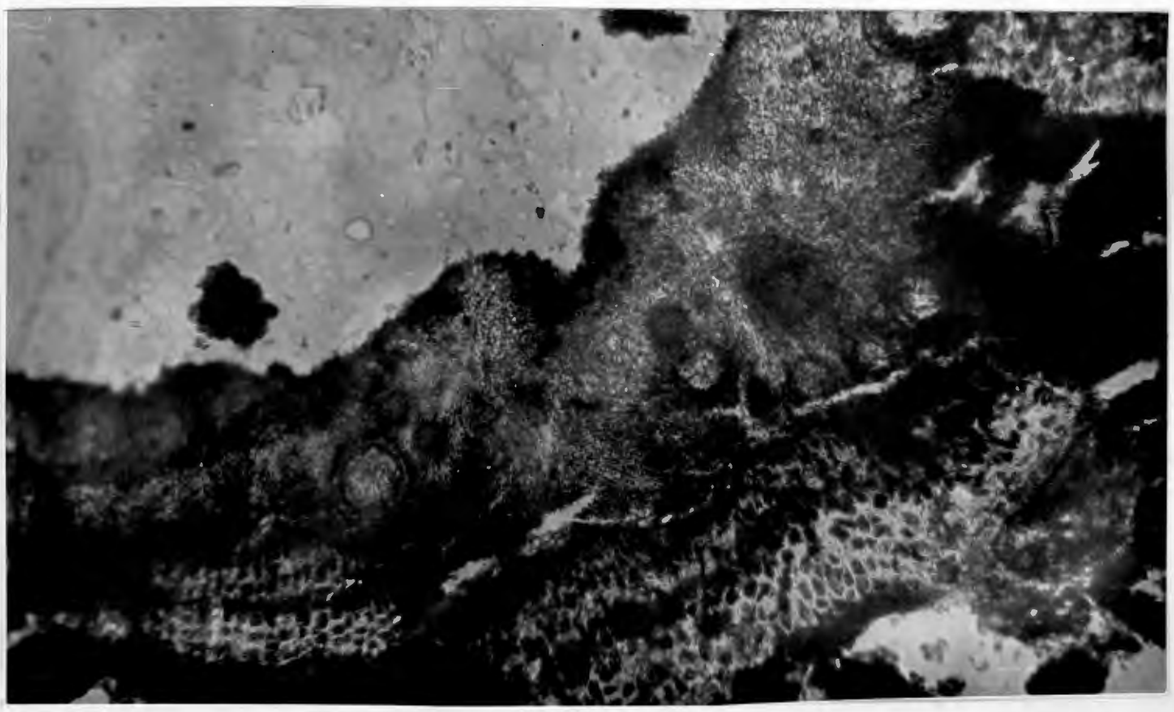


Plate 3. Hypoxylon vividum, 5-6 weeks old. The stroma is at a slightly more advanced level than in Plate 2.

ect.cr. ectostromal crust.

ost,c. ostiolar cap.

p,w, end of perithecial wall.

p,c. perithecial centrum.

h.w. host wood.

The wall between the ostiolar sphere and perithecial vertex has disintegrated and the ostiolar cap is pushing upwards to the superficial crust.

Plate 4. Hypoxylon vividum, 6 weeks old. The ostiolar cap, reinforced by stromal material outside, has broken through the stromal crust.

asc. Young asci. Other lettering as above.

Plate 5. Hypoxylon vividum, 6-8 weeks old, showing the disintegration of the ostiolar cap. The umbilicate ostiole between the perithecial walls can clearly be seen.

h.b. = host bark. (Note that stroma is partly erumpent.)

ect. == ectostroma.

Other lettering as above.

PLATE 3

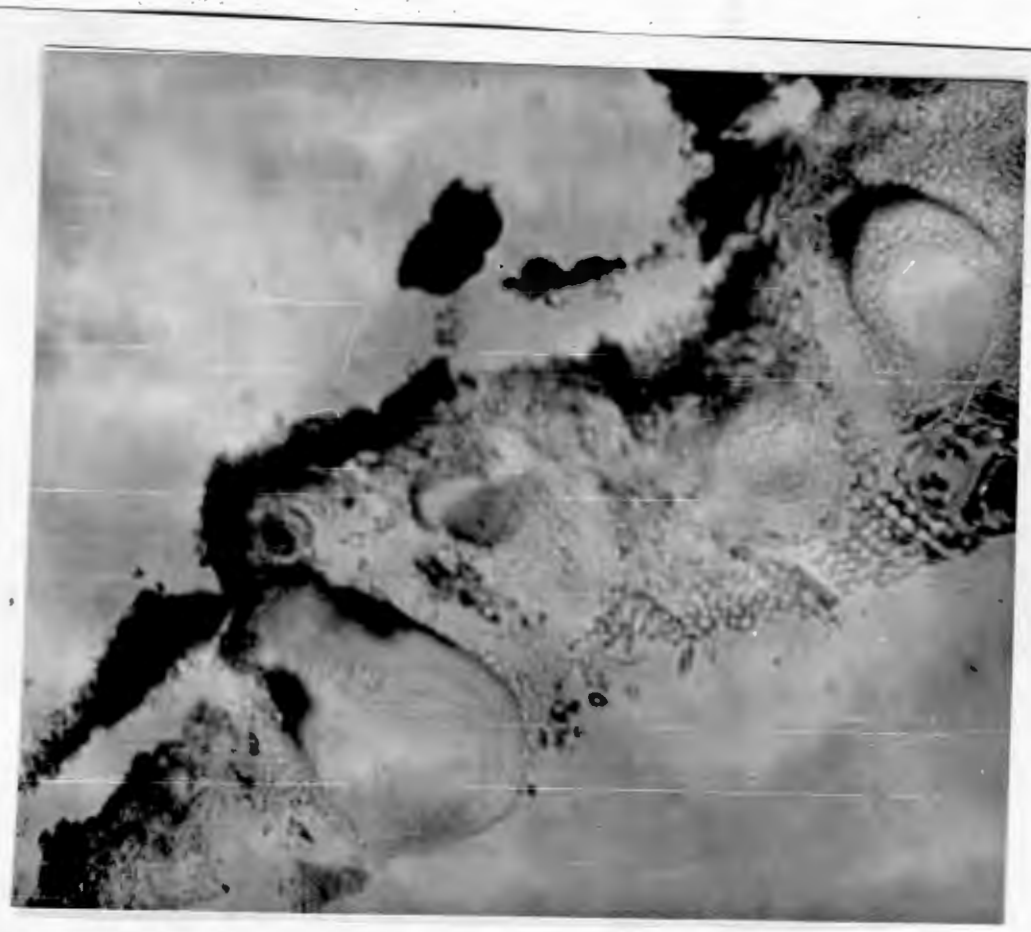


PLATE 4

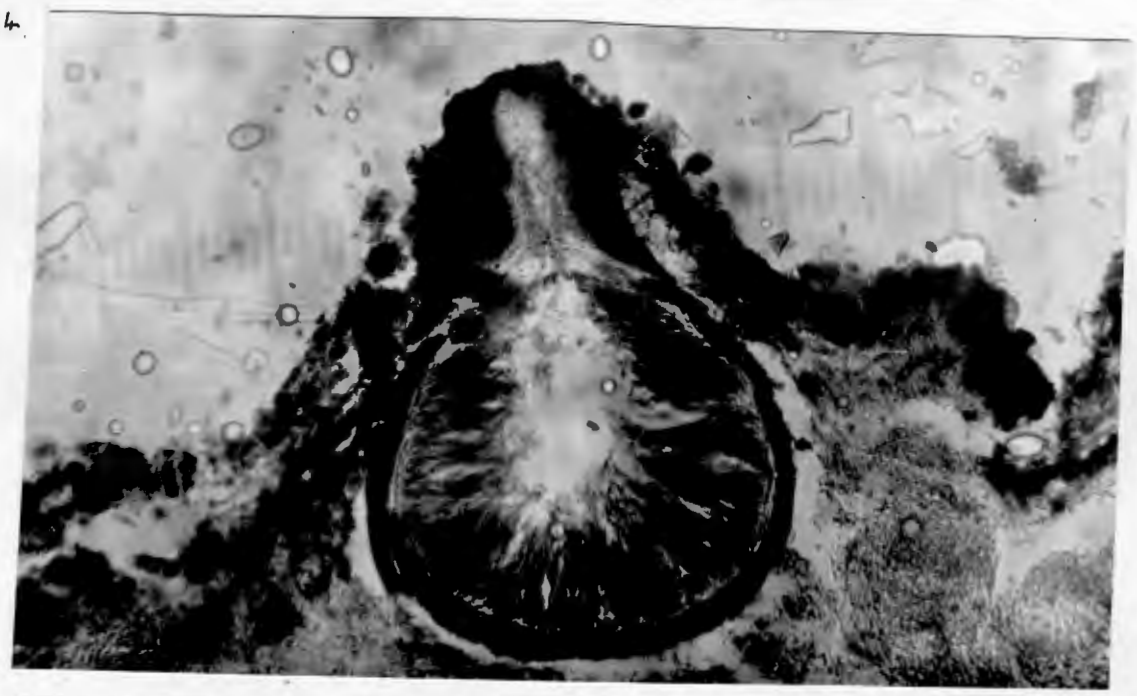


PLATE 5

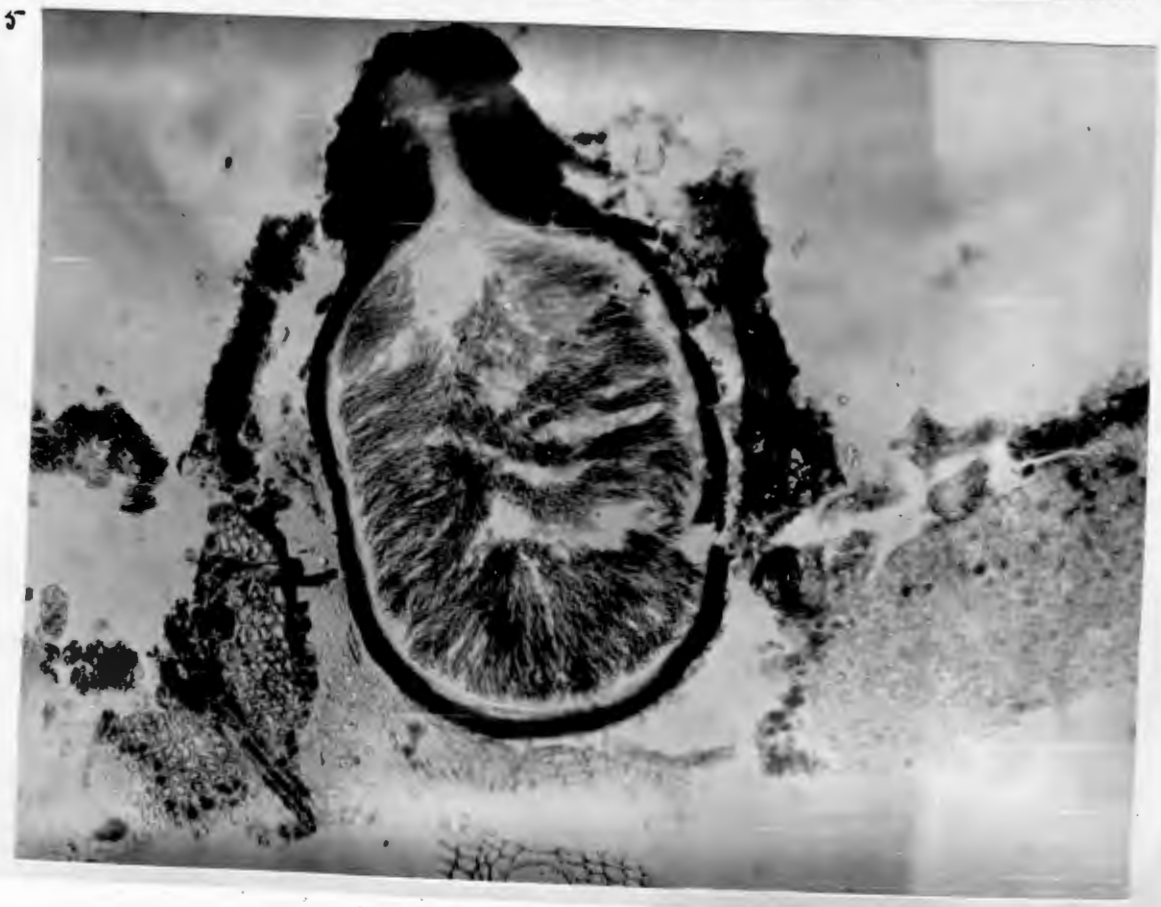


Plate 6. Hypoxylon 18B, an unidentified species in the same species group as Hypoxylon vividum, showing a mature perithecium.

ect.p. ectrostromal particle of the ectostromal crust.

ect.cr. ectostromal crust.

ost. ostiole, formed partly of stroma, partly of perithecium.

p.w. perithecial wall, which does not quite reach the surface.

Note the lack of differentiation of the mature stroma.

Plate 7. Xylaria leprosa. Section through a stroma which is clearly differentiated.

con. outside mycelial layer, derived from that bearing the conidia.

c.ect. carbonous ectostroma.

p.w. perithecial wall, very pale in colour, and uncarbonized except for the vertex.

f.ent. fleshy white entostroma.

Note that the ostiole is papillate and is composed of both the perithecial wall and the outside carbonous layer. This is true for all papillate ostioles of the other species investigated.

Note also the strong similarity to plate 4: Hypoxylon vividum before the ostiolar cap is shed.

PLATE 6

PLATE 7.

Plate 8. Hypoxylon vividum. Section through mature stroma (8 weeks old) showing development of a dark entostroma after the first perithecia have become mature.

ect. orange ectostroma.

p.w. wall, in tangential view, of a mature perithecium.

y.p. young perithecium.

ost.c. ostiolar cap (slightly displaced) of a developing perithecium.

ent. entostroma.

d.s.m. dark surface mycelium of original crust (see plate 1.)

Plate 9. Rosellinia aquila. Photograph of an illustration by Arx & Muller, (Die Gattungen Der Amerosporen Pyrenomyceten, 1954) to show inaccurate interpretation of the stroma.

PLATE 9.

Rosellinia aquila (Fr.) de Not.

ie: *Sphaeria aquila* Fr. — Vet. Ak. Handb., 25[illegible]
Rosellinia aquila de Not. — Giorn. Bot. Ital., 1, 3[illegible]
Hypoxylon aquila Bref. — Unters. Ges. Myk., 10[illegible]
Sphaeria byssiseda Tode — Fungi Mecklenb., 2, 10[illegible]
Rosellinia byssiseda Schröter — Krypt.Fl. Schles., 3, [illegible] (1894)
Sphaeria mammosa With. — Bot. Arr., 4, 360 (1830)
Sphaeria papillosa Sow. — Engl. Fungi, 2, 236 (179[illegible])
Auf faulendem Holz (Kosmopolit).

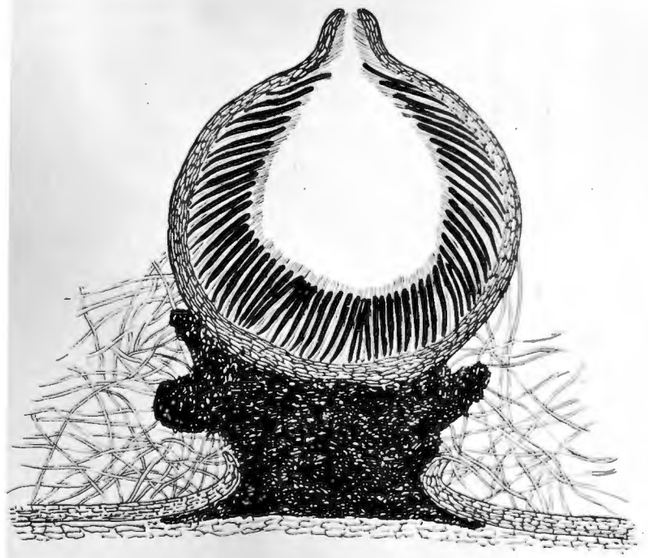


Abbildung 98
Schnitt durch ein Perithecium von *Rosellinia aquila*.
Vergr. 50mal (schematisiert)

Pilz überzieht mit einer oberflächlichen, nur zwei bis d
dicken, dunklen stromatischen Kruste größere Substratparti
it einzelnen Hyphensträngen in die obersten Holzschichten
hwuchert sie. Auf höckerig vorstehenden, aus kleinen, reg
eckigen, braunen Zellen aufgebauten Basalstromata sitzen
rasig nebeneinander — die bis 1,2 mm großen, dunkelbraun

PLATE 8

Diagram B. Rosellinia corticalis.

Stages in development of the stromata (from material collected).

con. caducous conidial layer.

c.ect. carbonous ectostroma.

f.ent. entostroma, at first soft, later brittle and hard.

Diagram C. Hypoxylon glomeratum var.4.

Section through developing stroma to show:-

con. conidial layer.

c.ect. carbonous ectostroma.

f.ect. soft ectostroma, which will later become hard carbonous.

f.ent. soft entostroma. This part of the stroma does not become carbonous but hard and brittle.

DIAGRAM B

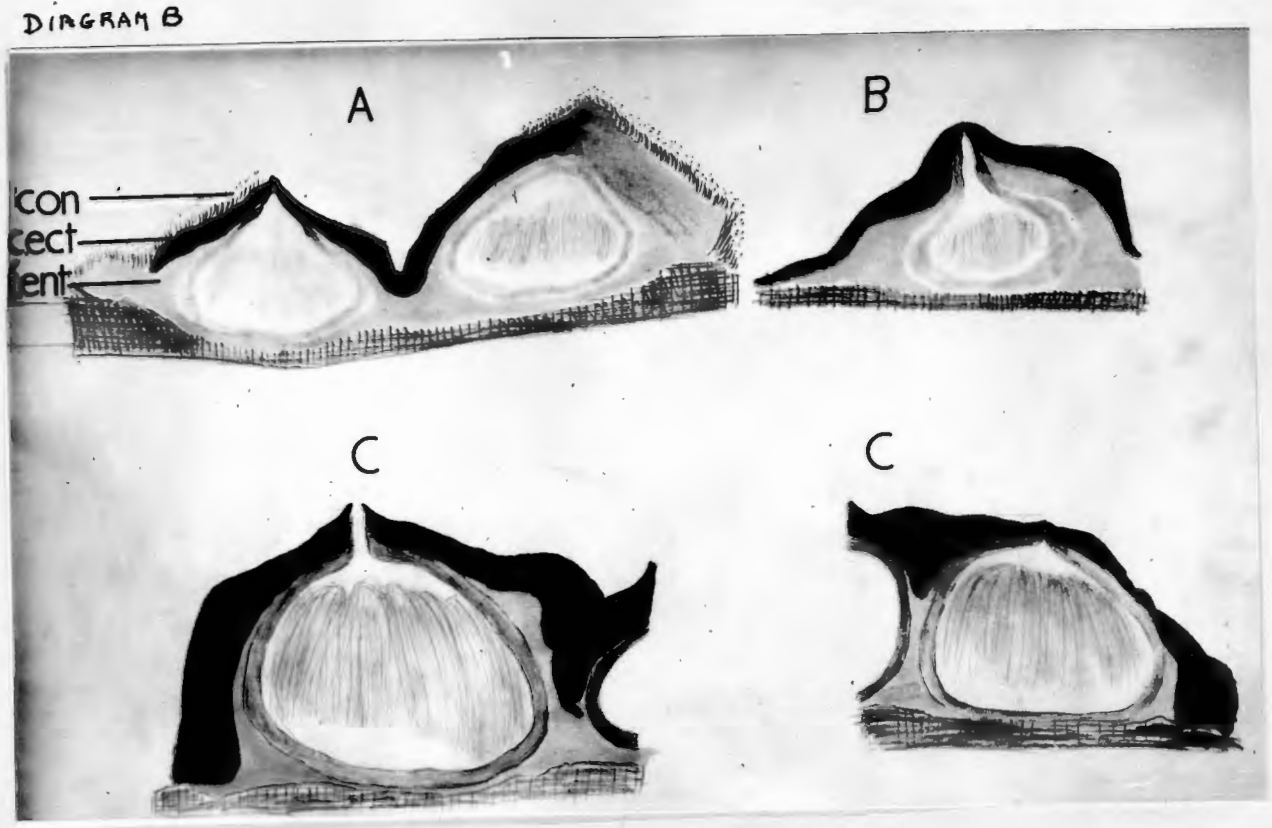
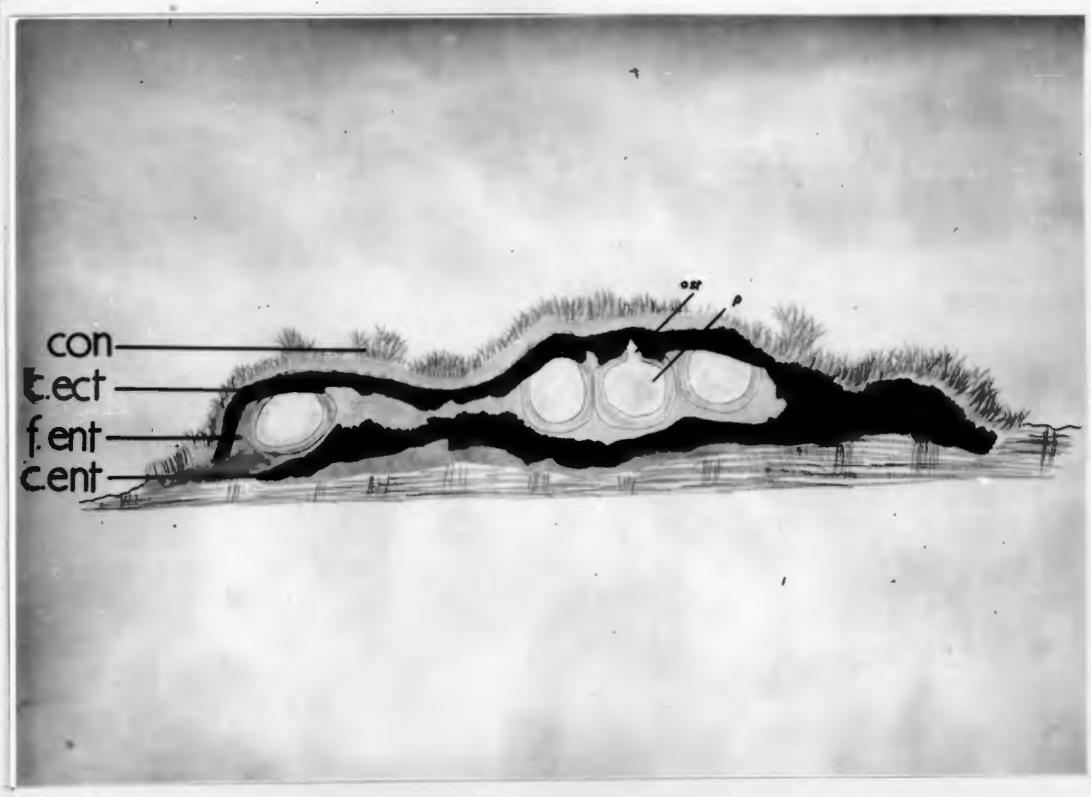
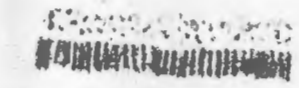


DIAGRAM C.

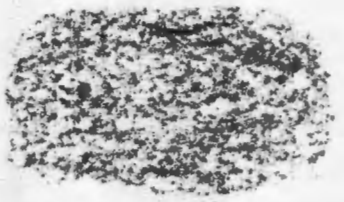


KEY TO DIAGRAMMATIC REPRESENTATION IN ILLUSTRATIONS FOLLOWING

Palisade of conidiophores



Dark dense secondary mycelium



Carbonous tissue; granulate

dense

Pale, hard but not carbonous, tissue

Dark coloured, hard to leathery but not carbonous, tissue

Fleshy tissue

Host wood

Fungus in wood
(at base of stroma)

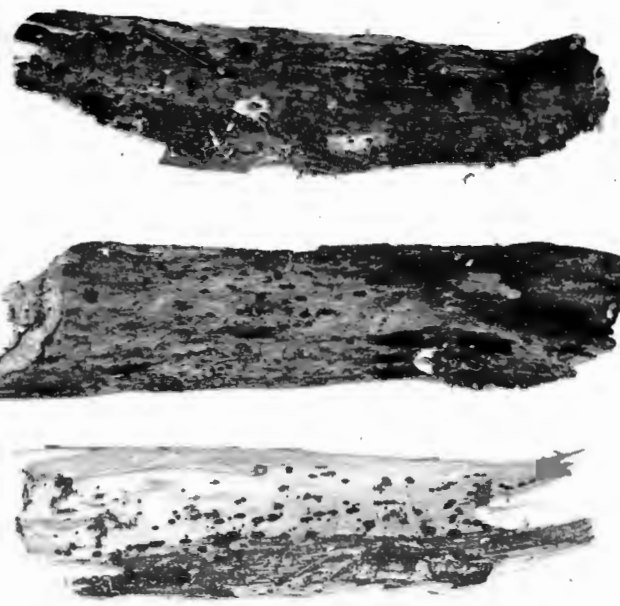
Rosellinia protuberans, 432;

Fig.1. Surface view of the stromata X $\frac{3}{4}$.

Fig.2. * Enlargement of the same, X $5\frac{3}{4}$.

* All subsequent enlargements are also X $5\frac{3}{4}$.

1.



1 25

2.

<u>Rosellinia protuberans</u>, 432;

Fig.3. Young stromata, covered by a white to pale grey conidial layer.

Fig.4. Surface view of stromata, slightly under natural size.

3

4

Rosellinia obtusissima, 529;

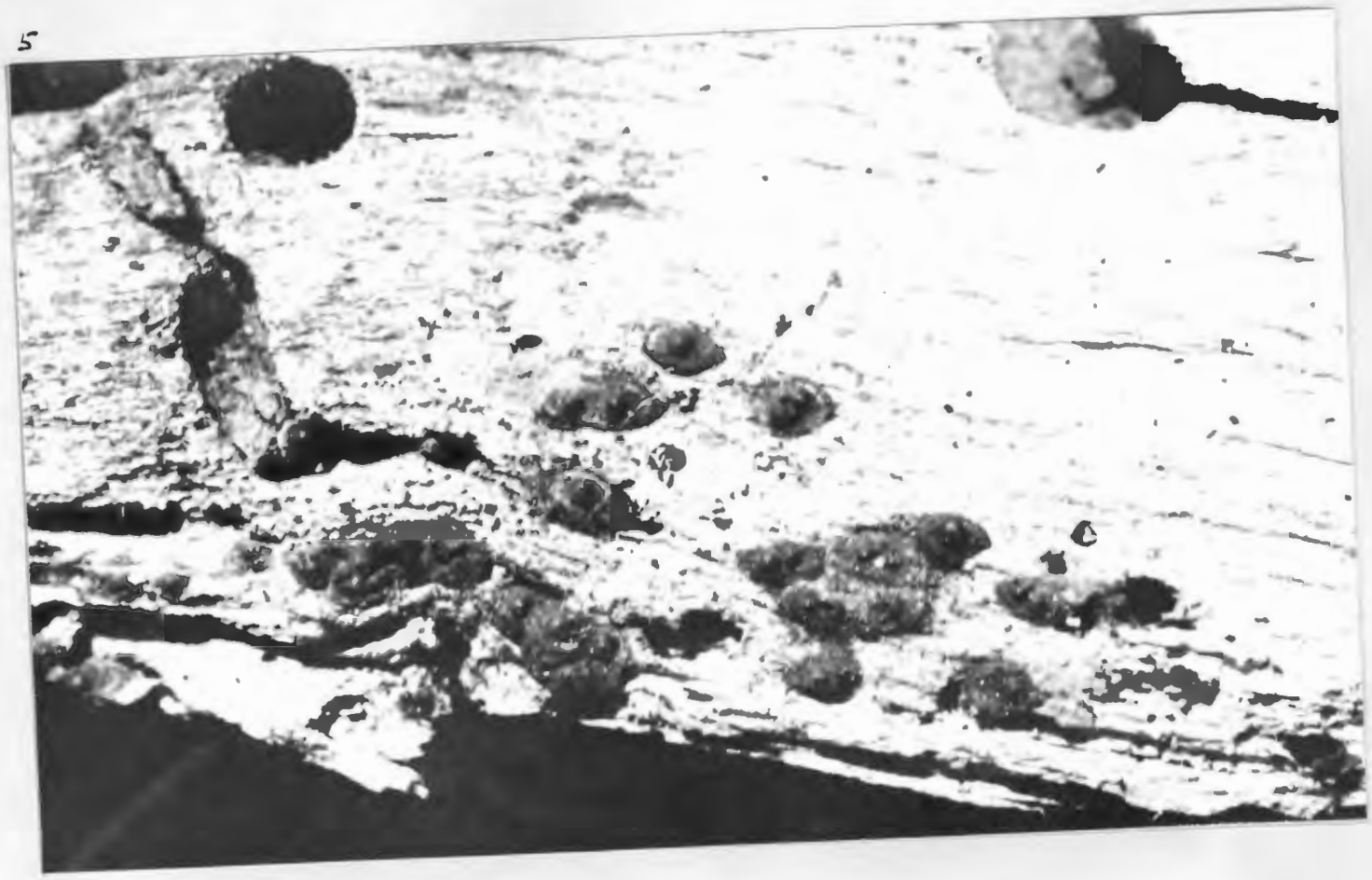
Fig.5. Enlargement of fig.4.

Fig.6. Longitudinal section through stromata of:-

A. Rosellinia protuberans, 432.

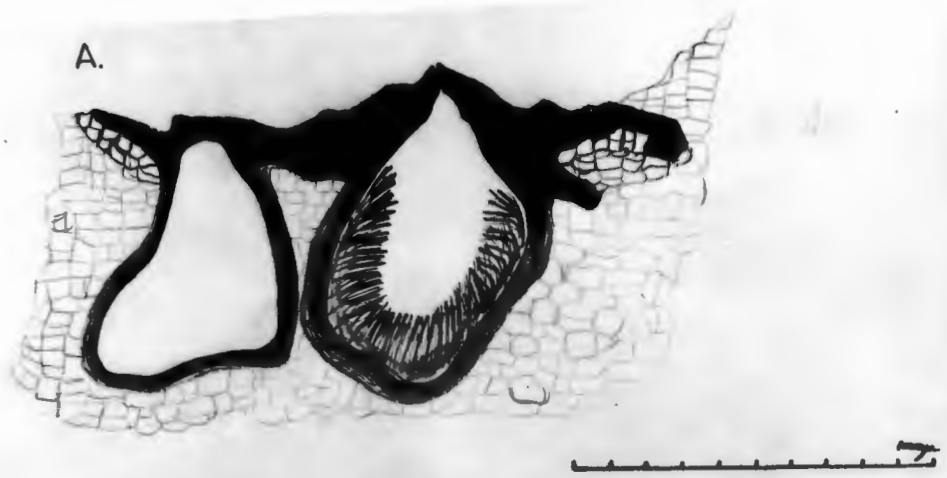
B. Rosellinia obtusissima, 529.

5



6

A.



B.

Fig.7. Asci & spores of:-

A. Rosellinia protuberans, 432.

B. Rosellinia obtusissima, 259.

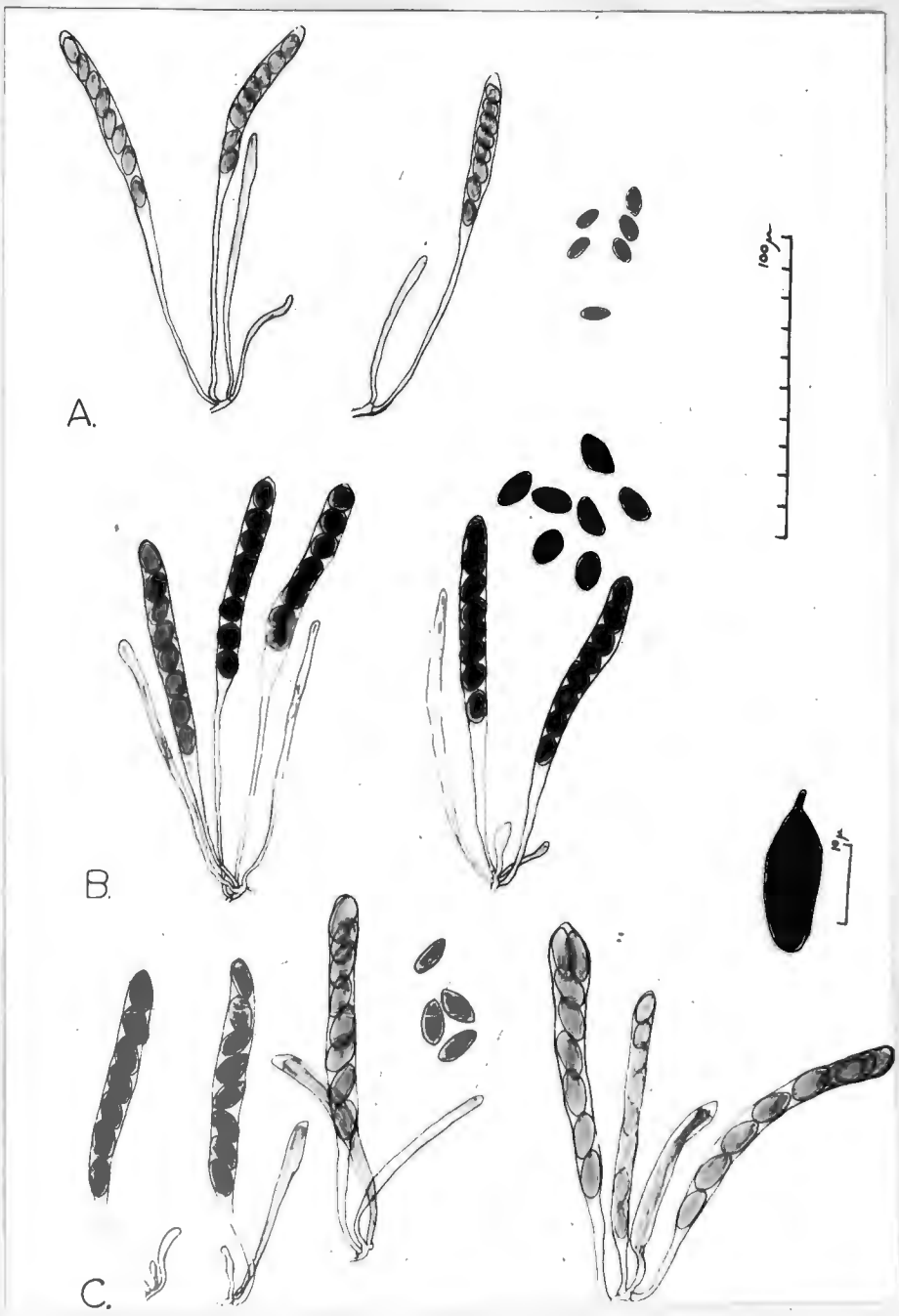
C. Rosellinia mammoidea, 433.

D. Rosellinia corticalis, 531.

Fig.8. Rosellinia moroides, 412.

Surface view of stromata, enlarged.

7.

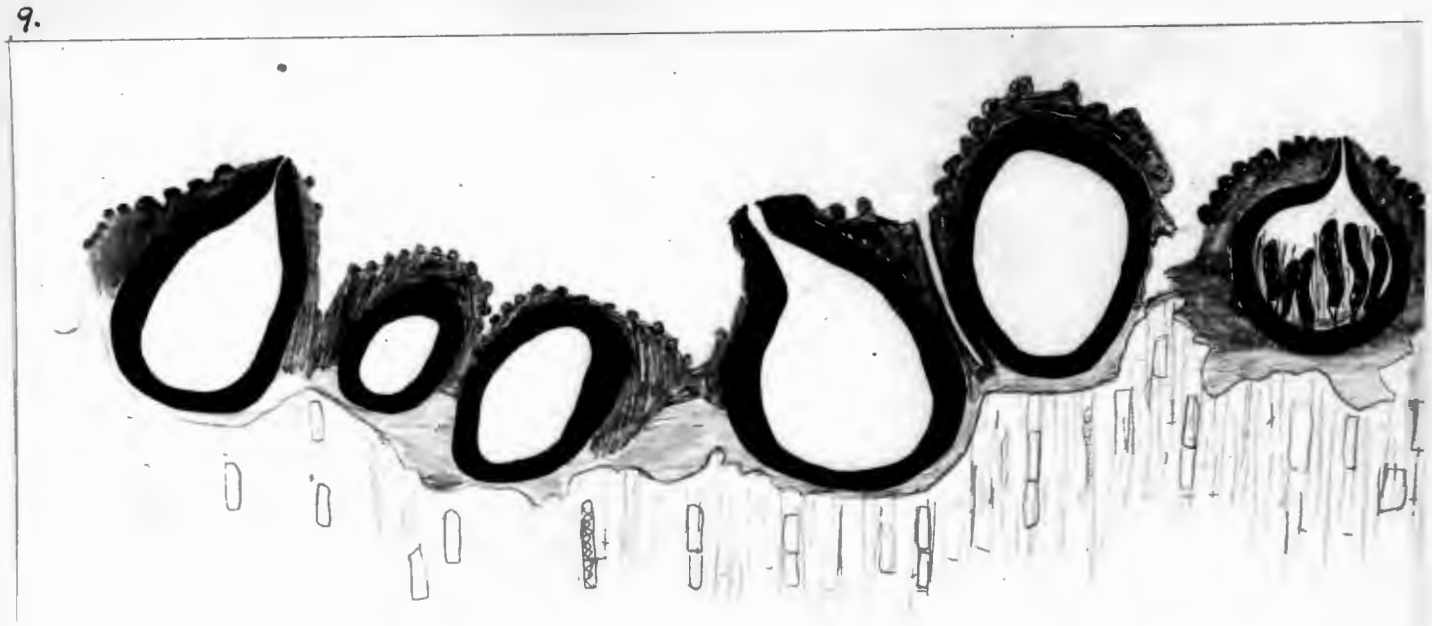


8

Fig.9. Rosellinia moroides, 412;
Longitudinal section through uniperitheciate and multiperitheciate stromata.

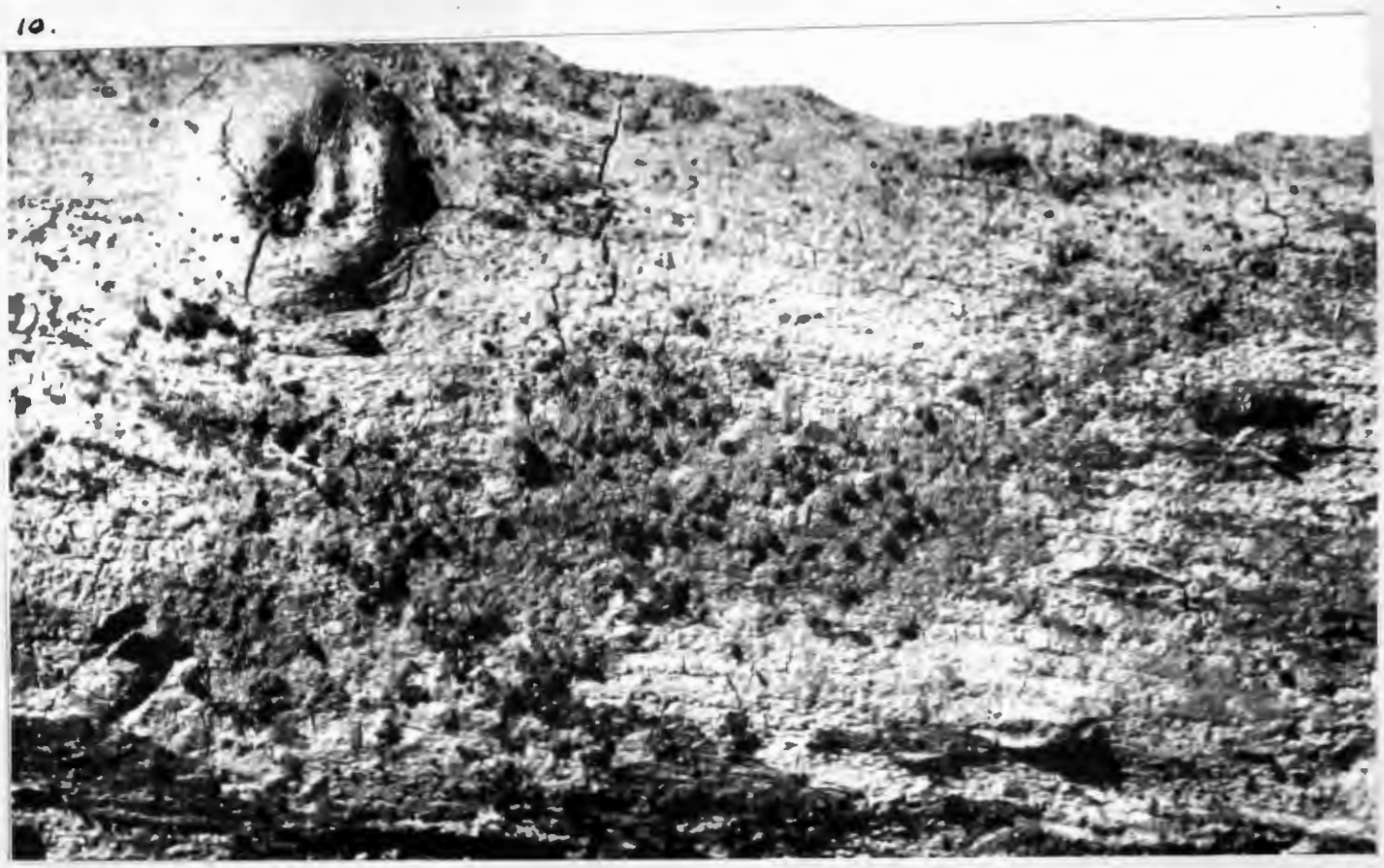
Fig.10. Rosellinia pulveracea, 269;
Surface view of stromata, enlarged.

9.



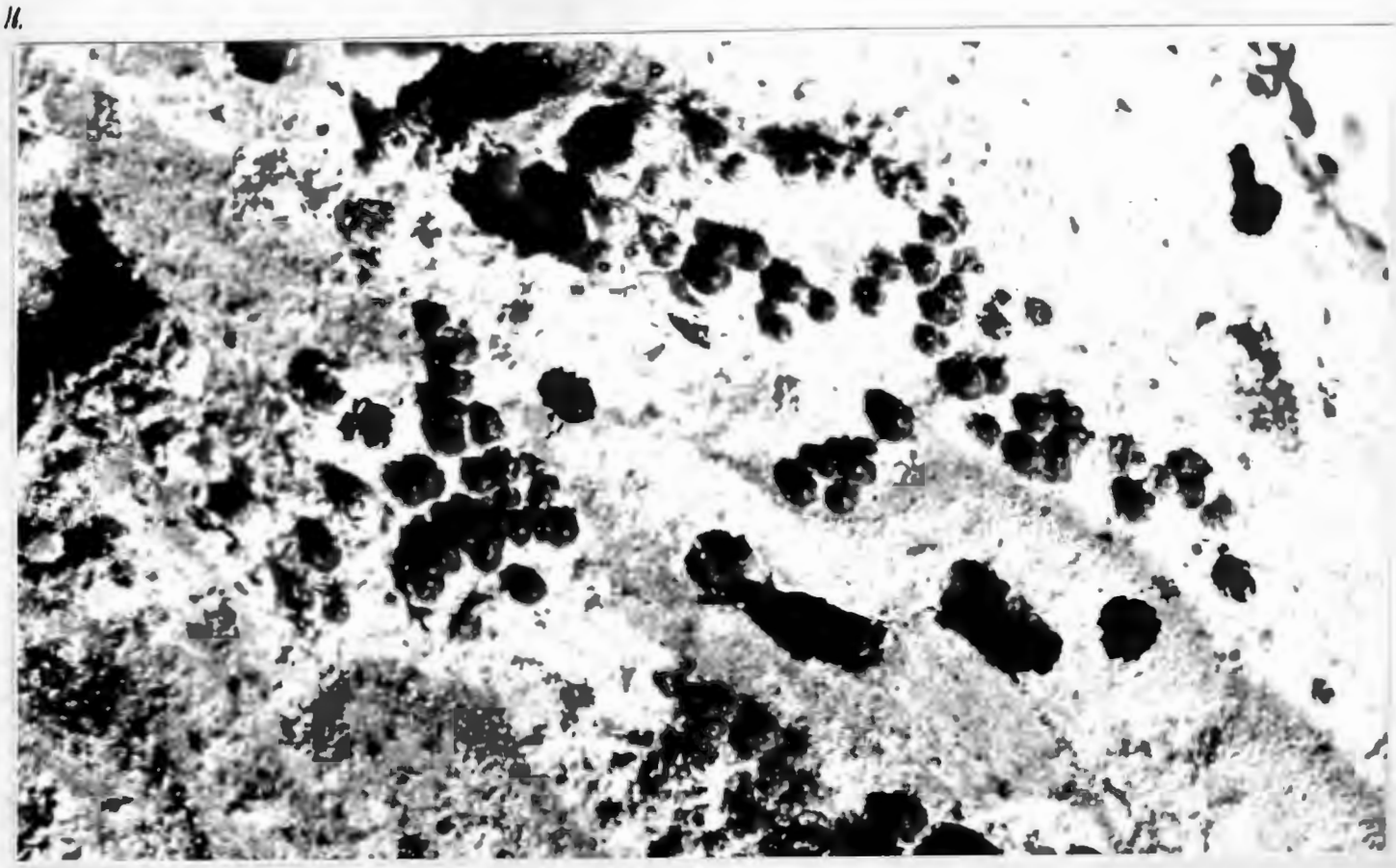
.500 μ

10.



Figs.11 & 12. Rosellinia apiculata, strains 256 & 76;
Note degrees of aggregation of uniperithecíate stromata and the degree of aggregation and immersion of the perithecia in the multiperithecíate stromata.

11.



12.

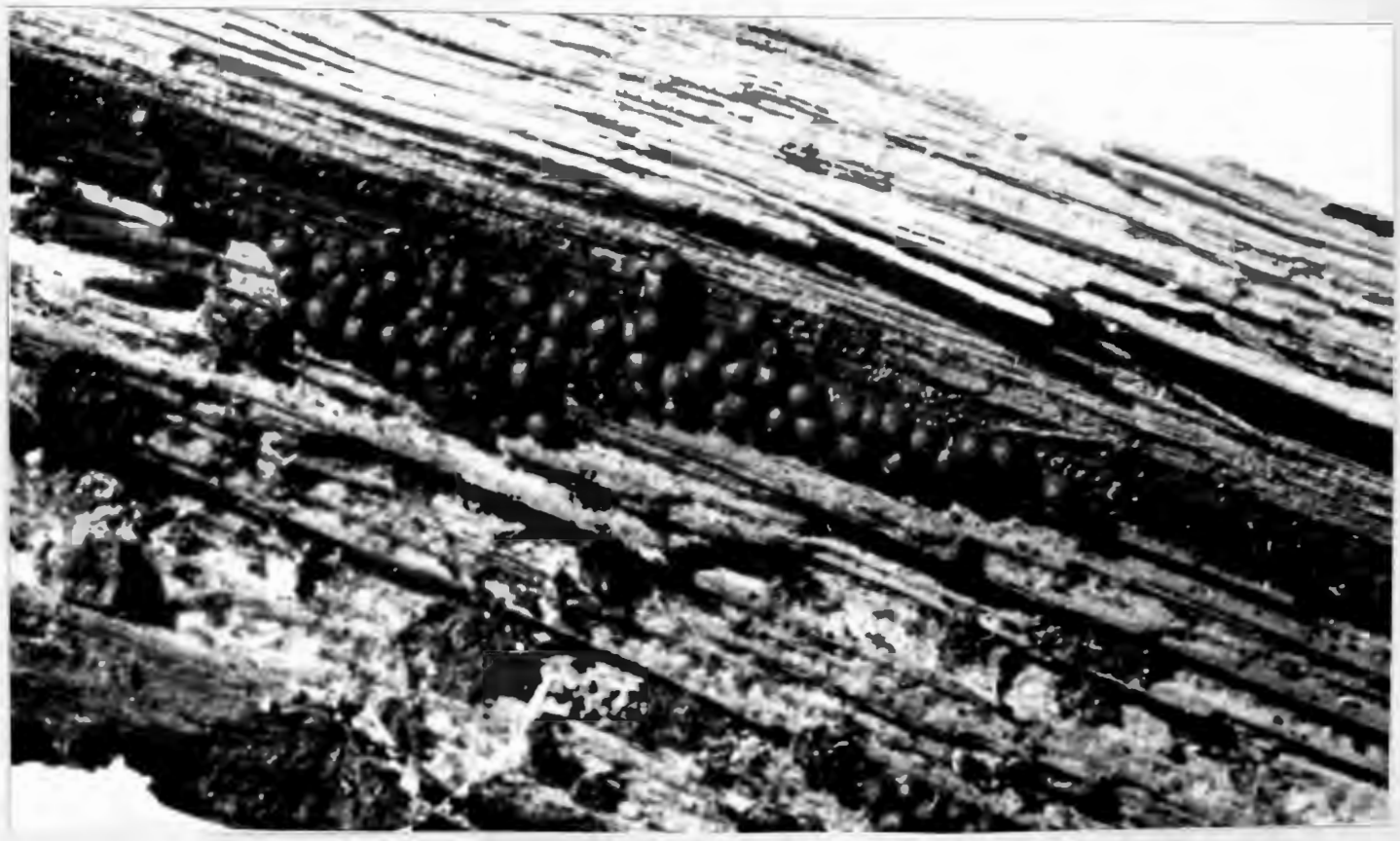


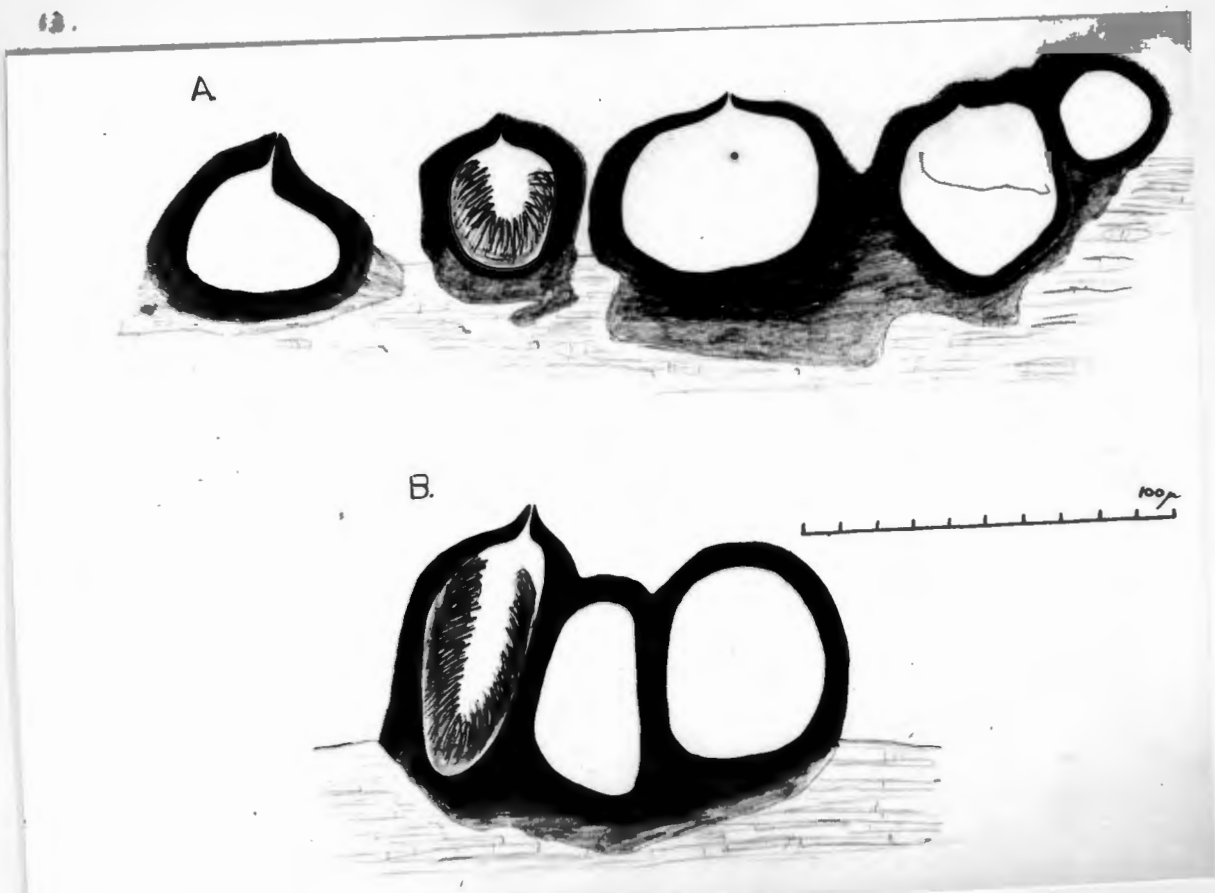
Fig.13. Rosellinia apiculata: A,76; B,554;
Longitudinal section through stromata to further illustrate the features mentioned previously; also note variations in thickness of stromal covering.

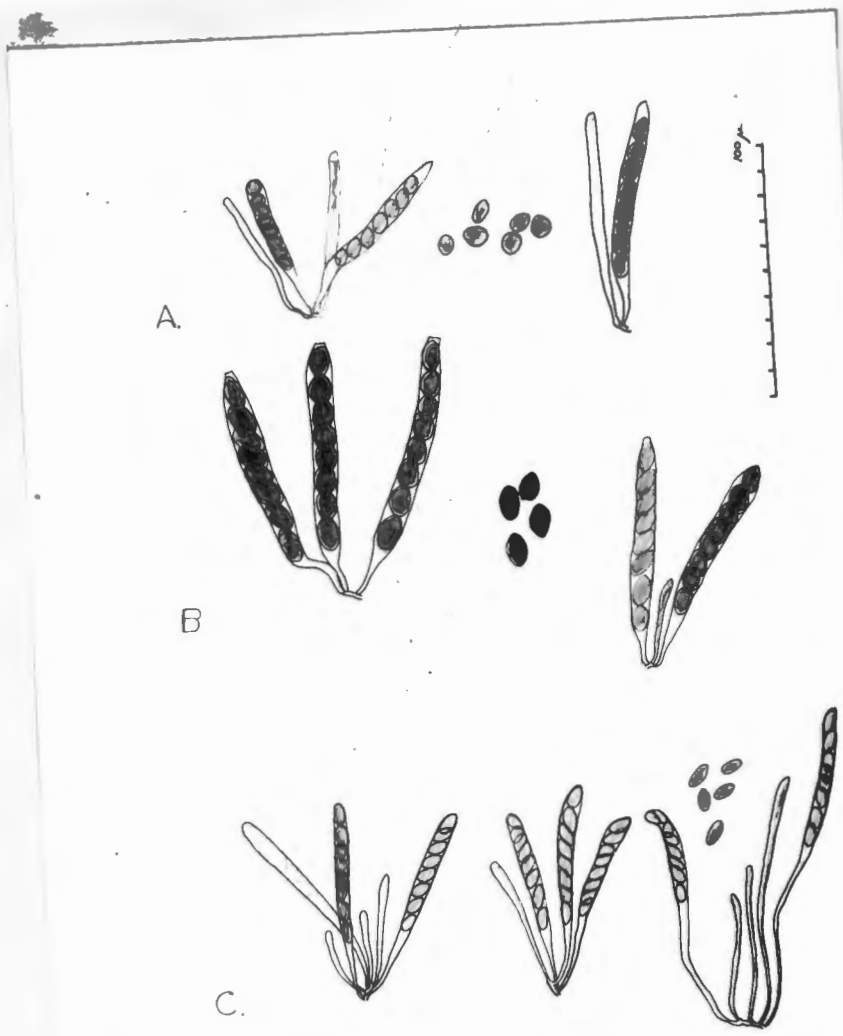
Fig.14. Asci & spores of:-

A. Rosellinia pulveracea, 269.

B. Rosellinia moroidea, 412.

C. Rosellinia apiculata, 256.


A.
B.
100μ


A.
B
C.
100μ

Rosellinia mammoidea.

Fig.15. Strain 433; surface view of stromata, slightly under natural size.

Fig.16. Strain 460; enlarged, showing young stromata with superficial white or pale grey conidial layer.

15.

1 20

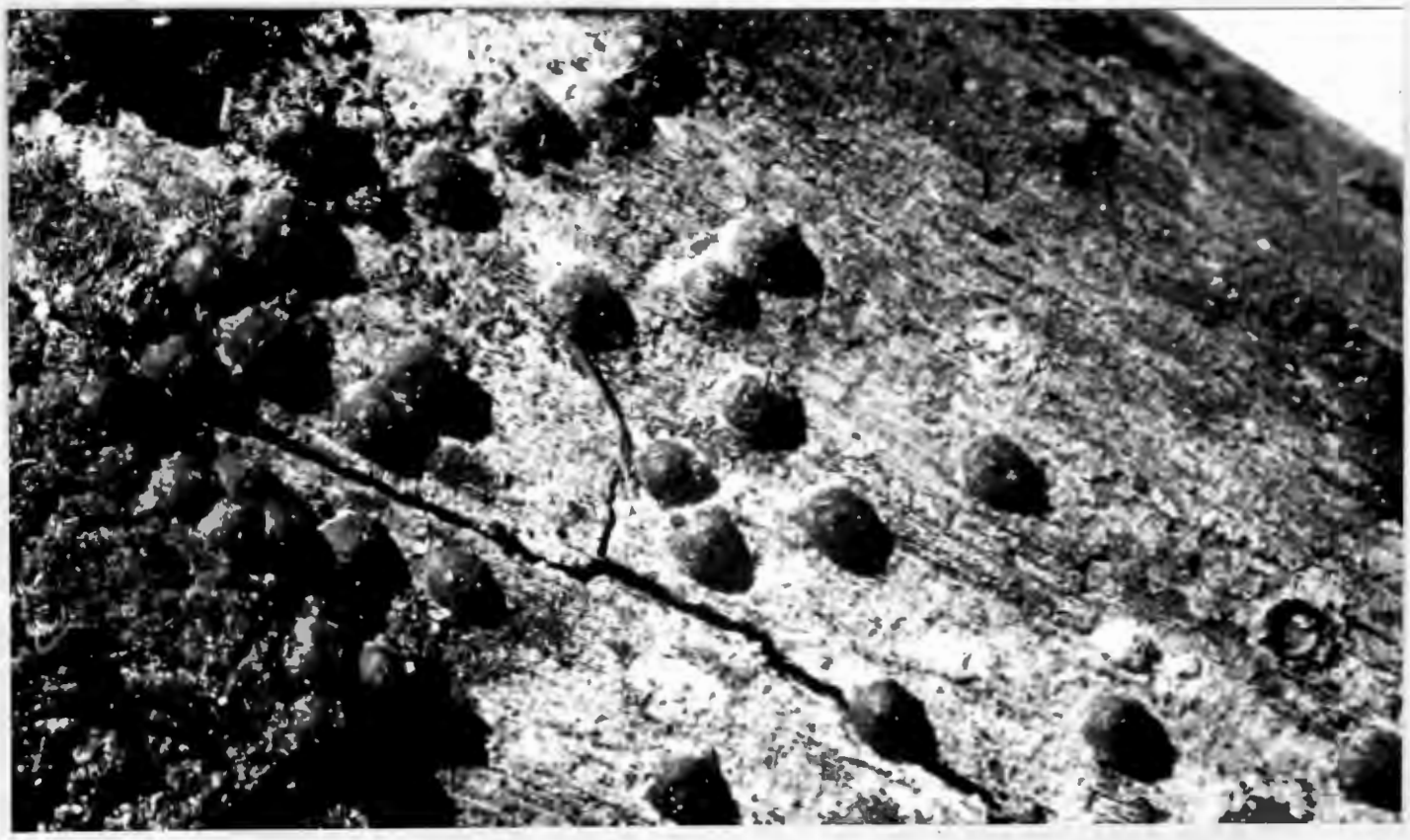
16.

Rosellinia mammoidea.

Fig.17. Strain 433; enlarged, showing stromata just before maturity; conidial layer disappearing.

Fig.18. Strain 461; mature uniperithecioate stromata.

17.



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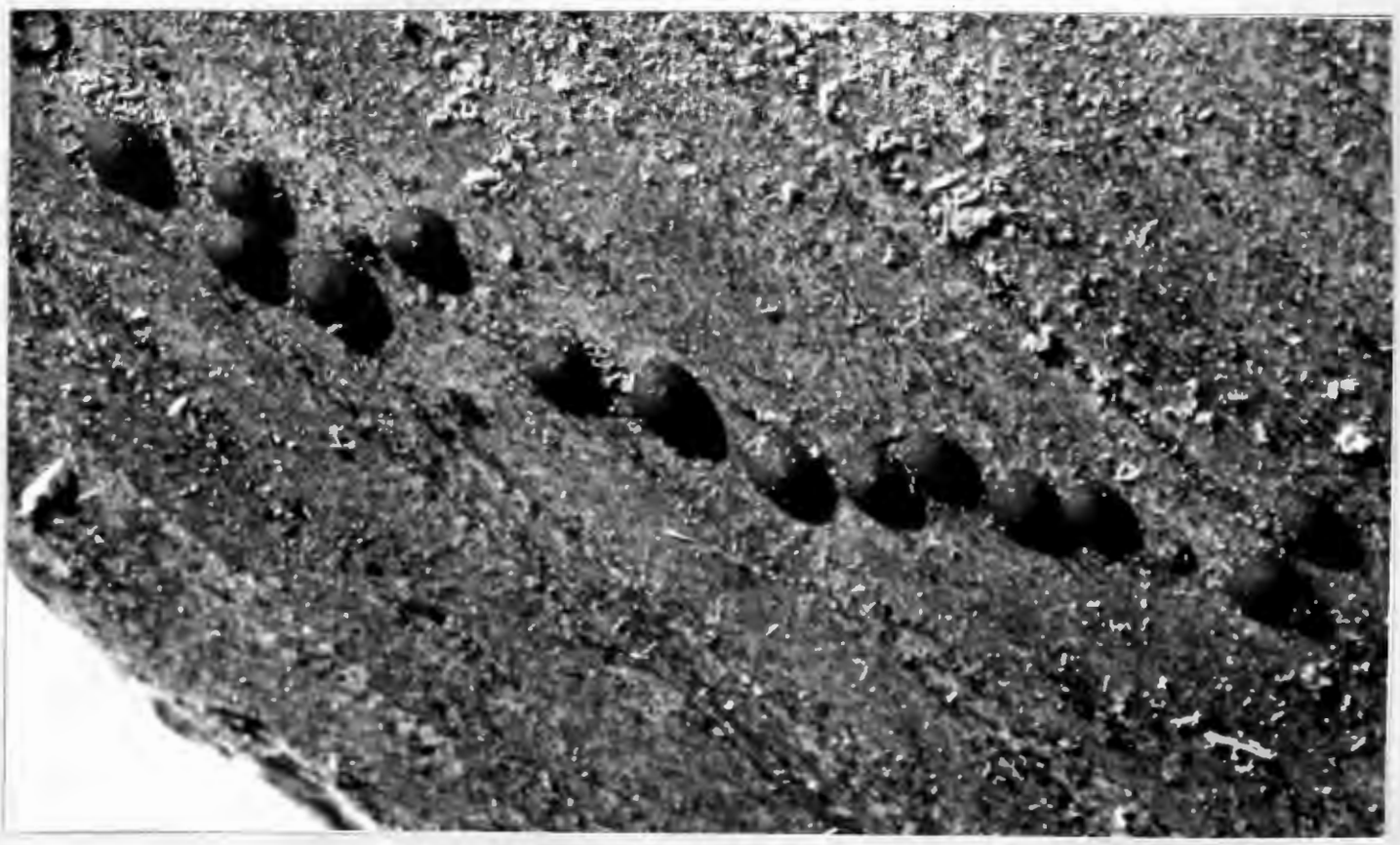


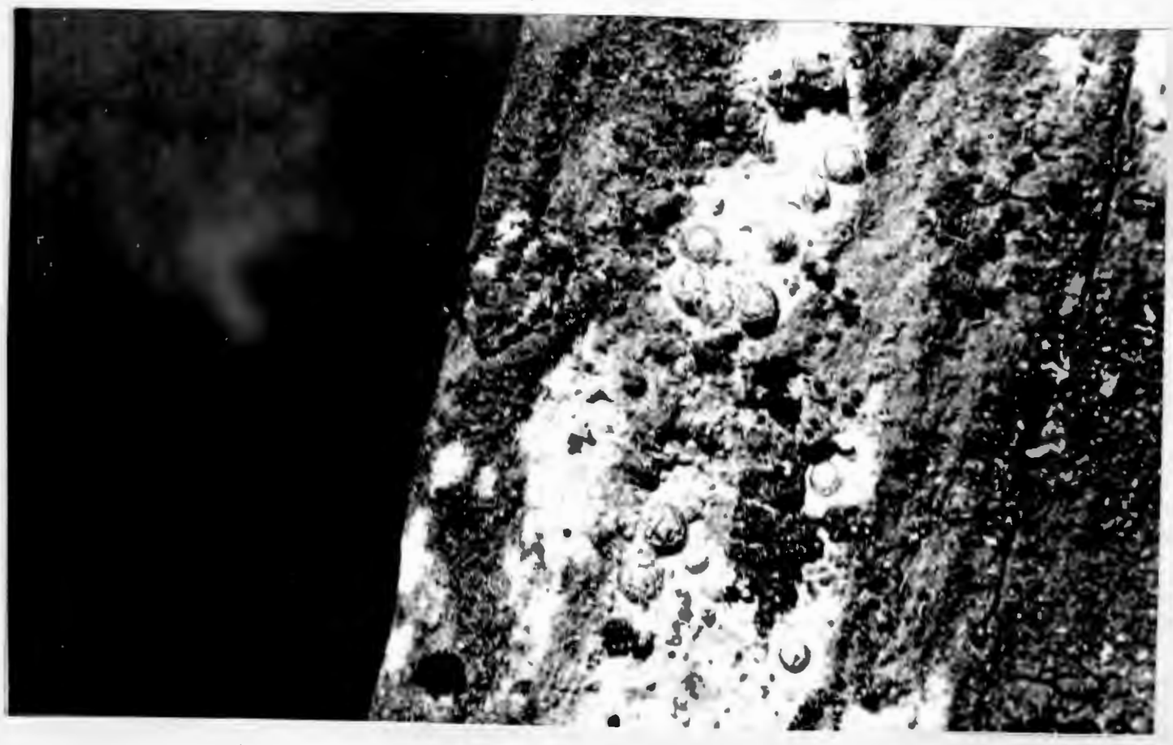
<u>Rosellinia corticalis</u>, 531;

Fig.19. Very early stage showing white superficial areas of mycelium. The area to the left shows a young uniperitheciate stroma (p).

Fig.20. A later stage in development showing an extensive granulate layer bearing conidia that covers the stromata beneath.

19

20.

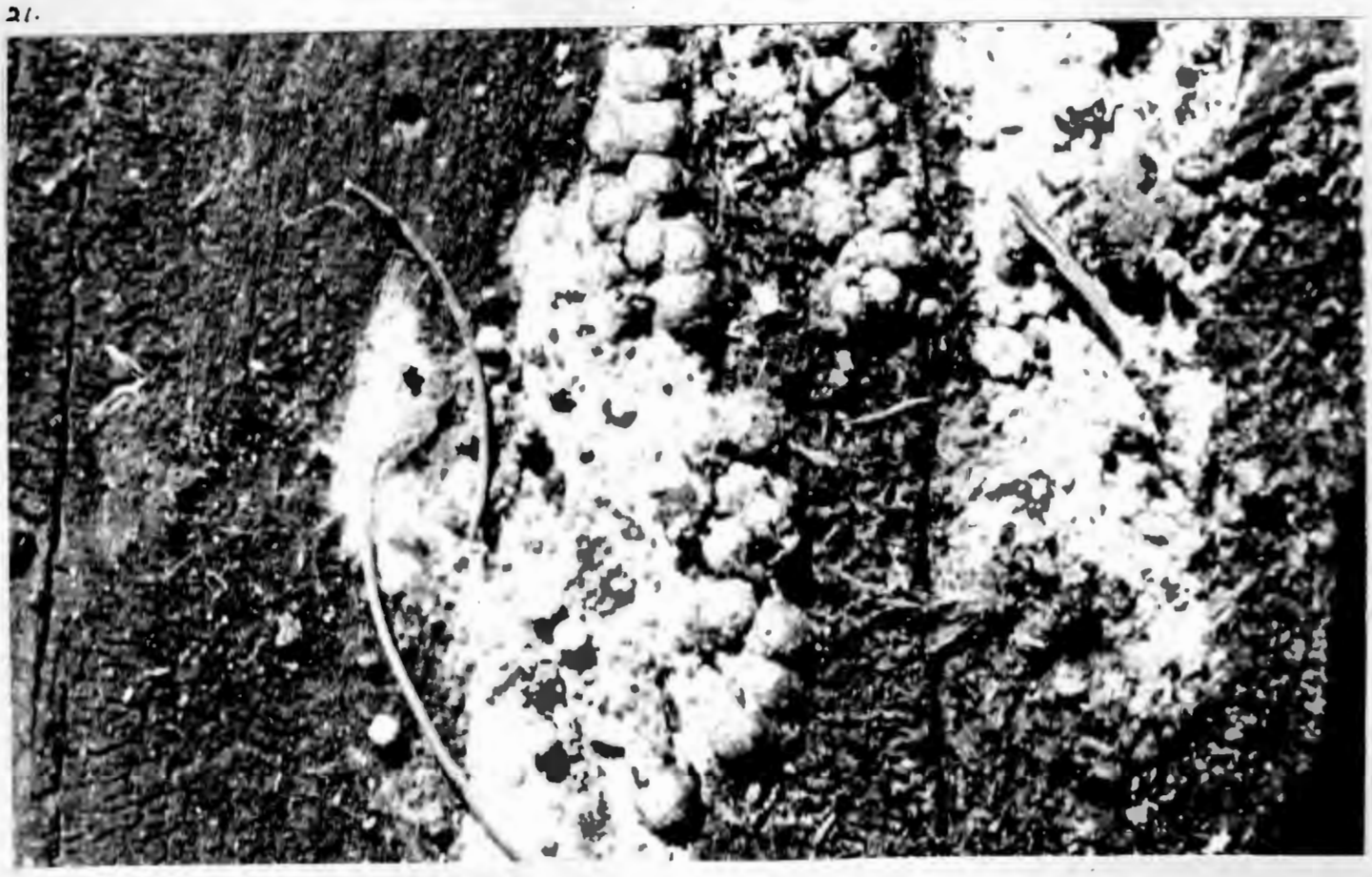


<u>Rosellinia corticalis</u>, 531;

Fig.21. Late stage in development; stromata aggregated due to many perithecia arising close together.

Fig.22. Mature stage, showing closely aggregated stromata united by a continuous carbonous layer that undulates with the shape of the perithecia beneath.

21.



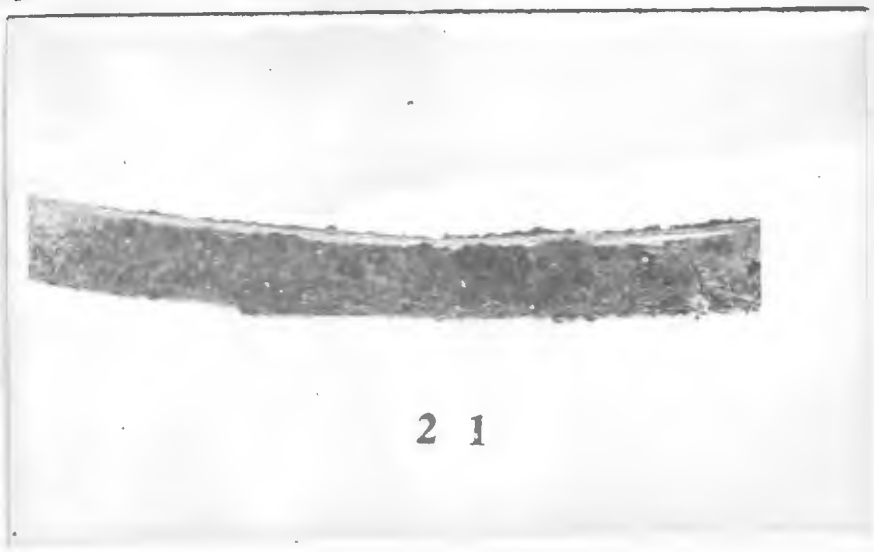
22.

Fig.23. Rosellinia thelena, 508; surface view, slightly below natural size.

Fig.24. Rosellinia aquila, 22; surface view of penzigioid type.

Fig.25. Enlargement of Fig.24.

23.



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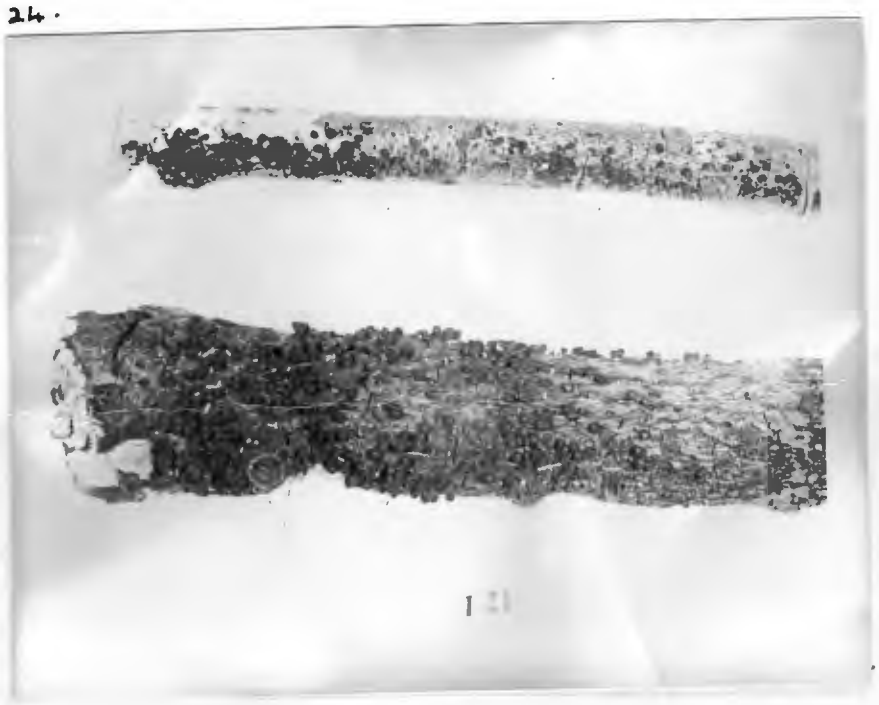

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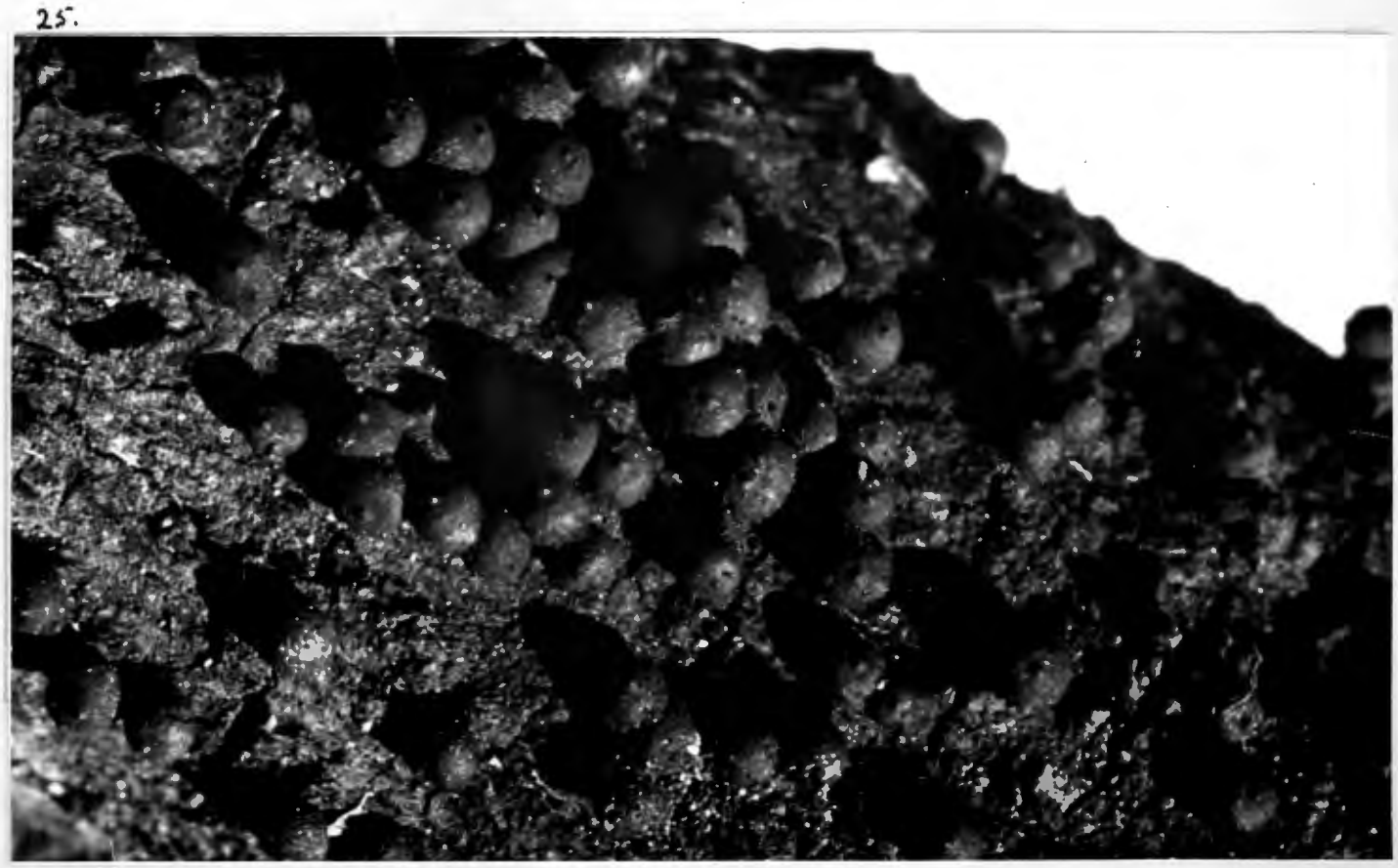
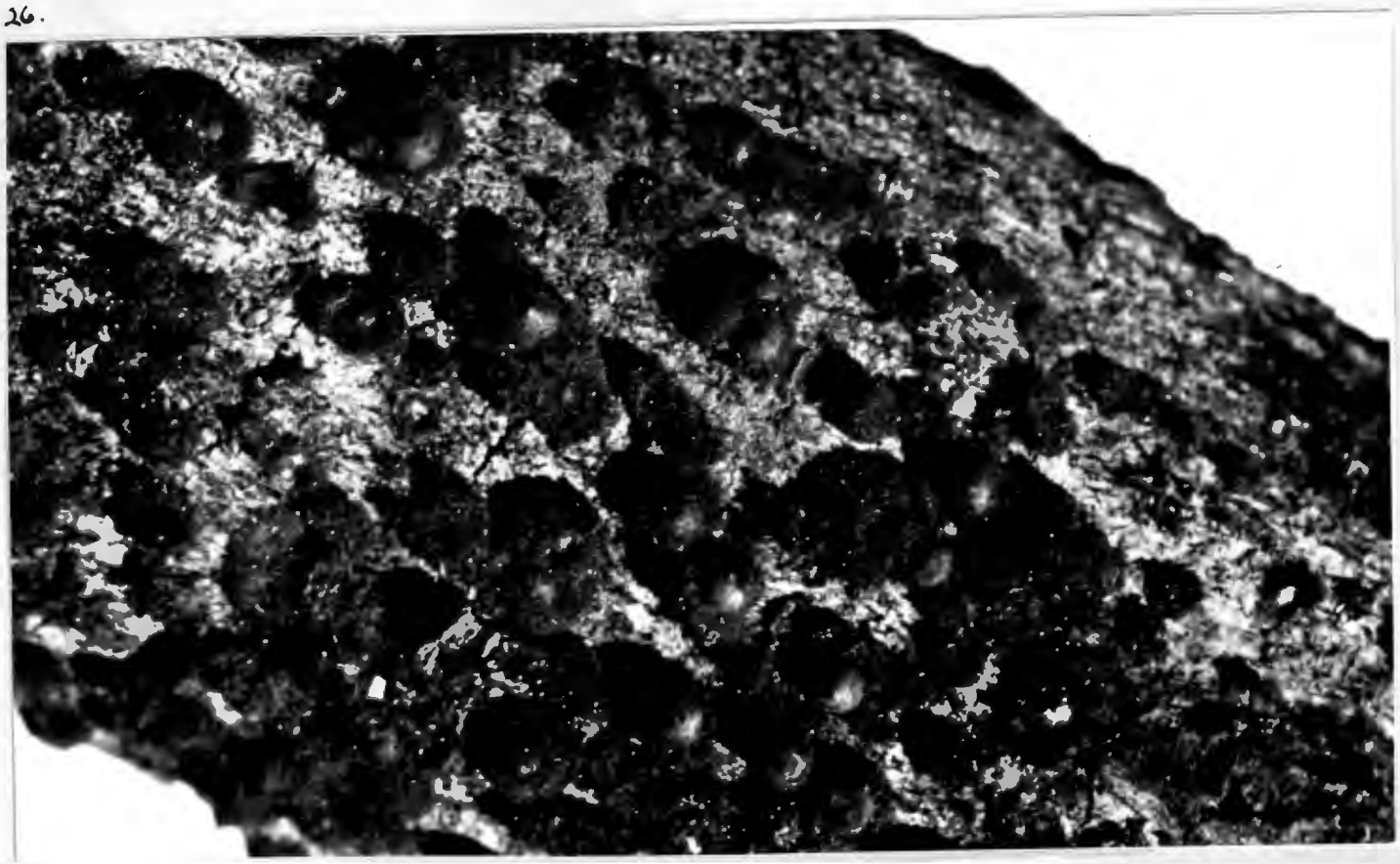


Rosellinia aquila.

Fig.26. Strain 361, normal type; enlargement to show associated uniperitheciate with occasional biperitheciate stromata, each seated in the centre of a floccose "subiculum" of dark hyphae. (N.B. Rosellinia thelena is very similar.)

Fig.27. Strain 548, normal type; enlargement to show a group of aggregated uniperitheciate stromata.

26.



27.

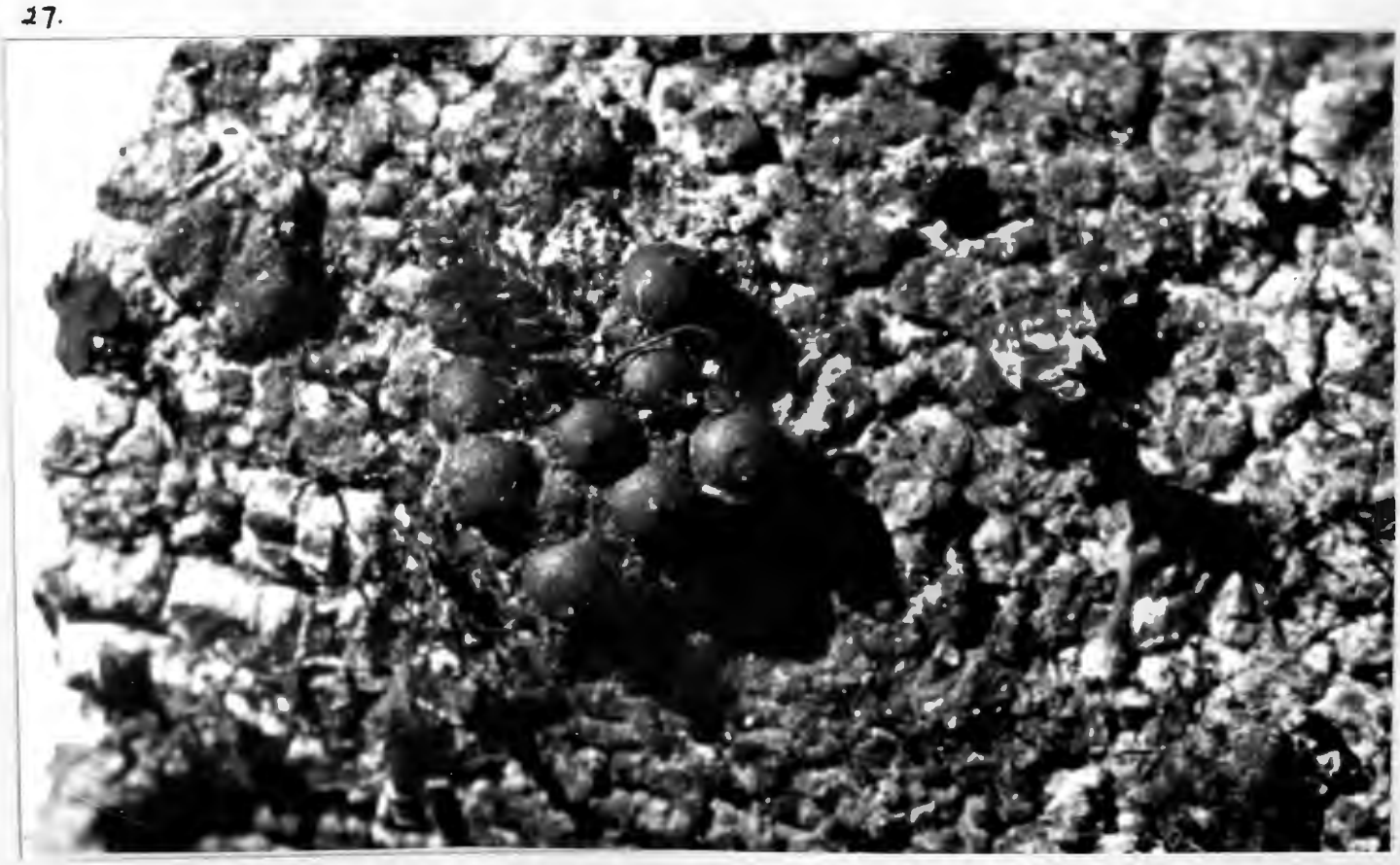


Fig.28. Longitudinal sections through the stromata of:-

A. Rosellinia aquila, 22; penzigioid type with pale entostroma uni-or biperitheciate.

B. Rosellinia aquila, 561; normal type with dark uncarbonized entostroma, uniperitheciate, rarely biperitheciate.

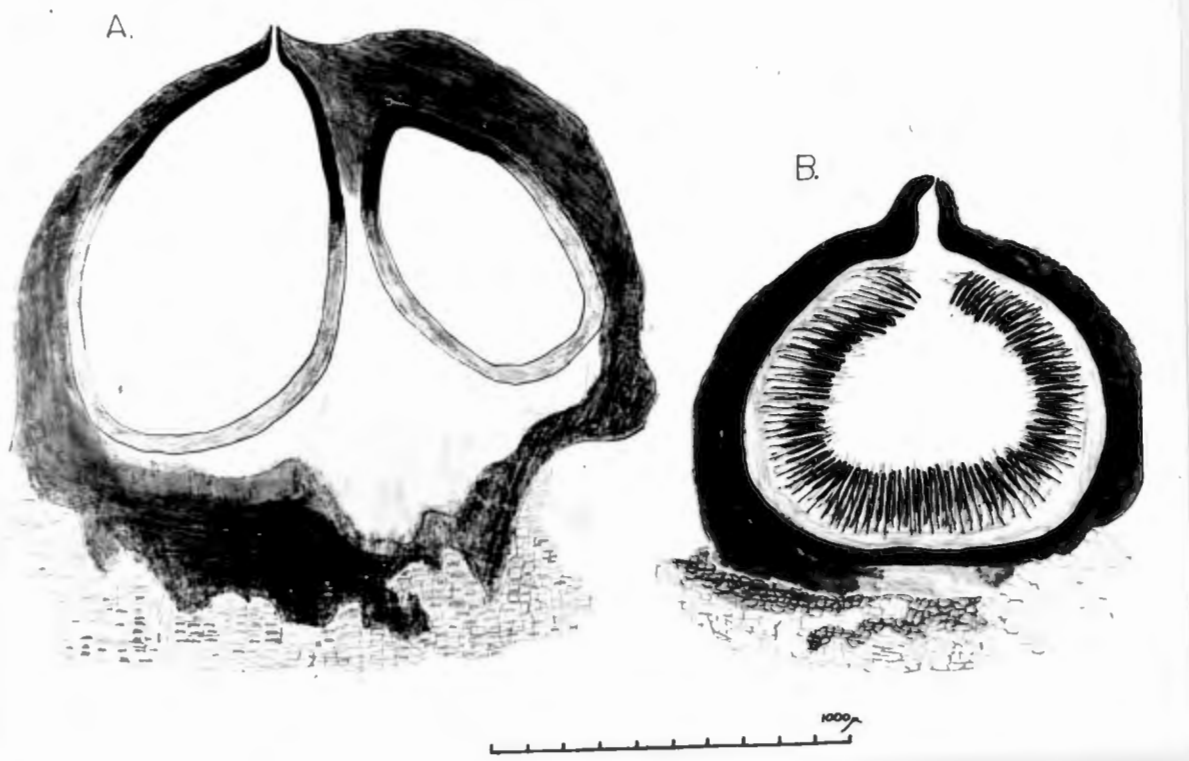
(N.B. All other Rosellinia species similar to this type except where specifically stated.)

Fig.29. Asci & spores of:-

A,B. Rosellinia aquila, 540.

C. Rosellinia thelena, 508.

28



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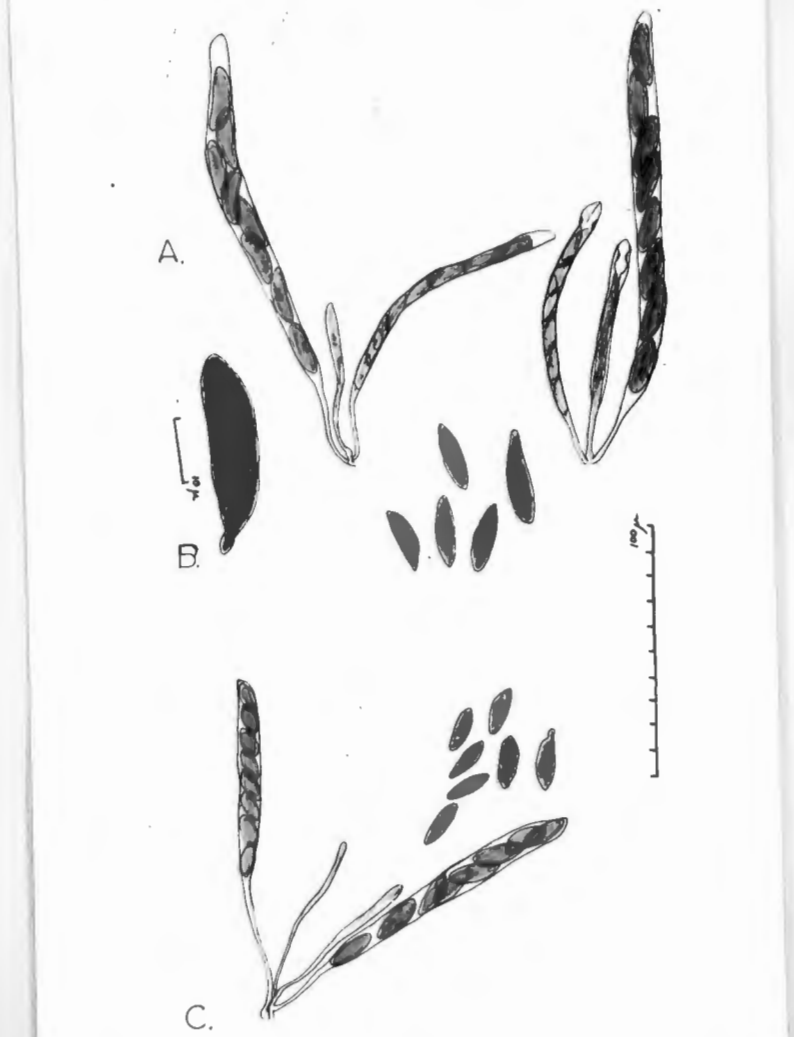
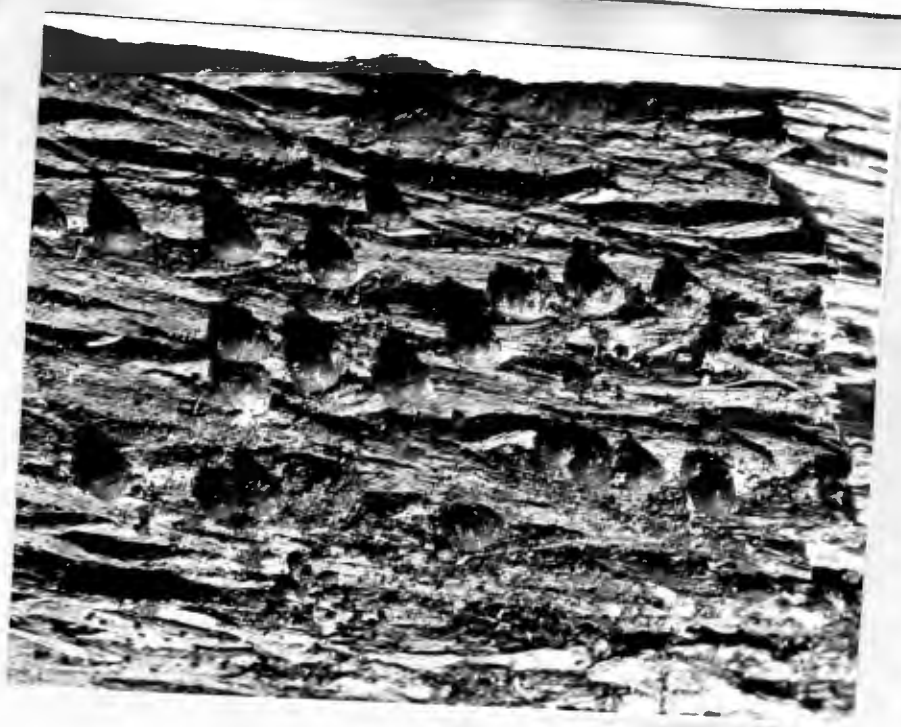


Hypoxylon glomeratum var.1, strains 377 & 119;

Fig.30. Strain 377; showing uniperitheciate with occasional biperitheciate stromata.

Figs.32,33. Strain 119; showing gradation from uni- to biperitheciate stromata.

30



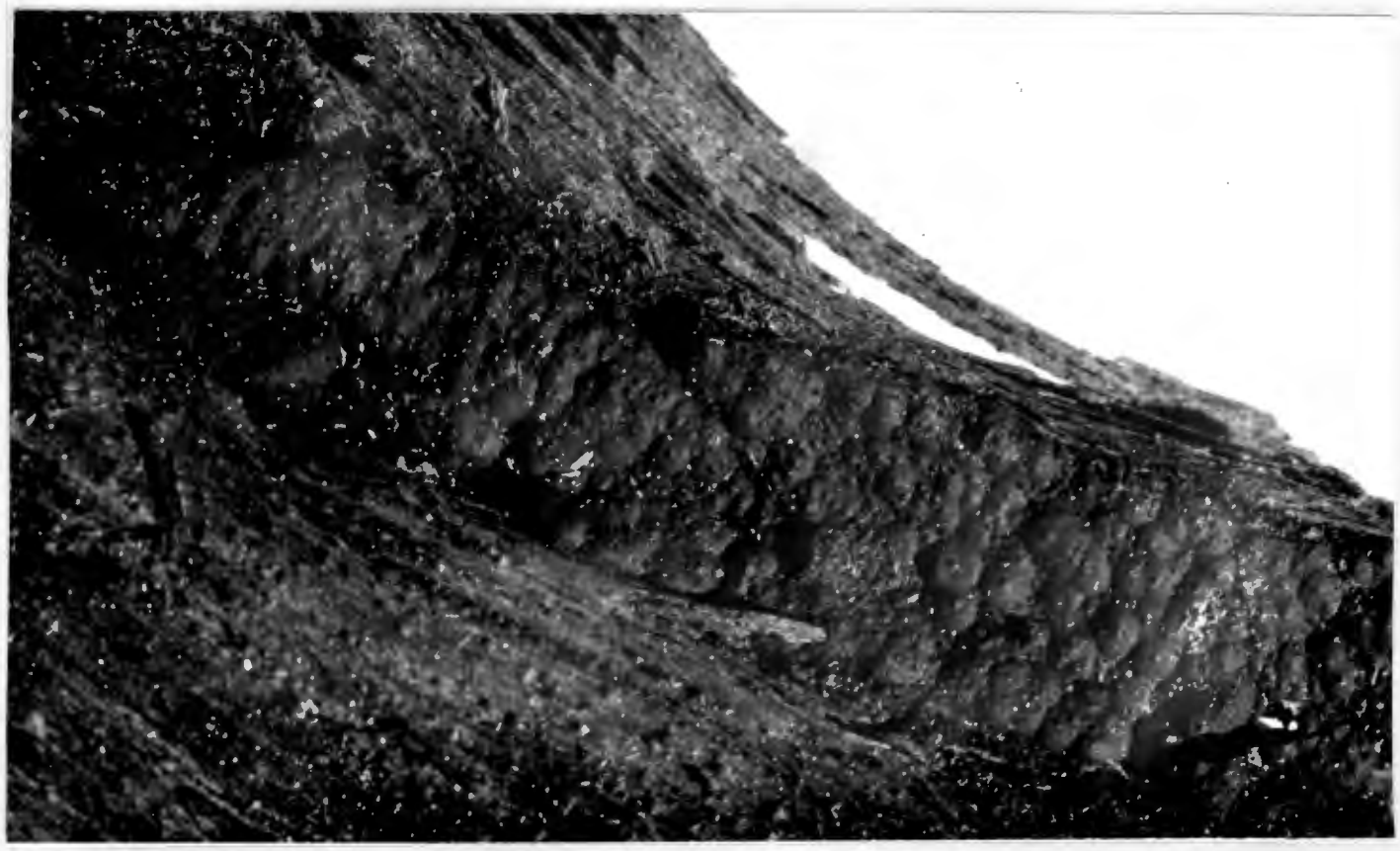
32.

33

Figs.34,35. Hypoxylon glomeratum var.l, 524;
Multiperithecia te stromata containing perithecia of various sizes and showing various degrees of immersion within the stroma.

34.

35.



Hypoxylon glomeratum var.l.

Fig.36. Strain 524; multiperithecíate stroma with perithecia closely associated, relatively small, and only vaguely evident in outline.

Fig.37. Strain 227:-
Note various degrees of coalescence of the stromata.

36.

37.

Hypoxylon glomeratum var.1.

Fig.38. Enlargement of Fig.37.

Fig.39. Strain 546; collected in the field, showing developing stromata with white or pale grey superficial conidial layer.

38.

39.

Hypoxylon glomeratum var.1.

Fig.40. Strain 553; collected in the field, showing the same features as in Fig.39. Note the emergent apices of the young perithecia.

Fig.41. Longitudinal sections through stromata of:-

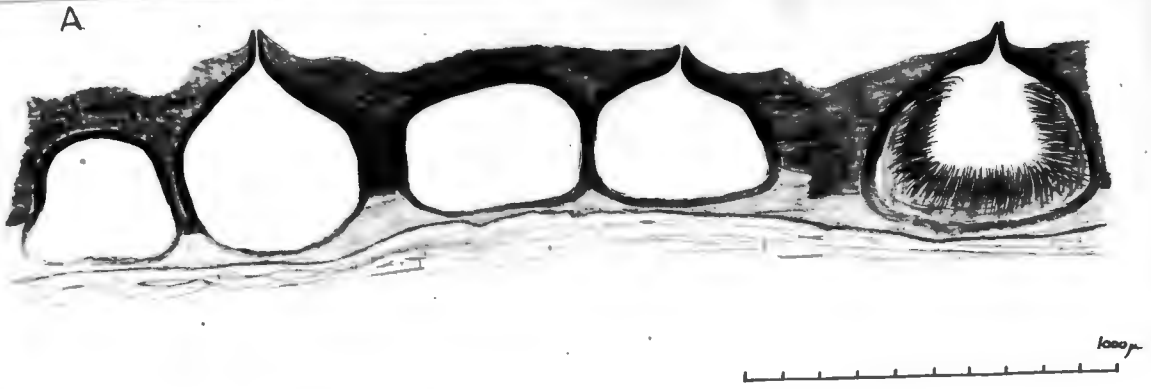
A. multiperitheciate type, 524,

B. uniperitheciate type, 377.

40

41.

A



1000 μ

B

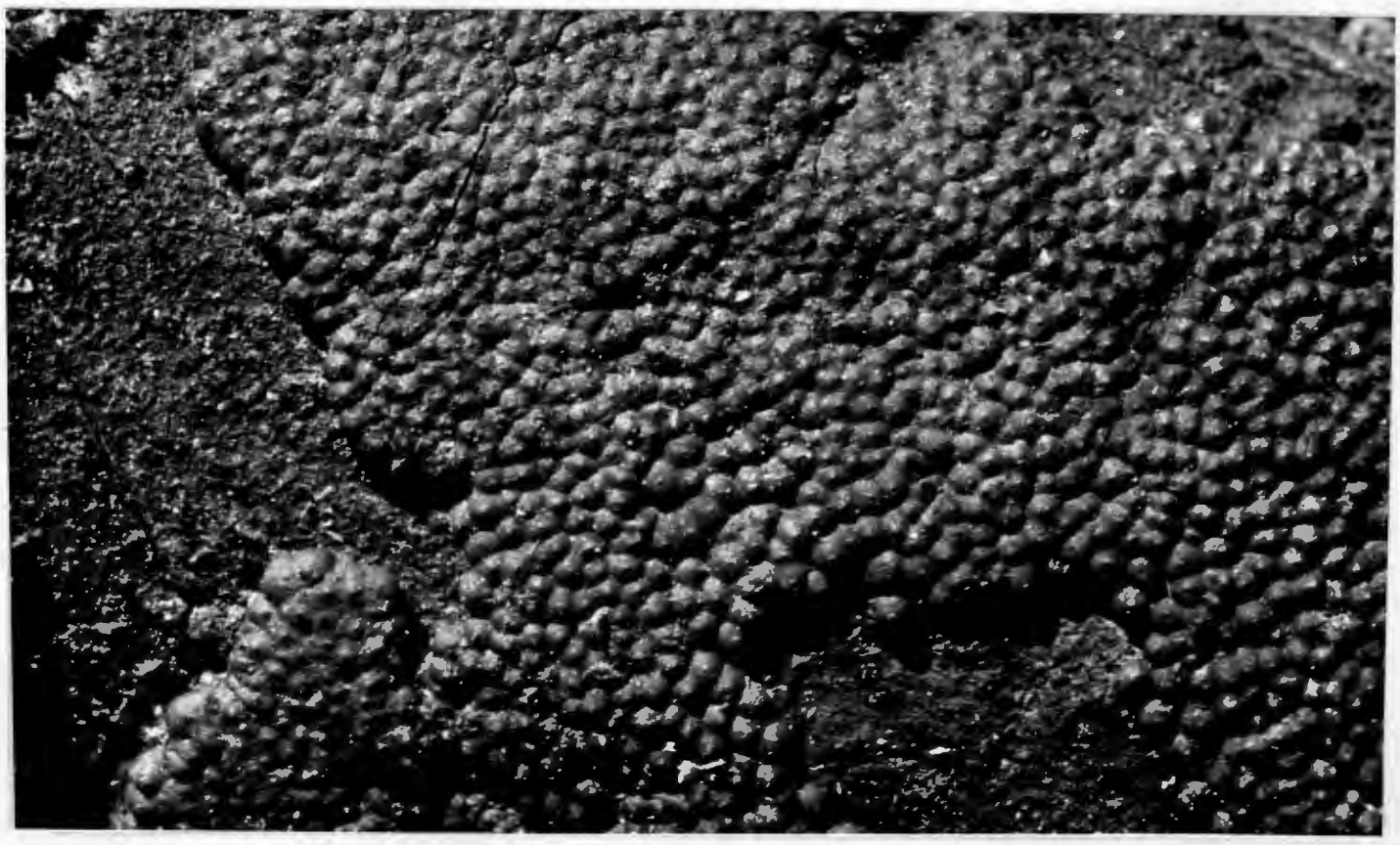
Hypoxylon glomeratum var.2, 212;

Fig.42. Surface view of stromata, about $\frac{1}{4}$ natural size.

Fig.43. Enlargement of the same.

42.

43.



Figs. 44 & 45. Hypoxylon glomeratum var. 3, 396 & 535;
showing small pulvinate stromata, enlarged.

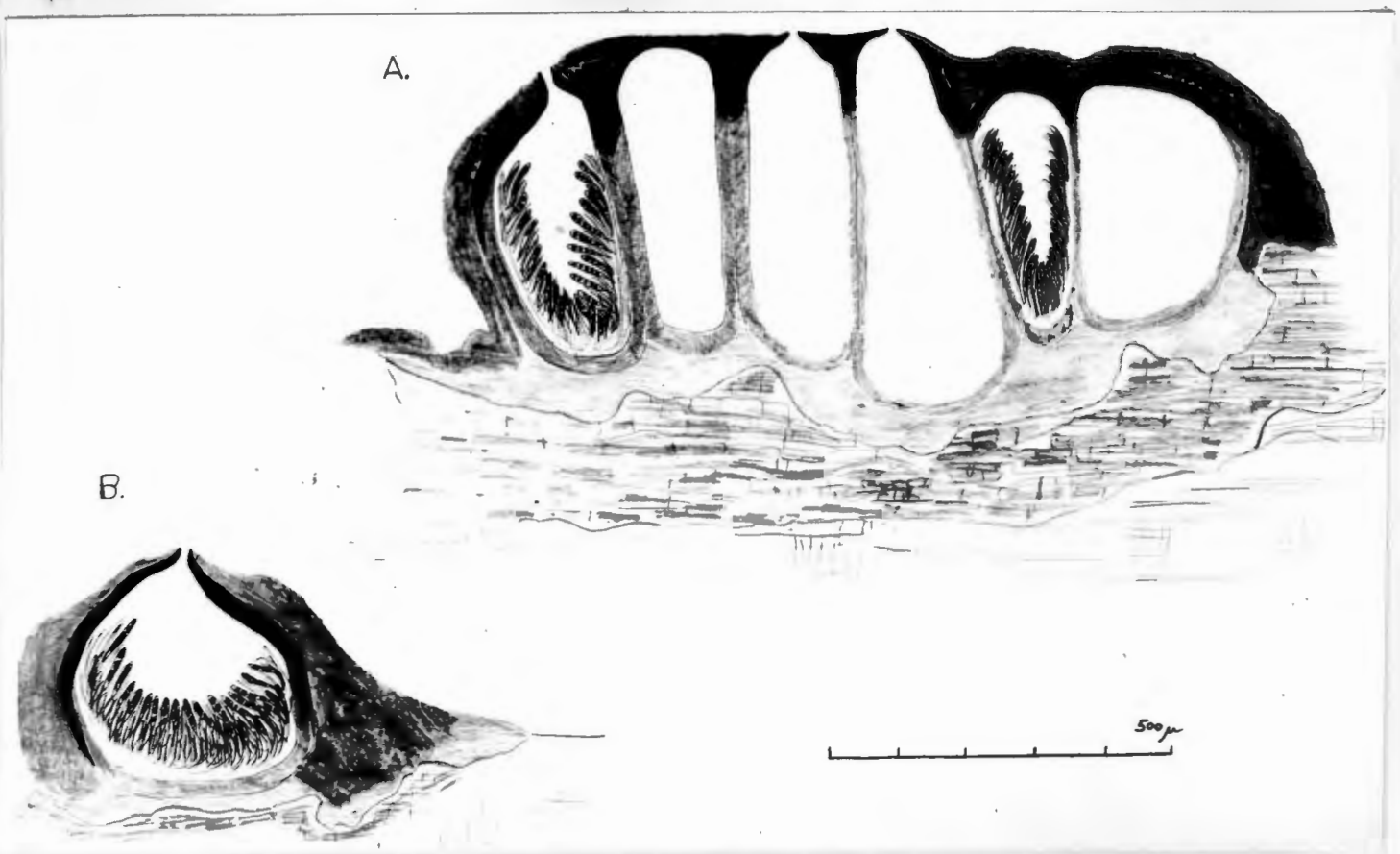
44.

45.

Fig.46. Hypoxylon glomeratum var.3, 396;
Longitudinal section of:-
A. multiperitheciate stroma.
B. uniperitheciate stroma.

Fig.47. Hypoxylon glomeratum var.4, 130;
Surface view of stromata slightly less than natural size.

46



47.

1 2

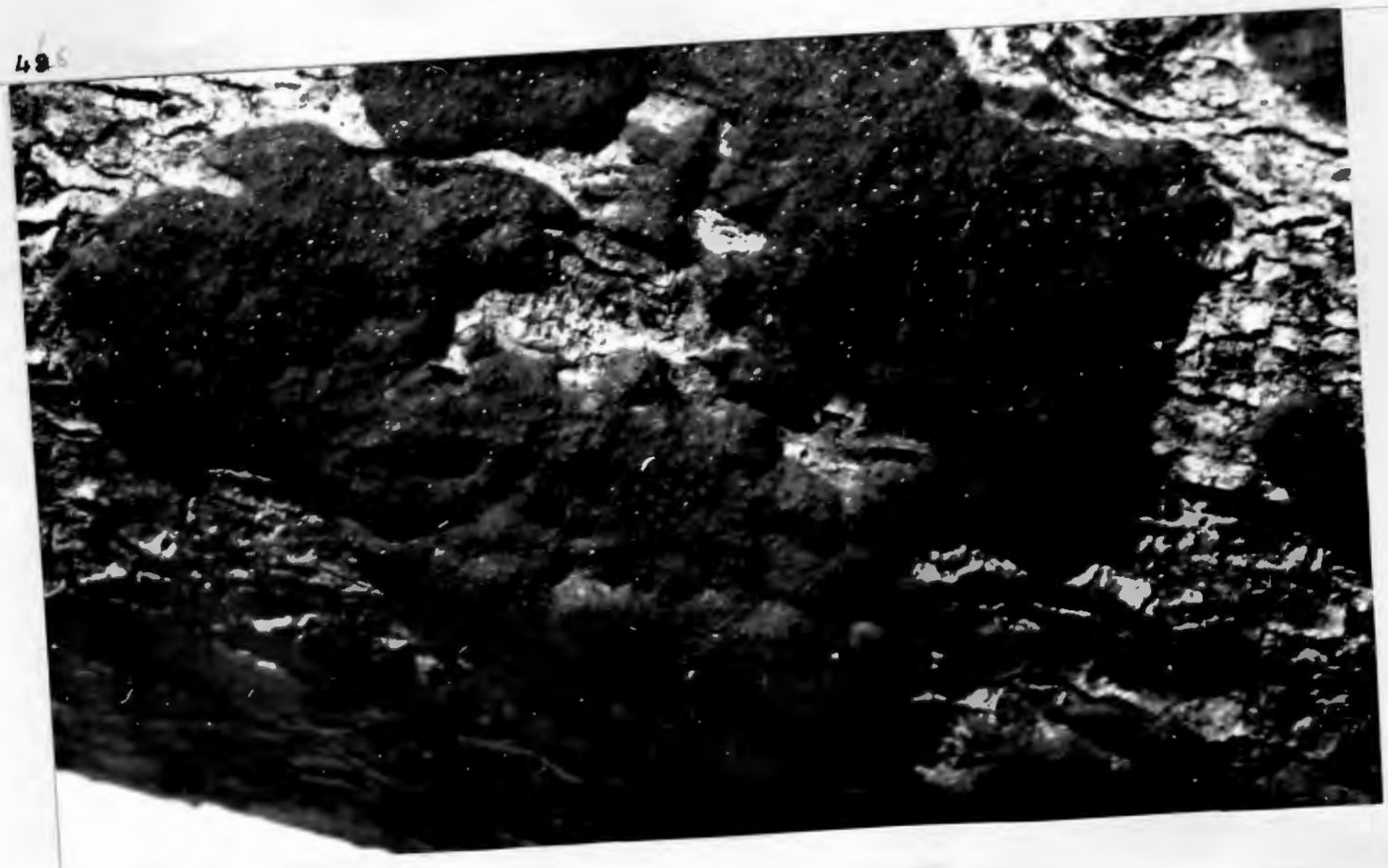
Fig.48. Hypoxylon glomeratum var.4, 130; enlargement showing complete immersion of perithecia within the stroma.

Fig.49. Longitudinal sections of the stromata of:-

A. Hypoxylon glomeratum var.4, 335.

B. Hypoxylon glomeratum var.2, 212.

48



49

A.

B.

Hypoxylon glomeratum var. 5, 397.

Fig. 50. Surface view of stromata, ½ natural size.

Fig. 51. Enlargement of the same.

50

17

51

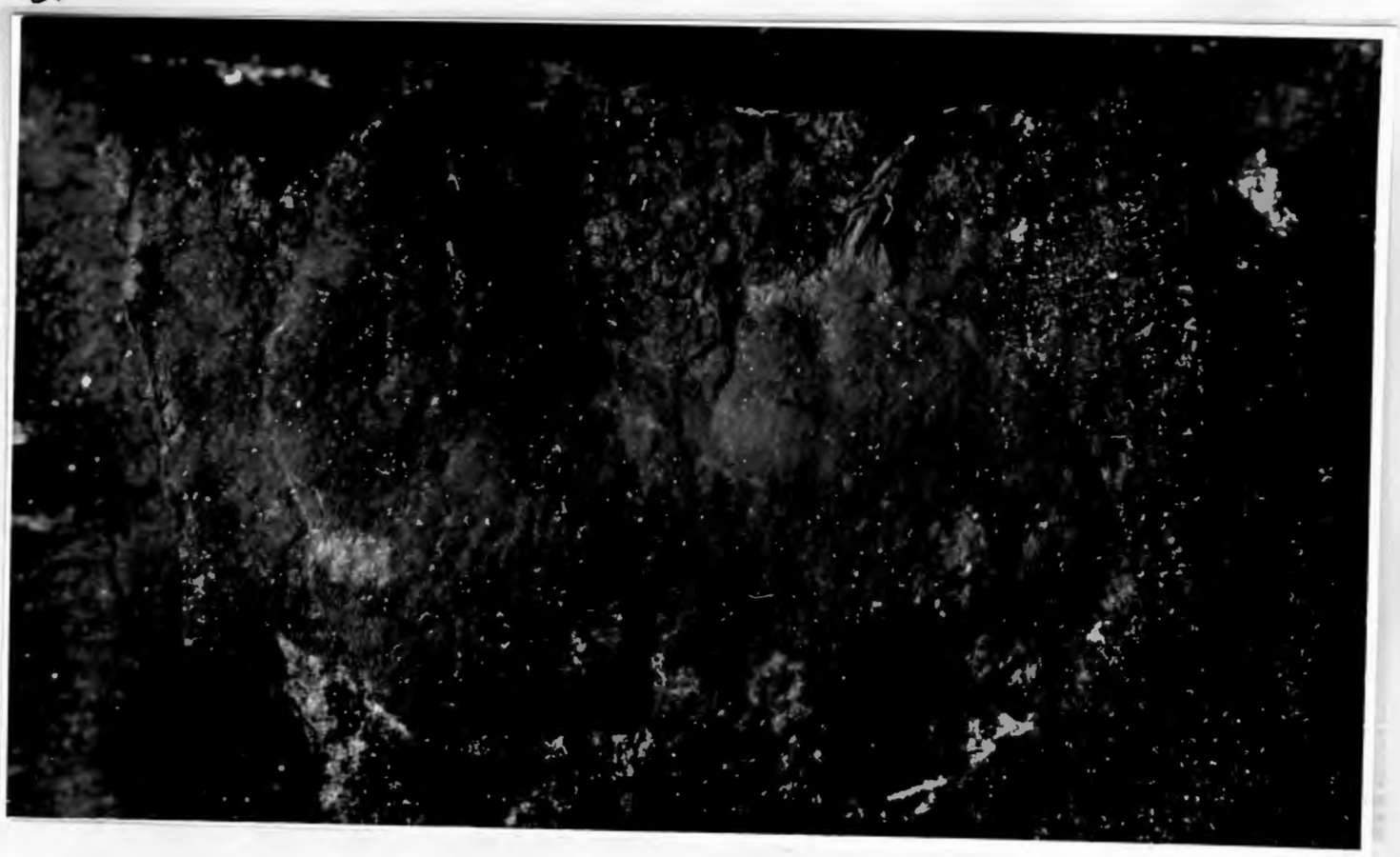


Fig.52. Asci & spores of:-

A. Hypoxylon glomeratum var.1, 524.

B. Hypoxylon glomeratum var.1, 272.

A form with shorter ascal stalks.

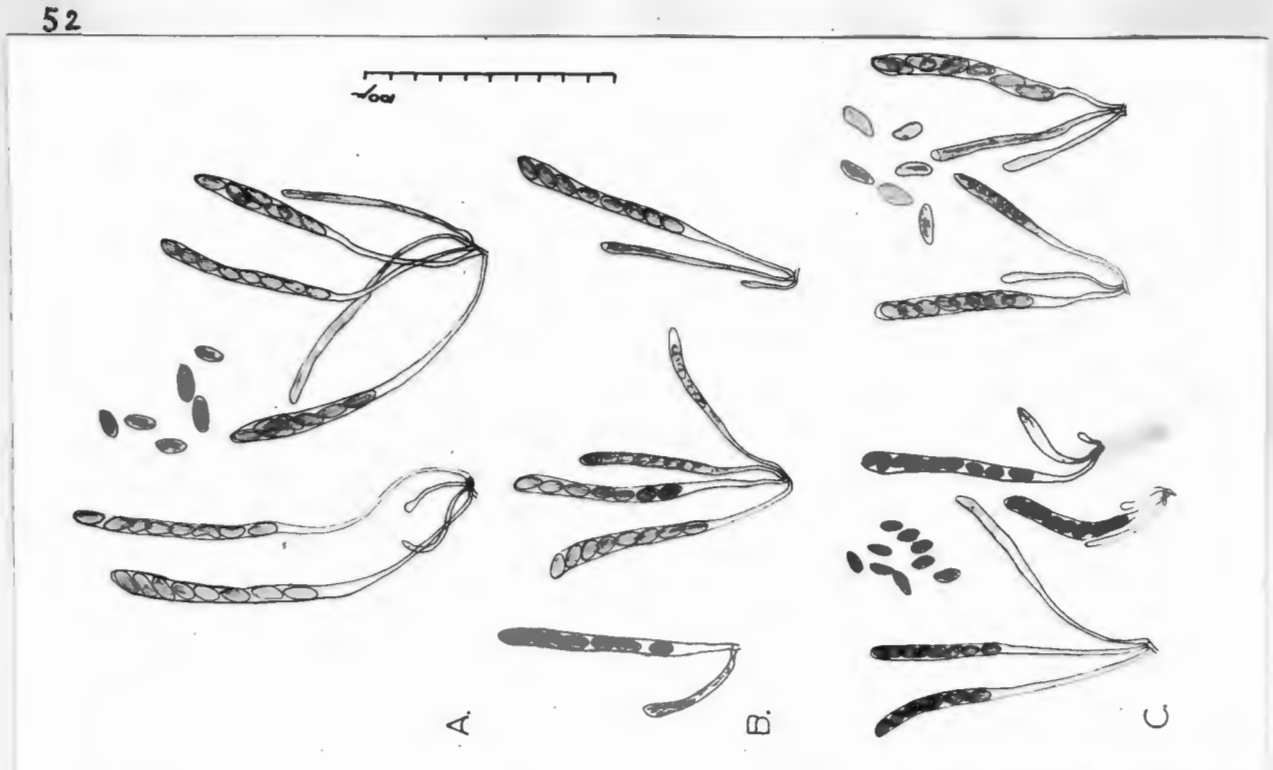
C. Hypoxylon glomeratum var.4, 335.

D. Hypoxylon glomeratum var.3, 396.

Fig.53. Nummularia succenturiata, 229; stromata, slightly less than natural size.

Fig.54. Nummularia succenturiata, 156; enlargement.

52



53

54

Nummularia uni-apiculata, 372.

Fig.55. Surface view of stroma, ½ natural size.

Fig.56. Enlargement of the same.

Fig.57A. Hypoxylon exutans, 382.
Surface view of stromata, just under natural size.

55.

56.

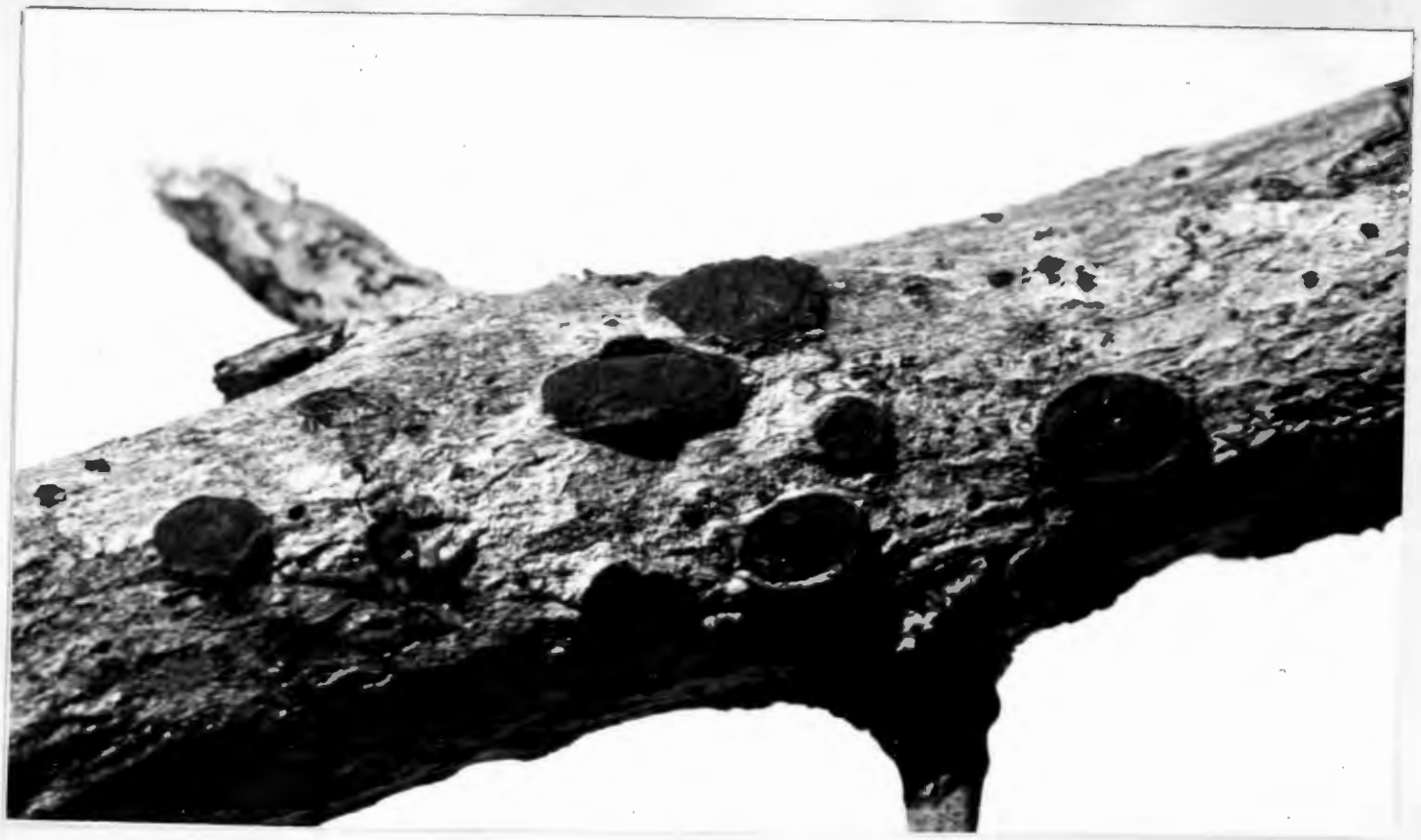
57A.

1 18

Fig.57B. Hypoxylon exutans, 382.
Enlargement of Fig.57A.

Fig.58. Hypoxylon species 13A, 127.
Surface view of stromata, 2/3 natural size.

578.



58.

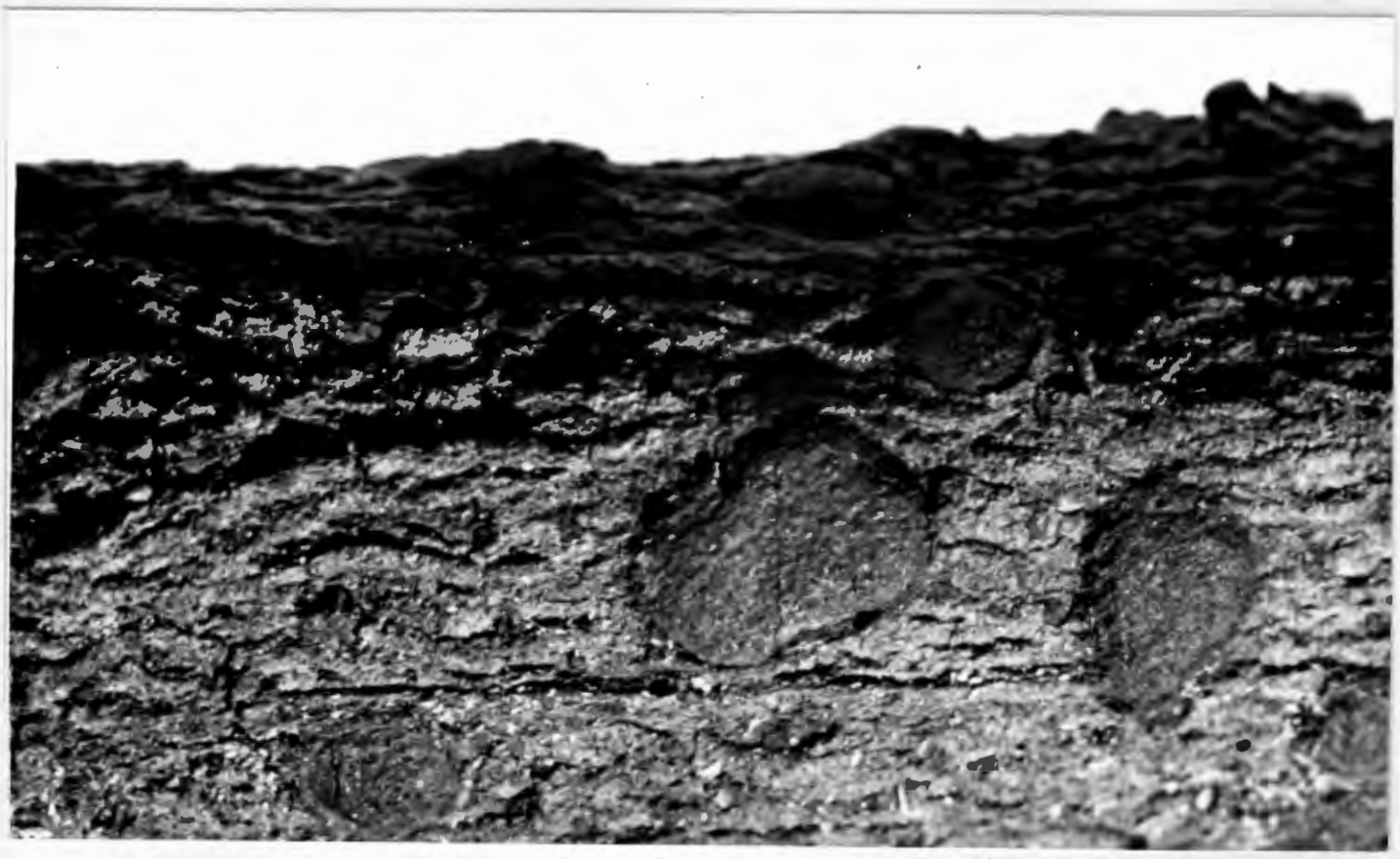
Fig.59. Enlarged view of Fig.58.

Fig.60. Longitudinal sections through the stromata of:-

A. Hypoxylon 13A, 127.

B. Hypoxylon exutans, 382.

59.



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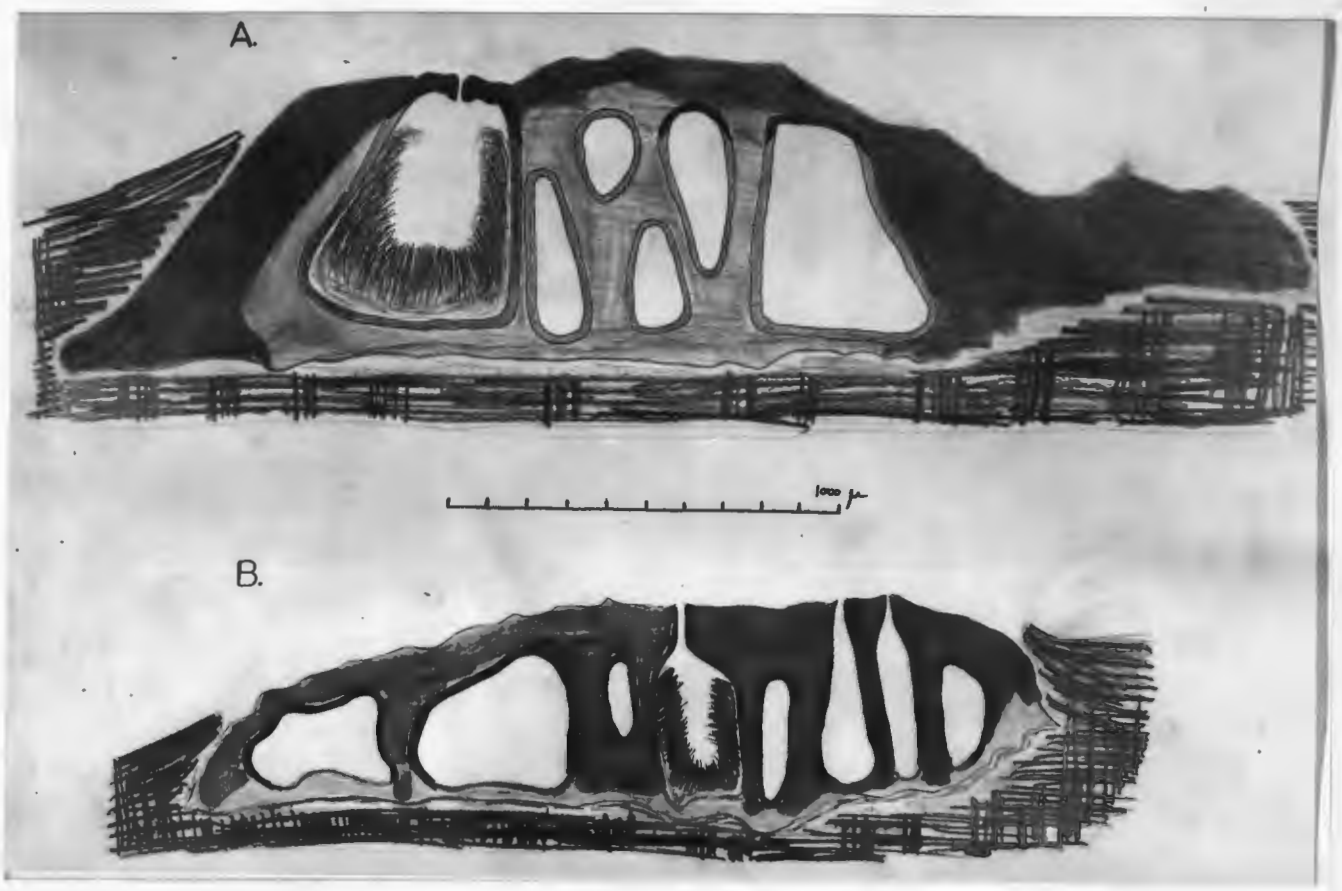


Hypoxylon merrillii.

Figs.61,62. Variation in form of stromata: strains 263, 70, 364.

Fig.63. Strain 263, enlarged.

61

62

63

Hypoxylon nummularium, 275.

Figs.64,65. Compare with previous 3 figures. Note shiny surface and prominent papillate ostioles.

64

65.

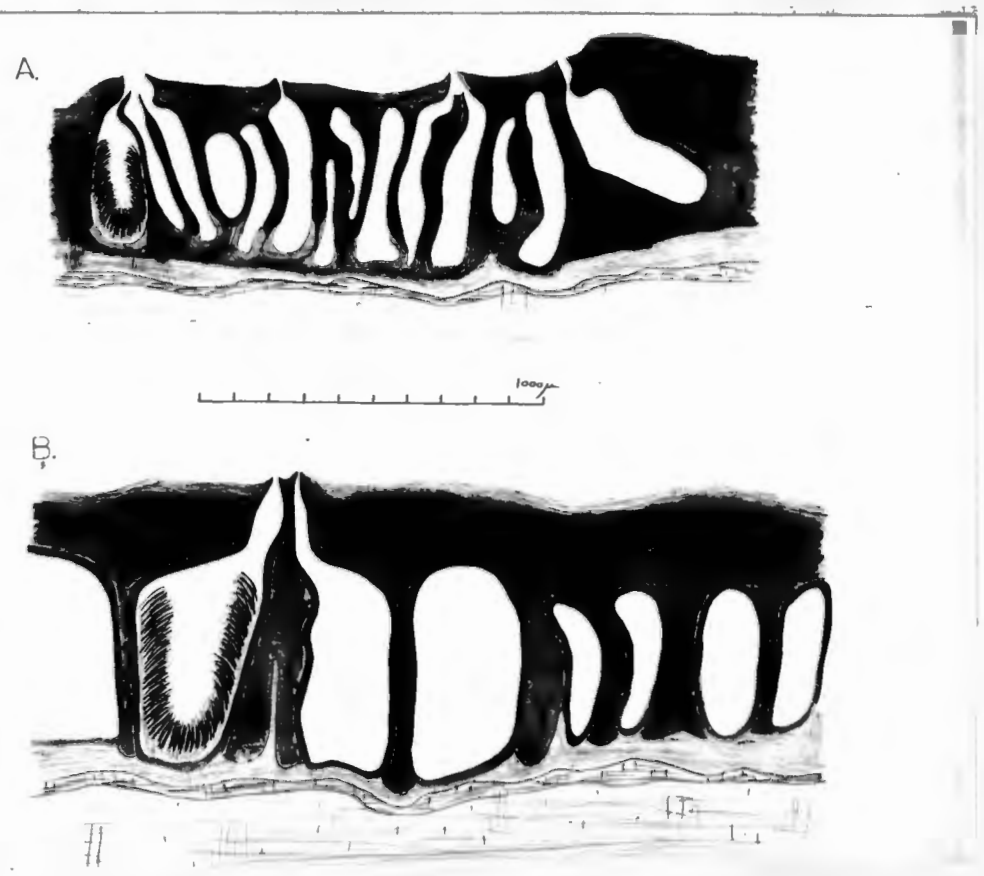
Fig.66. Longitudinal sections through the stromata of:-

A. Hypoxylon merrillii, 447.

B. Hypoxylon nummularium, 275.

Figs.67,68. Hypoxylon mediterraneum, 19 & 31; surface views of stromata 1/3 natural size.

66.



67.

68.

Fig.69. Hypoxylon mediterraneum.

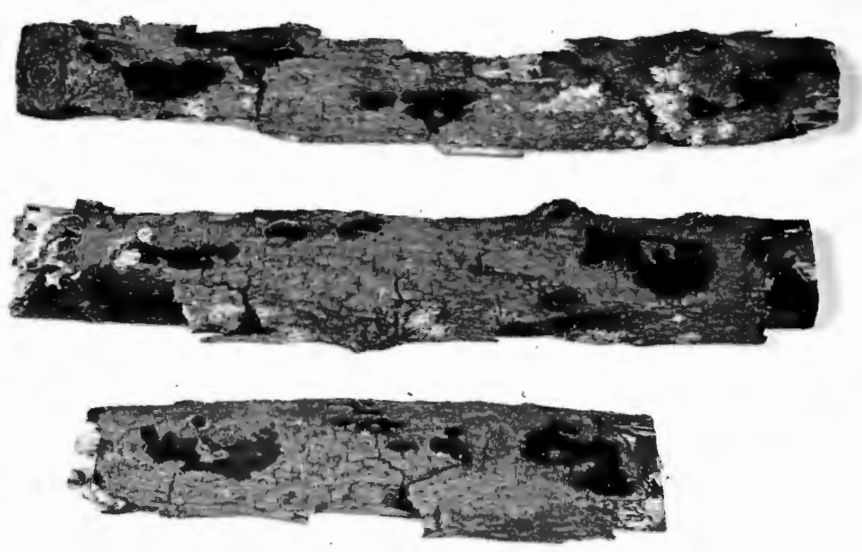
Enlarged view of Fig.67.

Fig.70. Hypoxylon asarcodes, 262.

Surface view of stromata about ½ natural size.

69

70



Figs.71,72. Hypoxylon asarcodes.

Enlargements of Fig.70.

Fig.72 shows the papillate ostioles clearly.

71

72

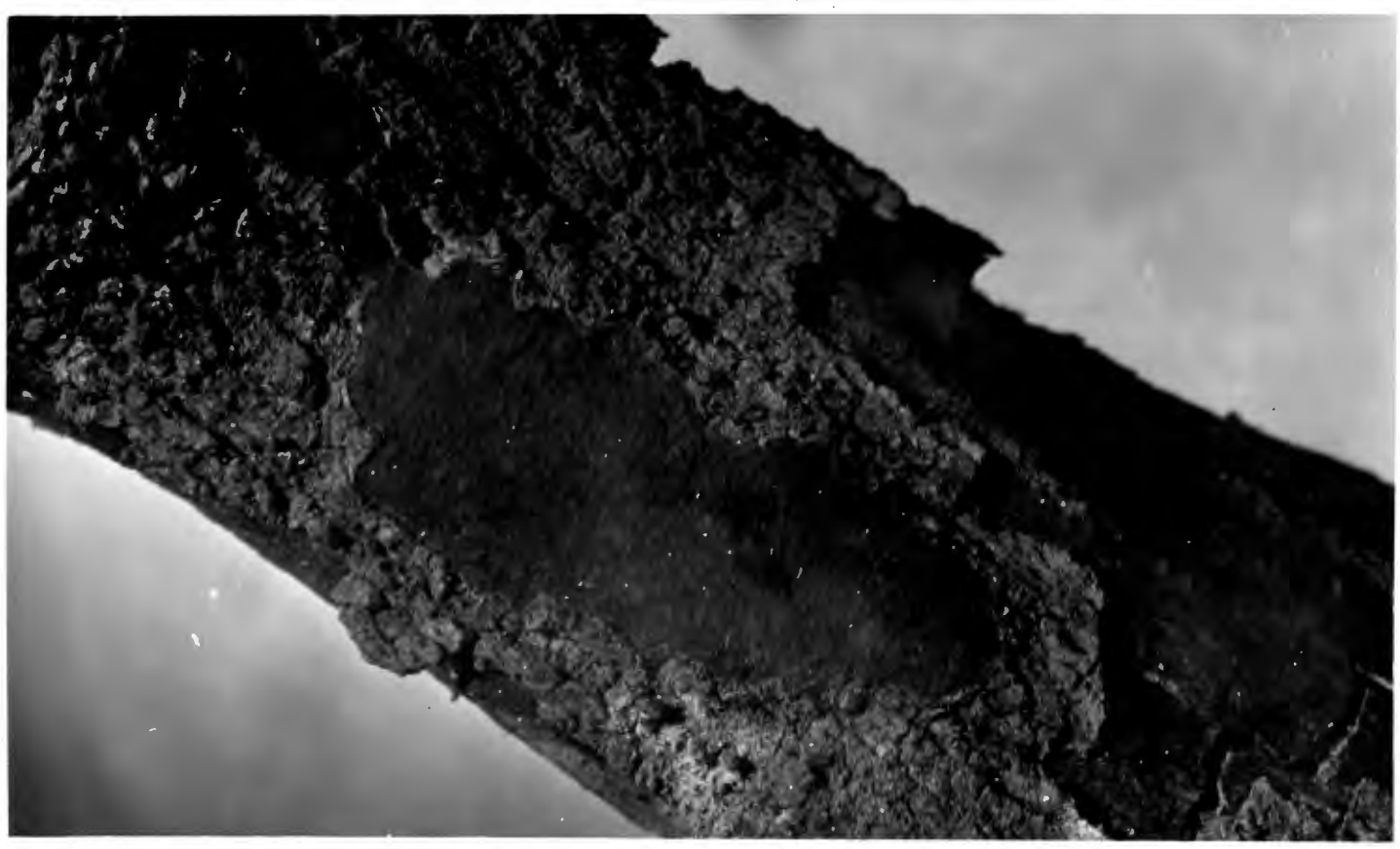


Fig.73. Longitudinal sections through the stromata of:-

A. Hypoxylon glomeratum var.5, 397.

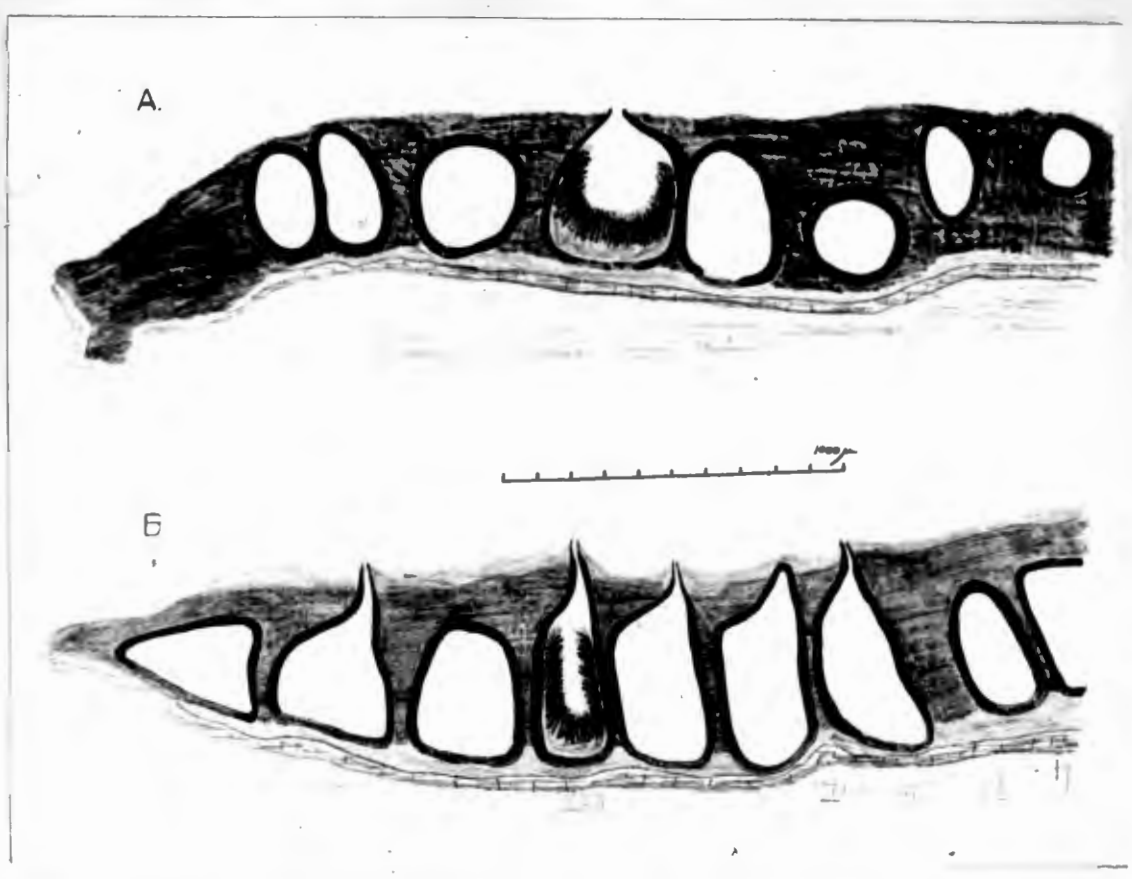
B. Hypoxylon asarcodes, 262.

Note similarity in form between the effuse form of Hypoxylon glomeratum and a typical member of the Nummularium group.

Fig.74. Nummularia kalchbrennera, 35; stromata about ½ natural size.

Fig.75. Nummularia kalchbrennera, 402; enlarged view whowing concave surface and raised edge of stroma.

73.



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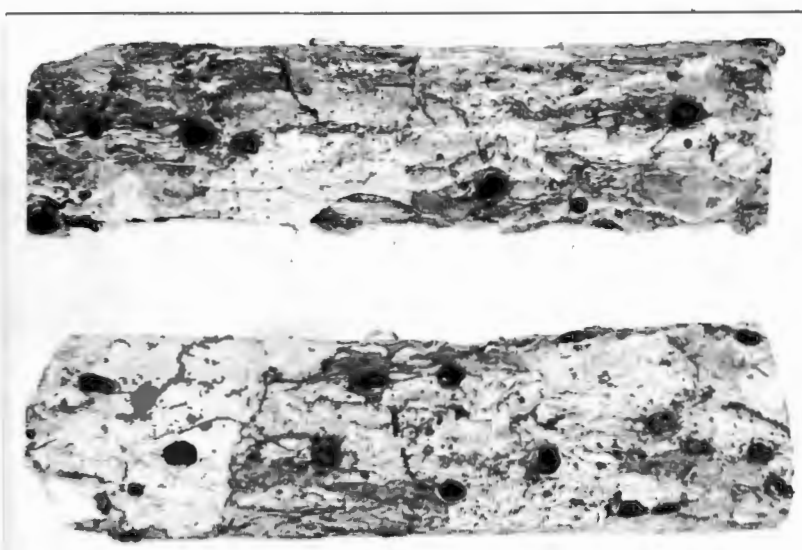


2 5

75.

Fig.76. Longitudinal sections of the stromata of:-

A. Nummularia uni-apiculata, 372.

B. Nummularia kalchbrennera, 402.

Fig.77. Asci & spores of:-

A. Hypoxylon glomeratum, var.5, 397.

B. Nummularia succenturiata, 218.

C. Hypoxylon merrillii, 447.

D. Hypoxylon nummularium, 275.

E. Hypoxylon mediterraneum, 381.

Fig.78. Asci & spores of:-

A. Nummularia uni-apiculata, 372.

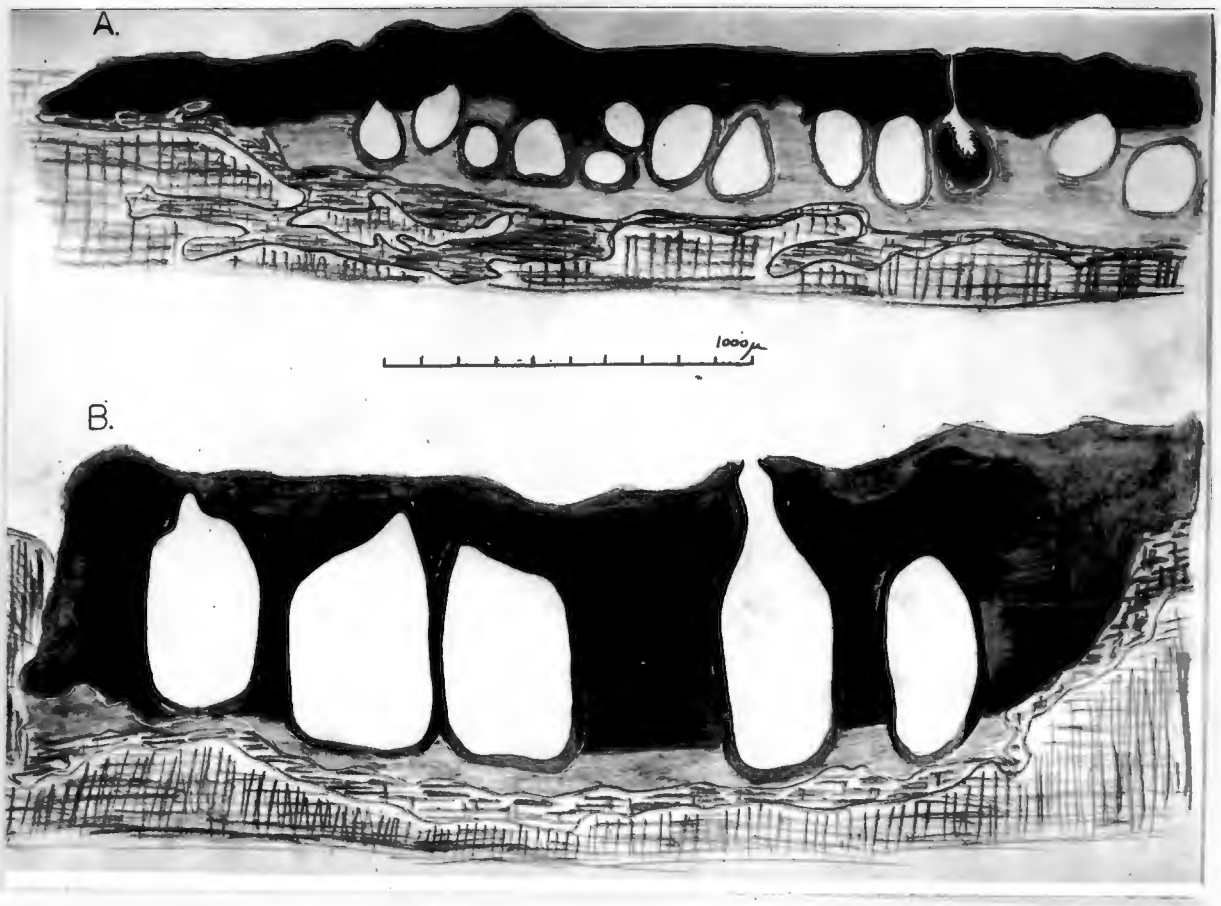
B. Hypoxylon asarcodes, 262.

C. Hypoxylon exutans, 382.

D. Hypoxylon 13A, 127.

E. Nummularia kalchbrennera, 402.

76.



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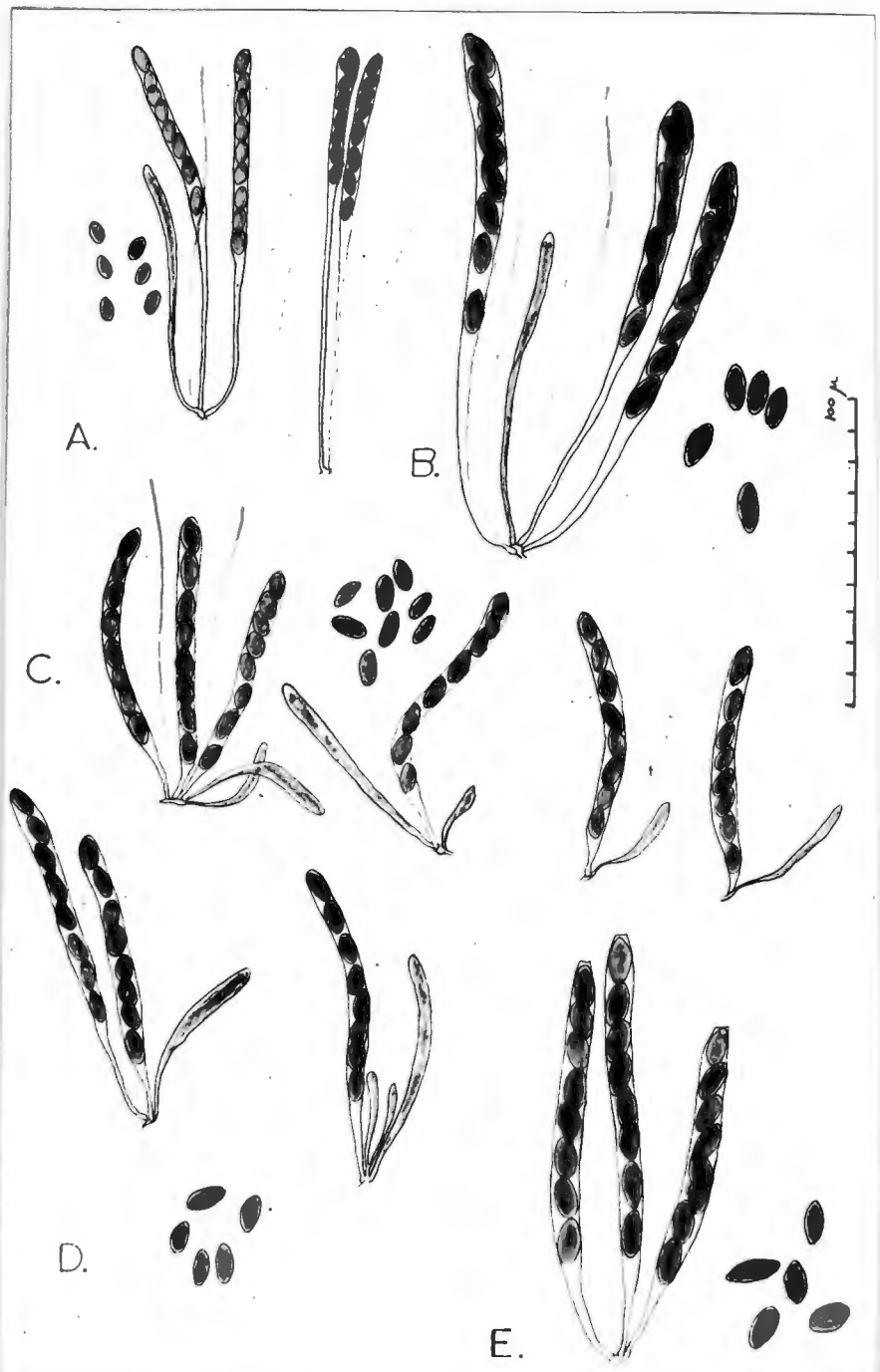
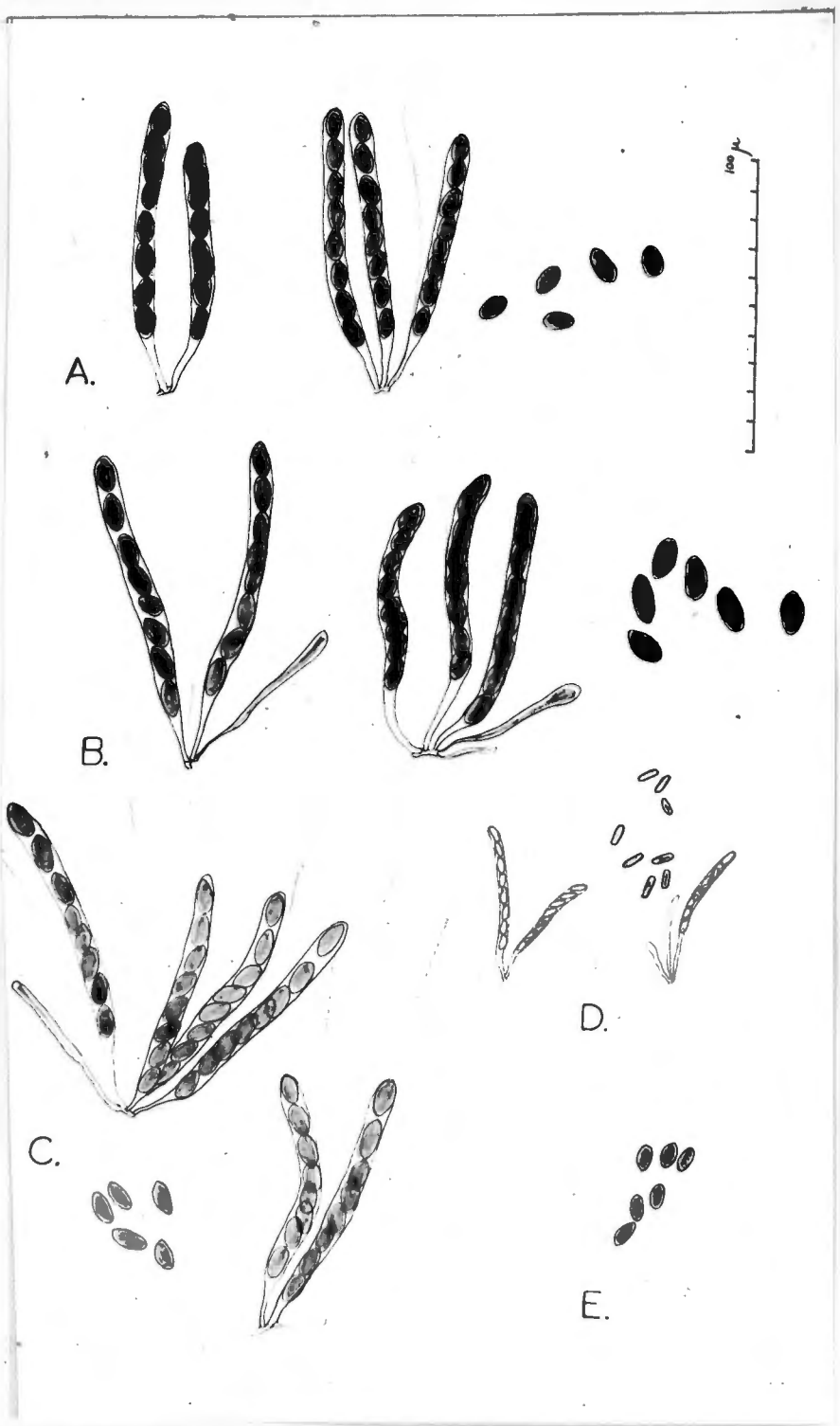


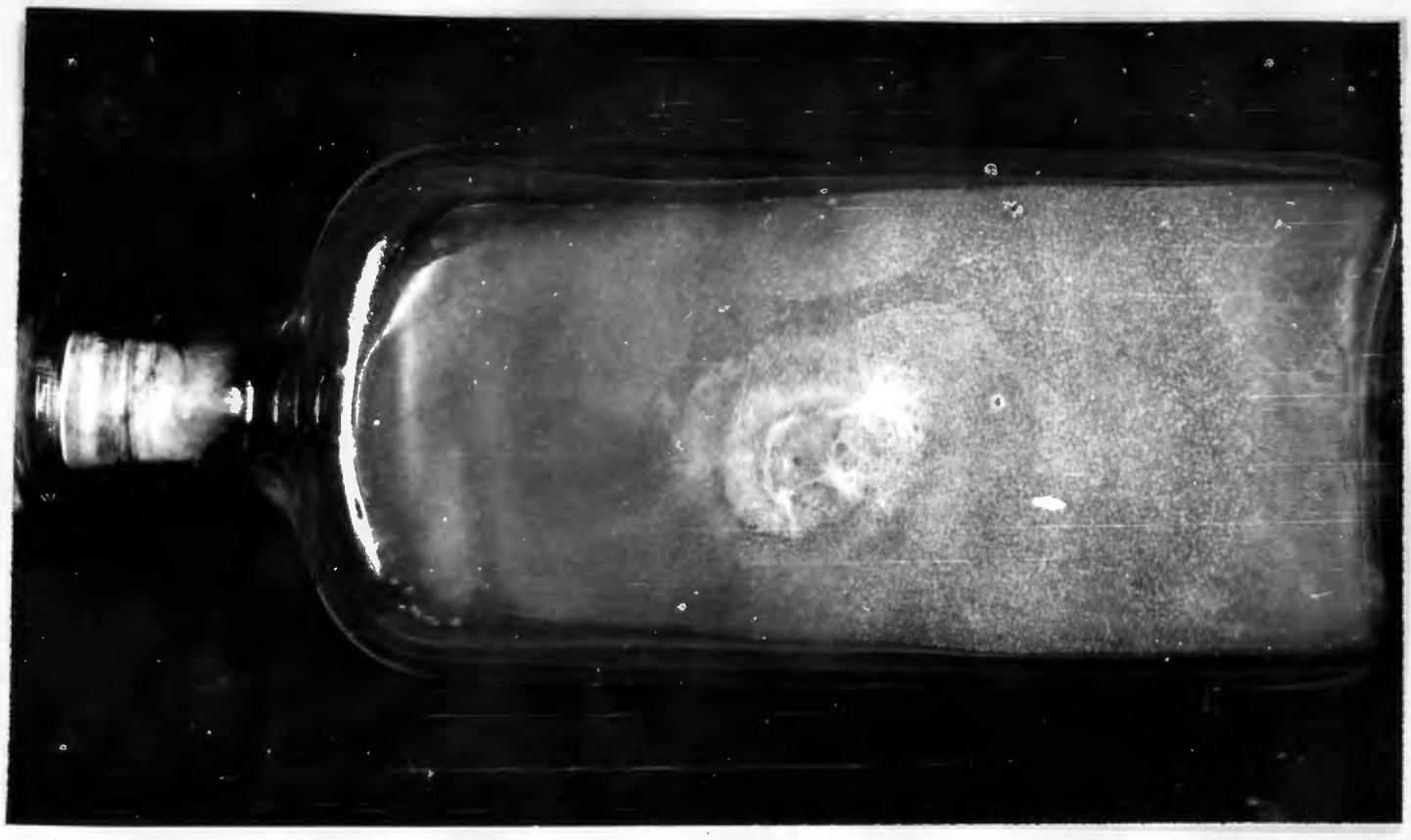

100 µ
A.
B.
C.
D.
E.

<u>Rosellinia apiculata</u>, 430; Bottle cultures.

Fig.79. Malt, 2 months old.

Fig.80. Leonian's, 2 months old.

79.



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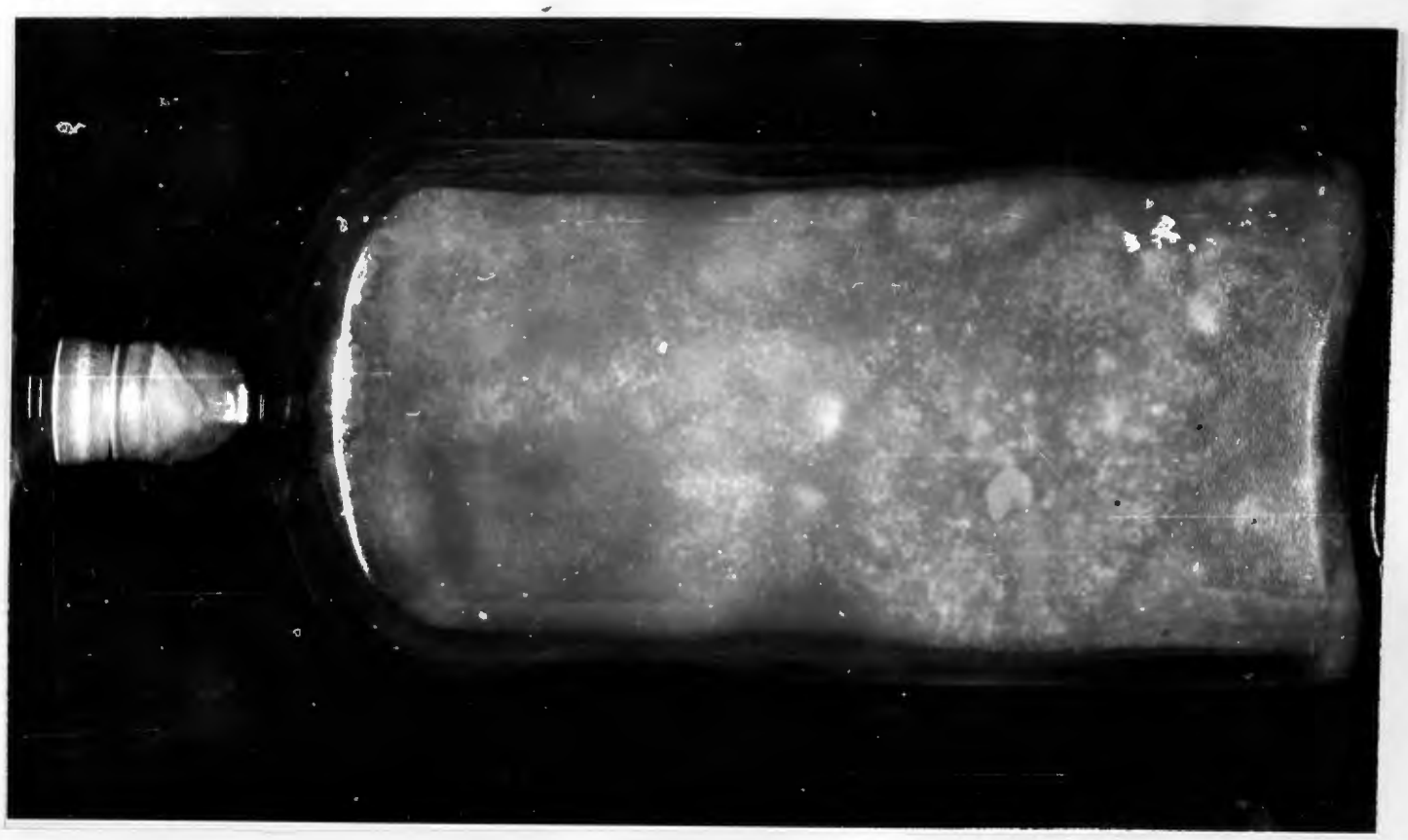
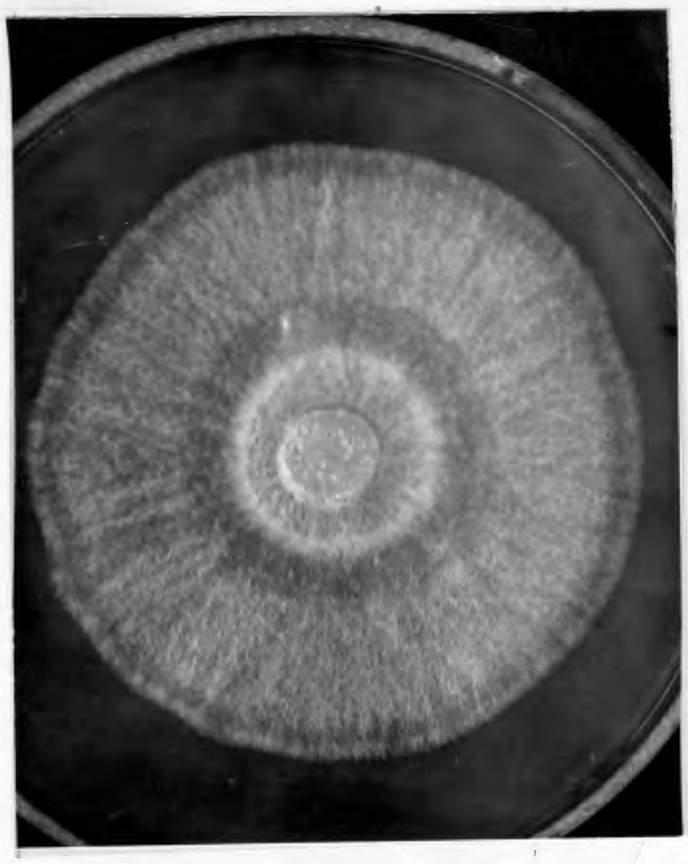


<u>Rosellinia apiculata</u>, 430; plate cultures.

Figs.81,82. Malt, 6 days old at 25°C.

Fig.83. Leonian's, 6 days old at 25°C.
Note gelatinous surface.

81.



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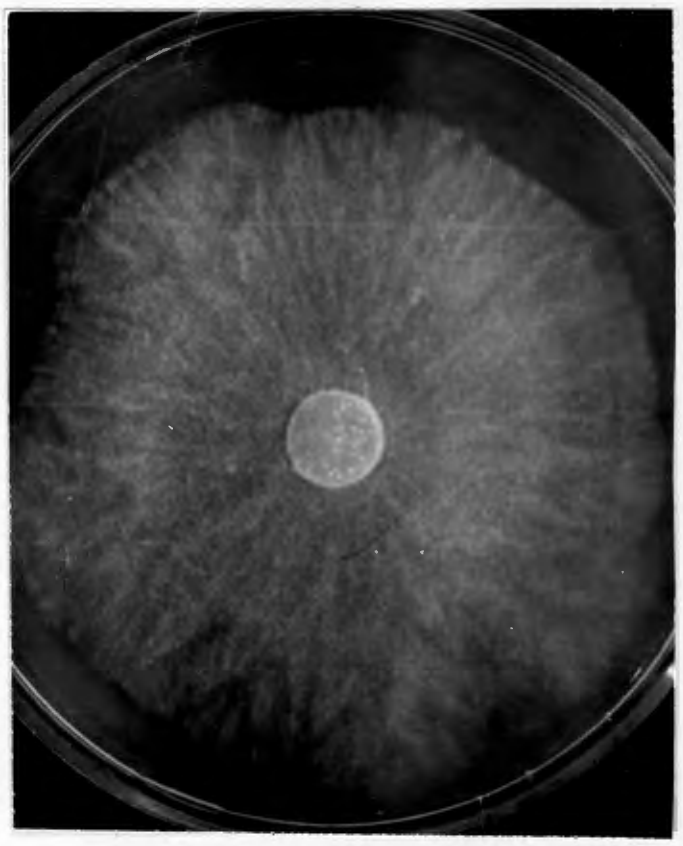

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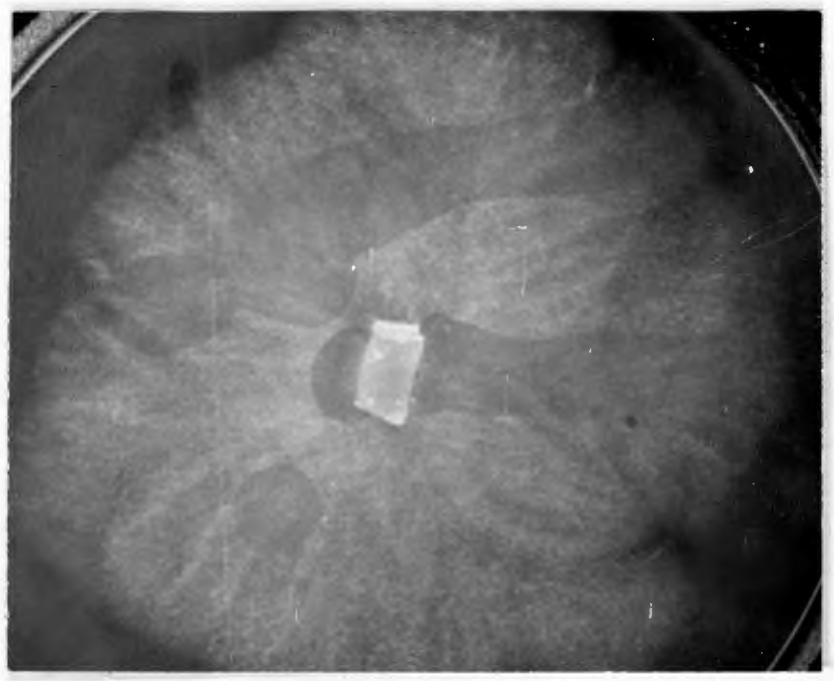


Hypoxylon glomeratum var.1, 524; Bottle cultures.

Fig.84. Malt, 2 months old.

Fig.85. Czapek, 3 months old.

84

85.

Hypoxylon glomeratum, var.1. plate cultures.

Figs.86,87. Malt. 86. strain 119, 16 days old at 20°C.
87. strain 524, 11 days old at 20°C.
Note thin aerial mycelium and abundant conidia.

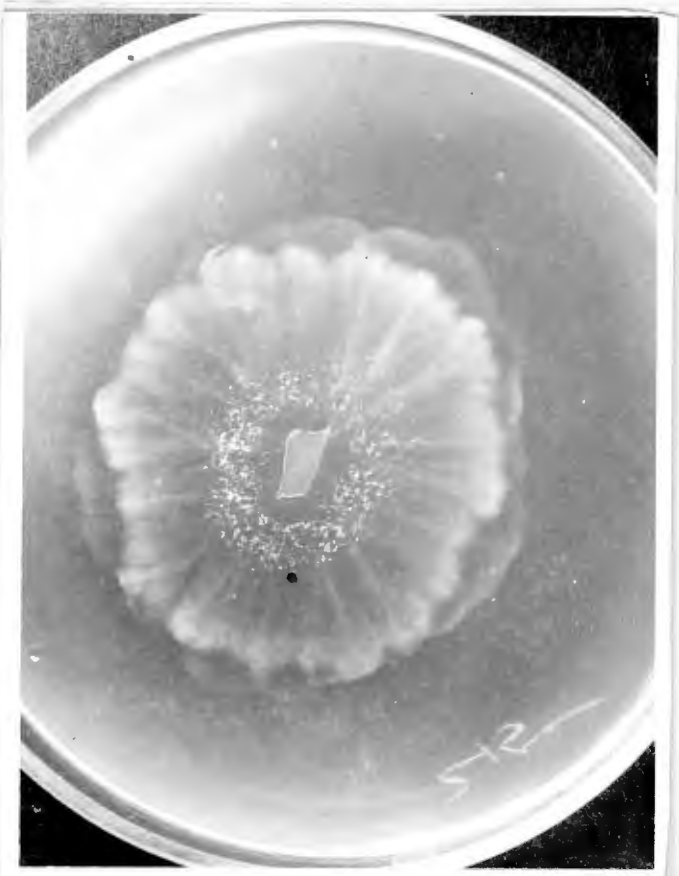
Fig.88. Maize. strain 524, 10 days old at 25°C.

Fig.89. Leonian's. strain 524, 10 days old at 25°C.

86

87

88



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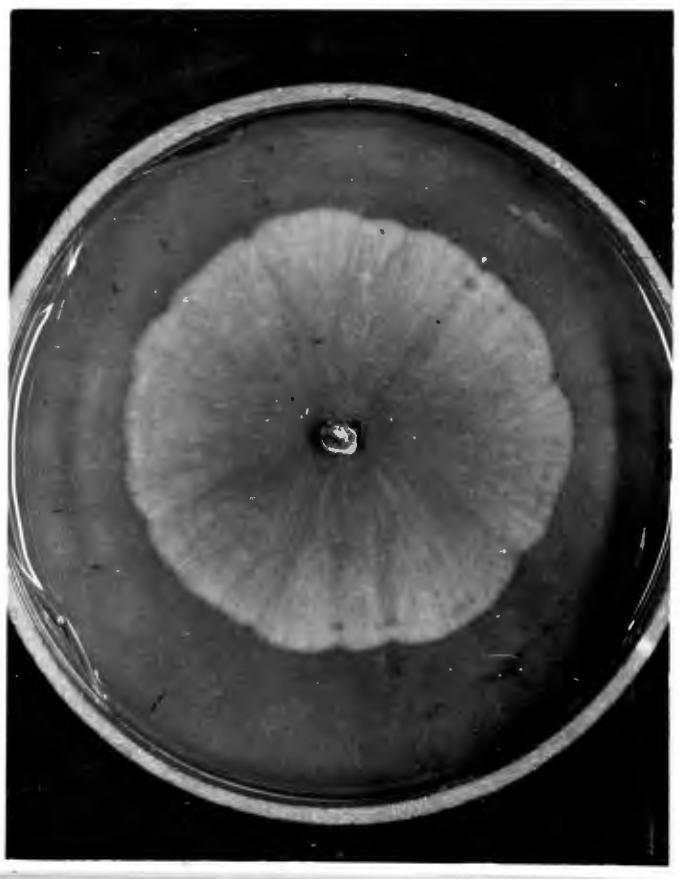


Hypoxylon glomeratum var.1, 524; plate cultures.

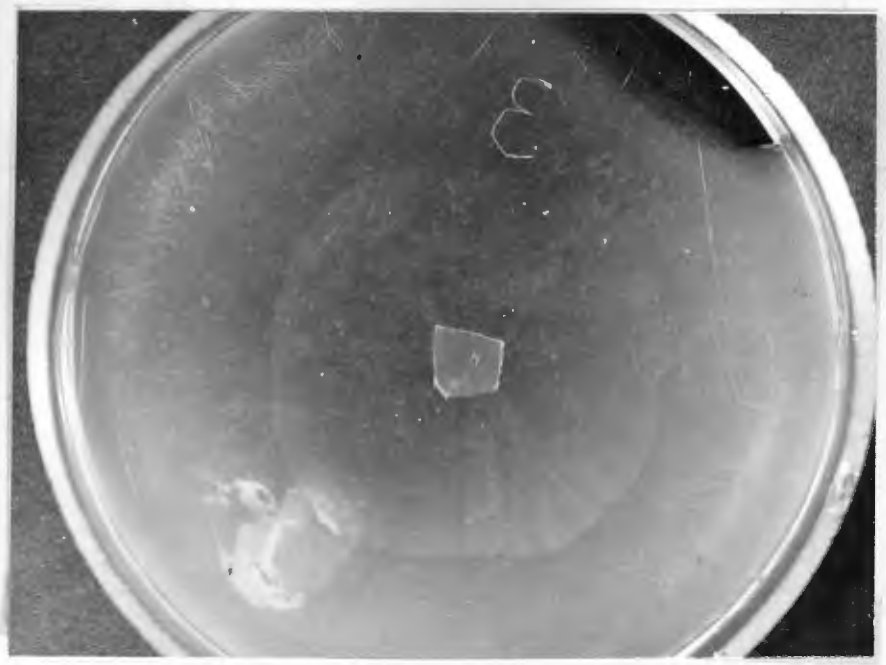
Fig.90. Czapek 10 days old at 25°C.

Hypoxylon glomeratum var.2, 212; bottle cultures.

Fig.91. Leonian's 2 months old.

Fig.92. Czapek 2 months old.

90



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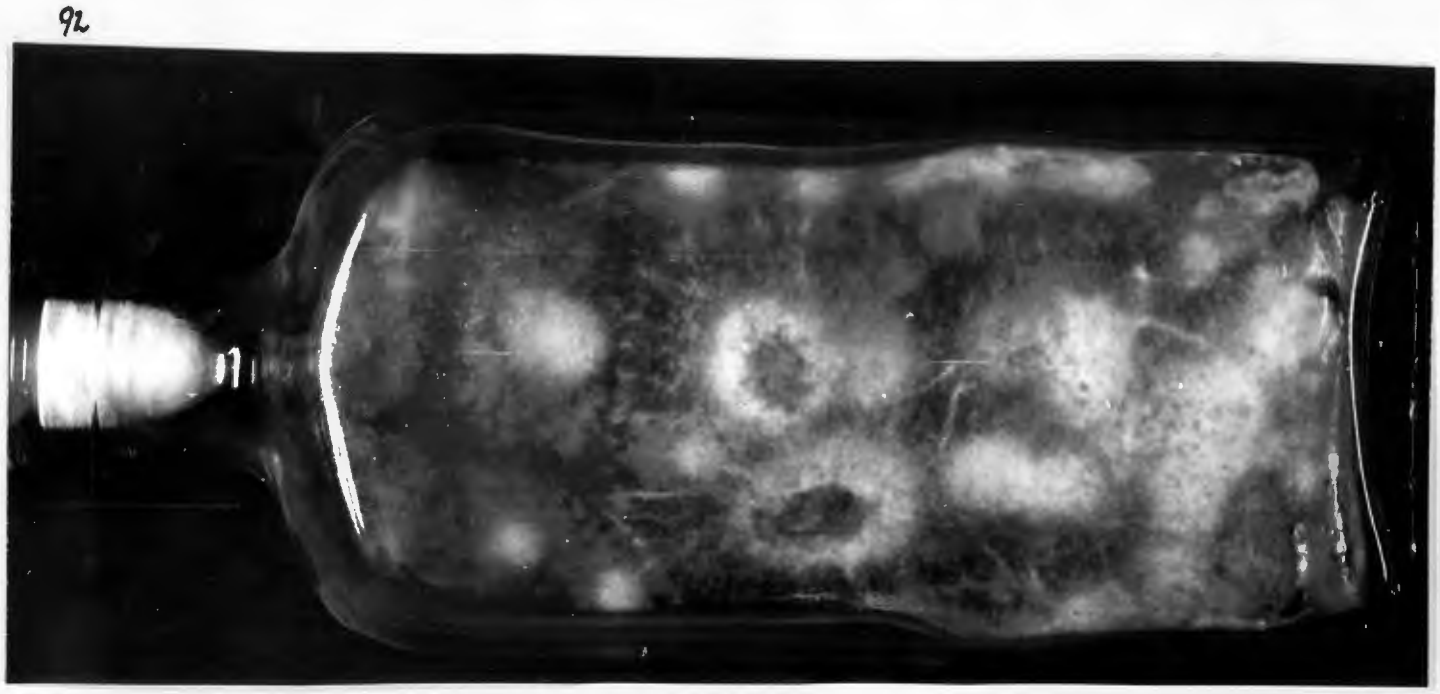


Hypoxylon glomeratum var.2, 212; plate cultures.

Fig.93. Malt, 12 days old at 25°C.

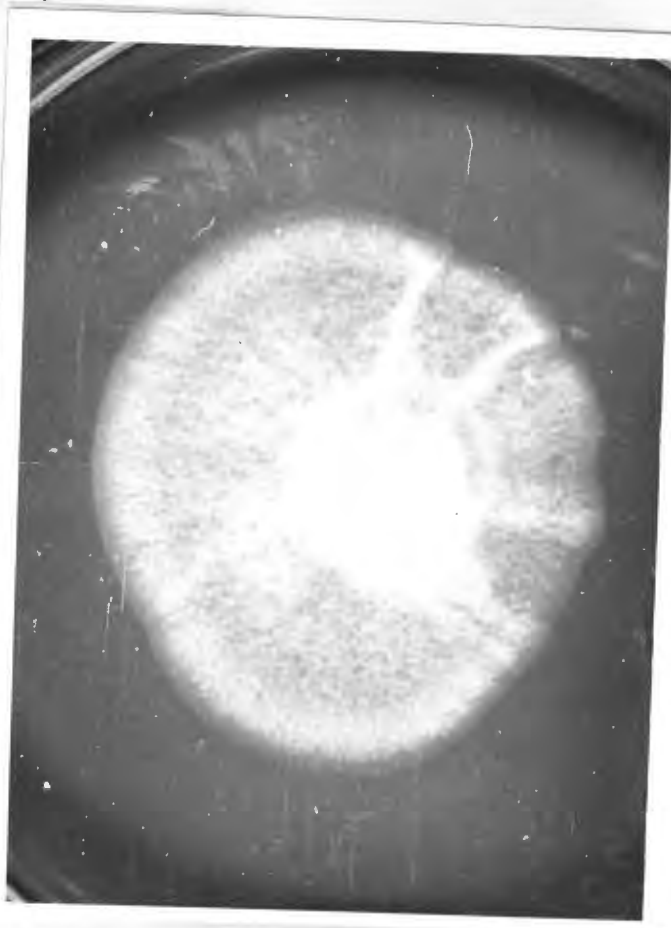
Fig.94. Malt, 15 days old at 15°C.
Note slight difference in appearance due to different temperatures.

Fig.95. Leonian's 9 days old at 25°C.

Fig.96. The same colony as above, 14 days old at 25°C.

93

94



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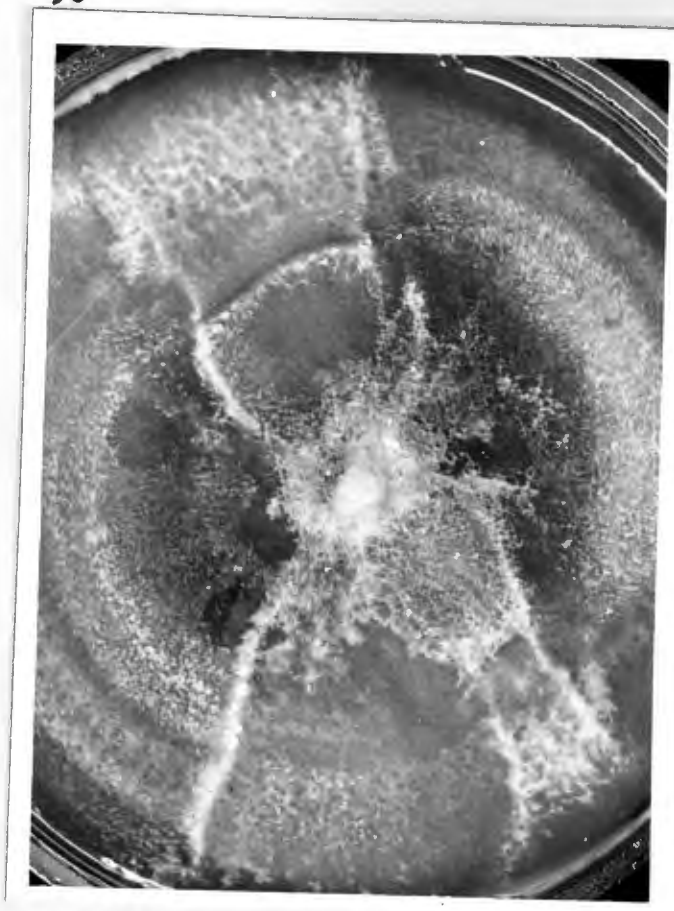


Hypoxylon glomeratum var.2, 212.

Fig.97. Czapek plate culture 8 days old at 25°C.

Fig.98. A. Conidiophore of Hypoxylon glomeratum var.1, 524; with apical clusters of conidia.

B. Part of the spicate type, same species, same culture.

C. Conidiophore of Hypoxylon glomeratum var.3, 396.

97

98

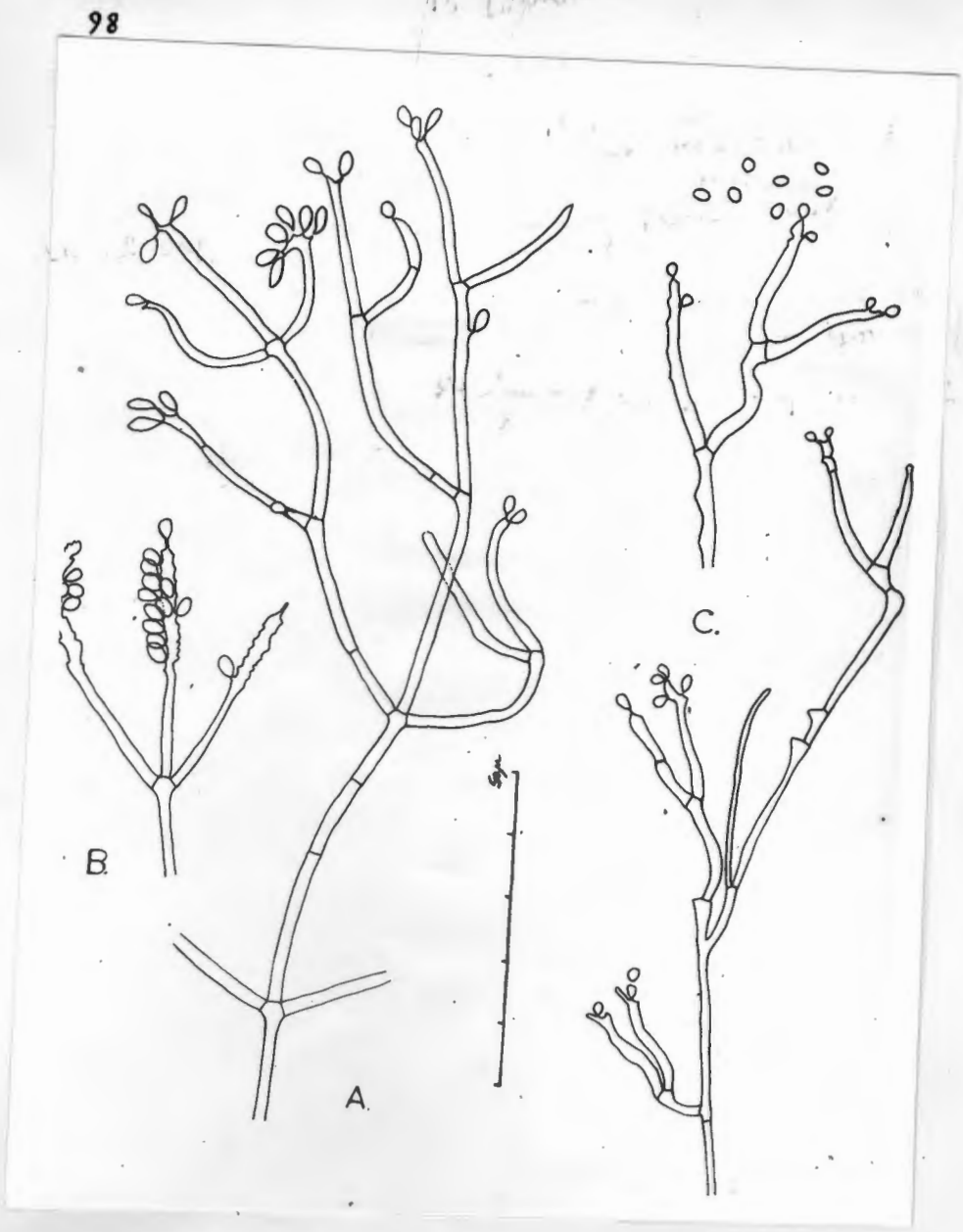


Fig.99. Hypoxylon glomeratum var.2, 212; cultural characters.

A. marginal hyphae.

B. part of secondary mycelium.

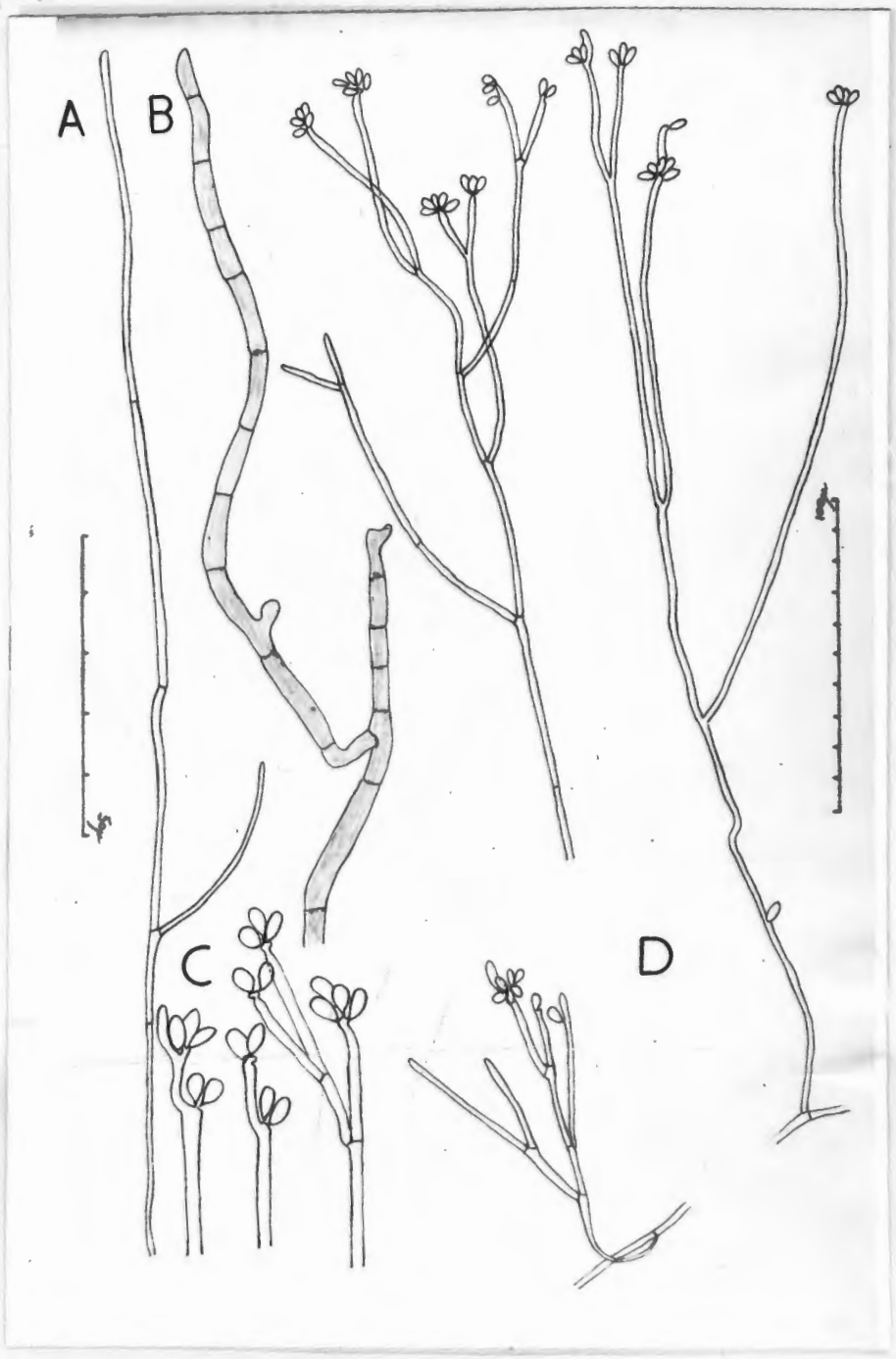
C. enlarged view of conidial heads; conidia apical and pleuracrogenous.

D. diagram to smaller scale showing variation in length and branching of the conidiophores.

Fig.100 Rosellinia moroides, 412;

Maize bottle culture, 2 months old.

99



100

<u>Rosellinia moroides</u>, 412.

Fig.101. Czapek bottle culture, 2 months old.

Fig.102. Malt plate culture, 15 days old at 25°C.

Fig.103. Maize plate culture, 12 days old at 25°C.

101

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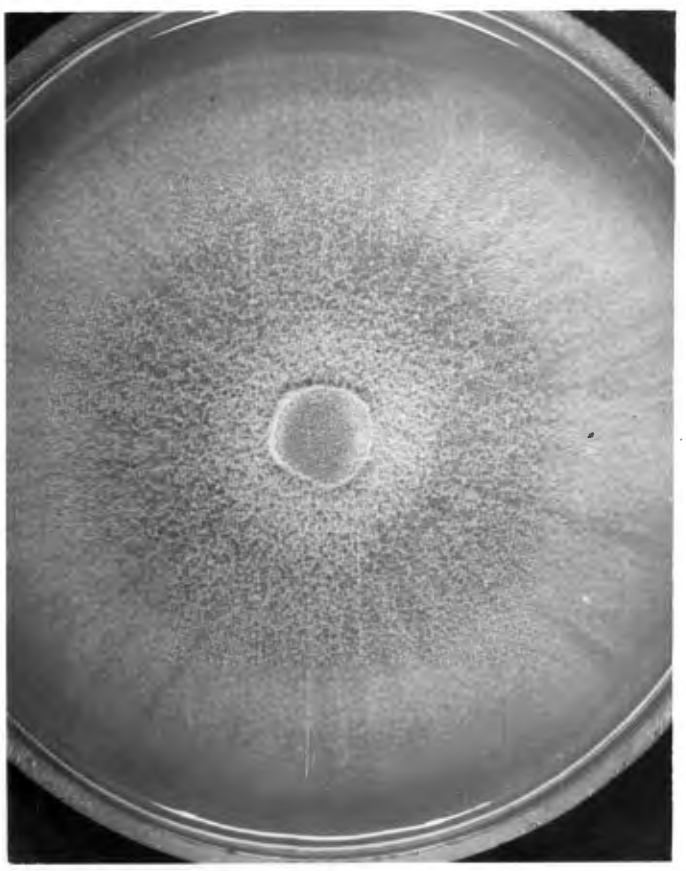

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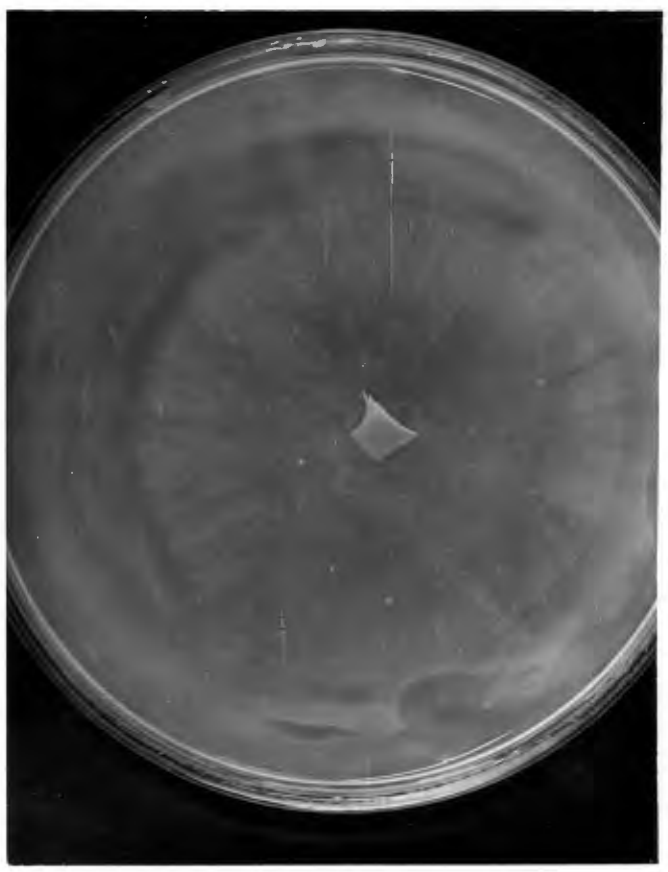
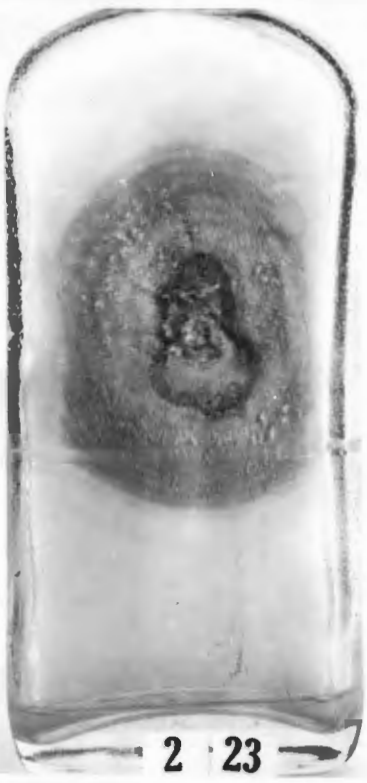


Hypoxylon asarcodes, 262; Bottle cultures.

Fig.104. Malt, 1 month old.

Fig.105. Maize, 2 months old.

104



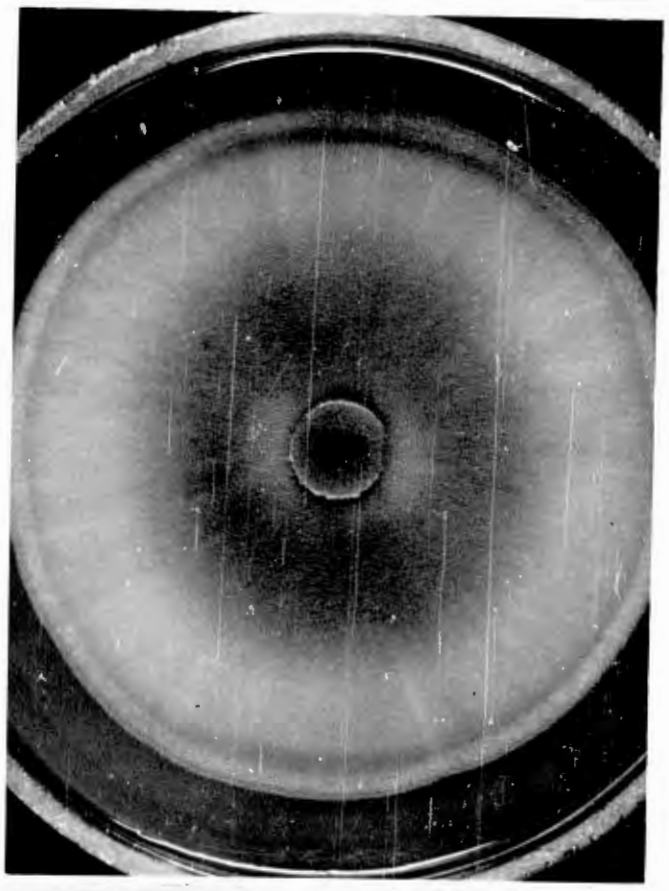
105

Fig.106. Hypoxylon asarcodes, 262; malt plate culture 10 days old at 25°C.

Fig.107. Same species; maize, same conditions. Note slightly less luxuriance.

Fig.108. Rosellinia obtusissima, 257; bottle culture, 3 months old. Note dense conidial layer.

106



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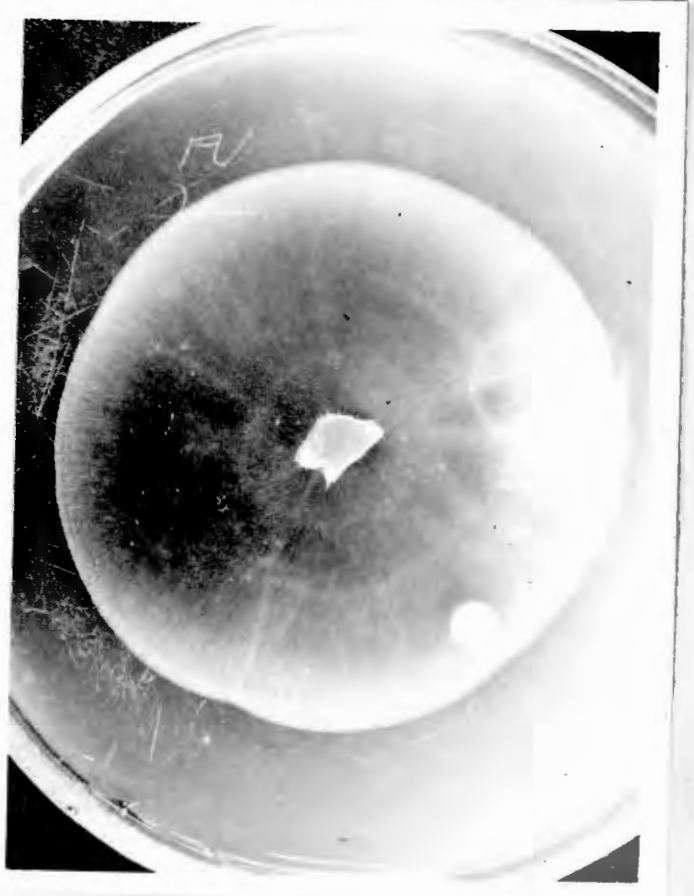


108

Fig.109. Leonina's, 2 months old.

Fig.110. Czapek, same age.

109

110

<u>Rosellinia obtusissima</u>, 257; plate cultures.

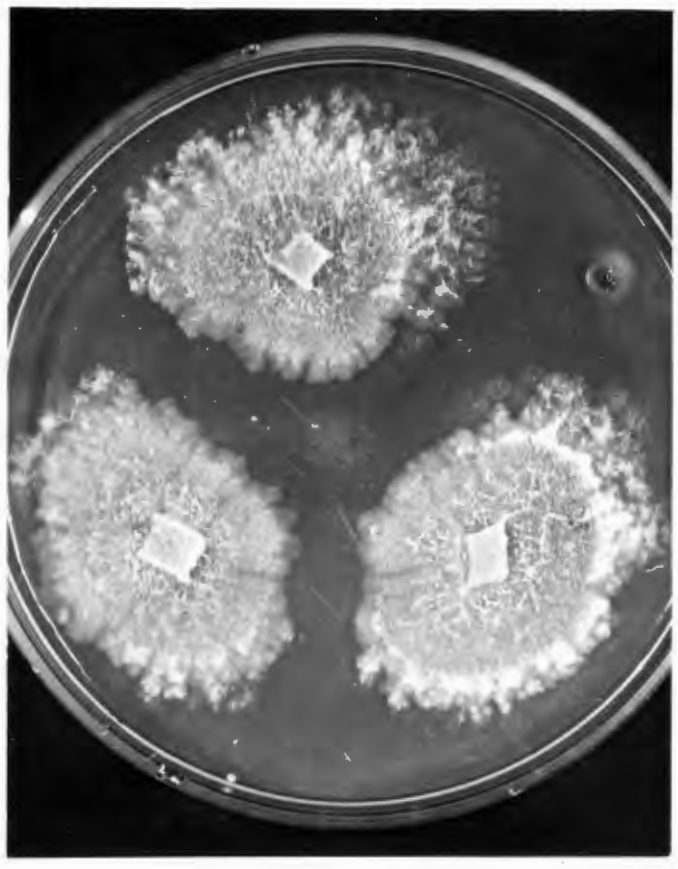
Fig.111. Maize, 10 days old at 25°C.

Fig.112. Leonian's, same conditions.

Fig.113. Czapek, same conditions.
Note difference in form.

Fig.114. Malt, 16 days old at 25°C.

111



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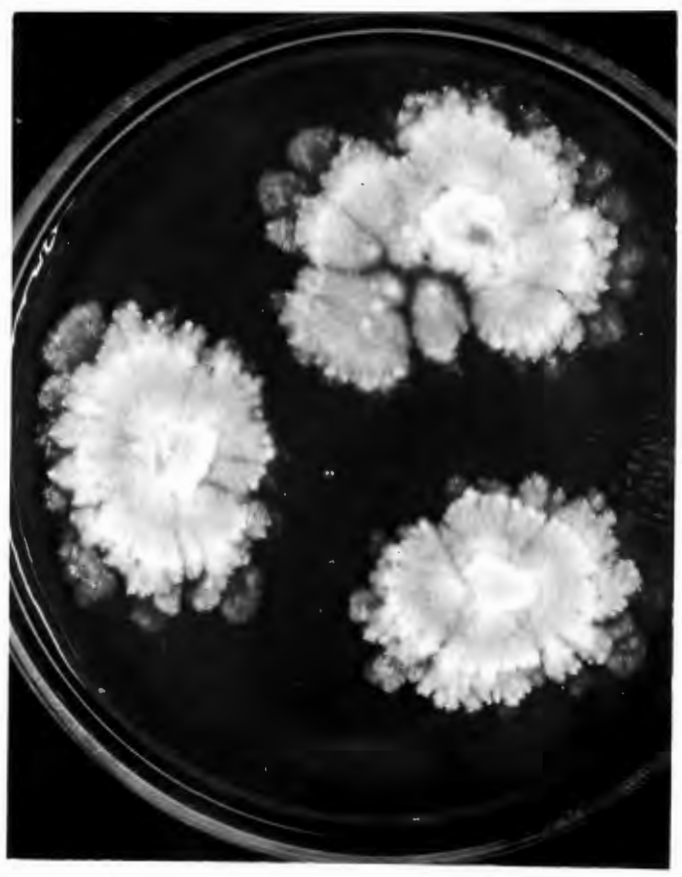

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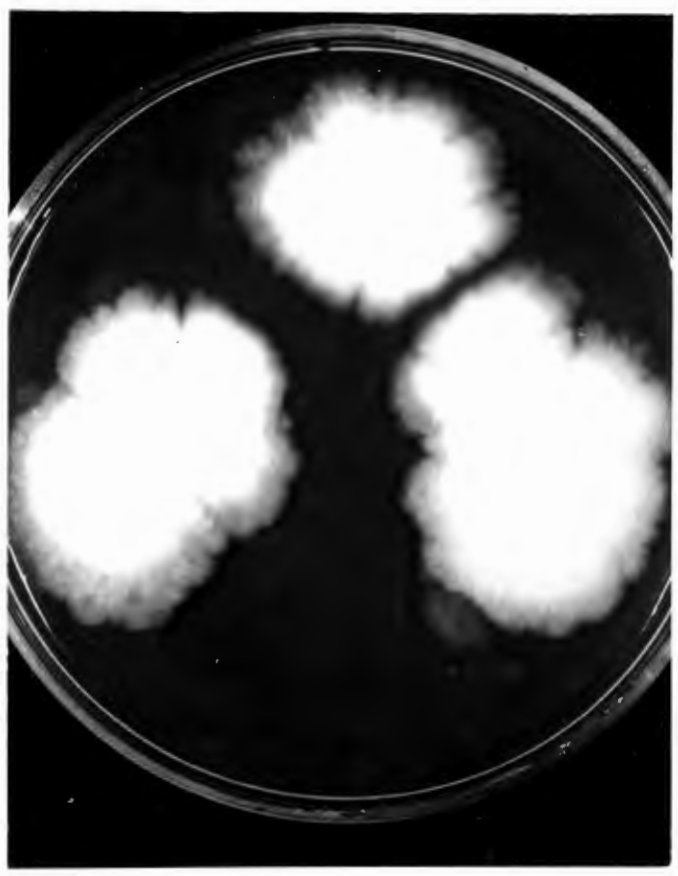

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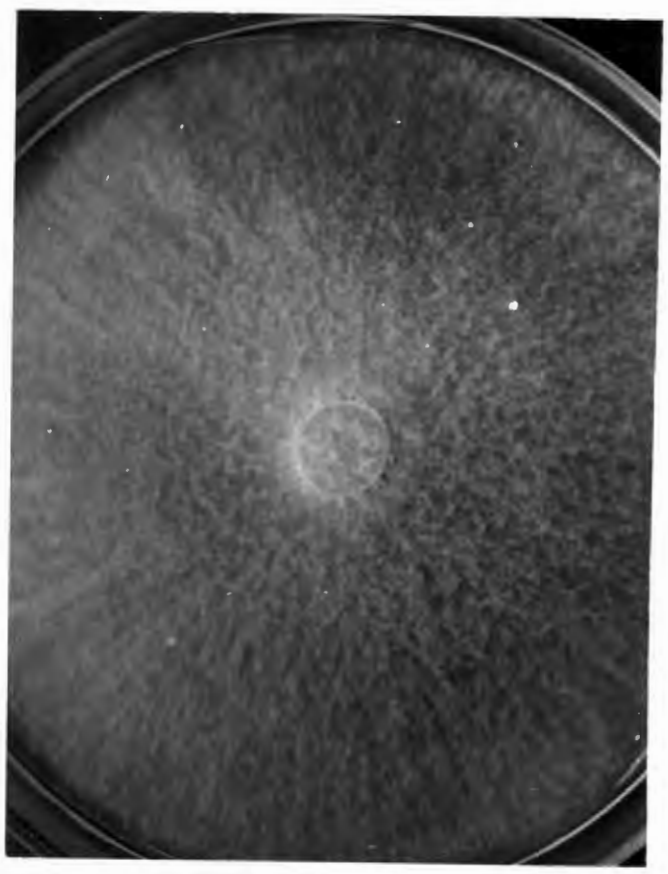

Rosellinia obtusissima, 257.

Fig.115. Malt plate culture, same as in fig.114, 4 weeks old, showing floccose development with age.

Fig.116. A single conidiophore; the least specialized of the total number of species (63) investigated.

Fig.117. A. part of the fertile hypha of Rosellinia obtusissima, 257.

B,C. Whole conidiophores of Rosellinia moroides, 412.

D. Minute secondary conidia of Rosellinia moroides, 412; produced during early growth of the colony.

Fig.118. Rosellinia protuberans, 147; malt bottle culture after three months.

Fig.119. Same species; Czapek, same conditions.

117

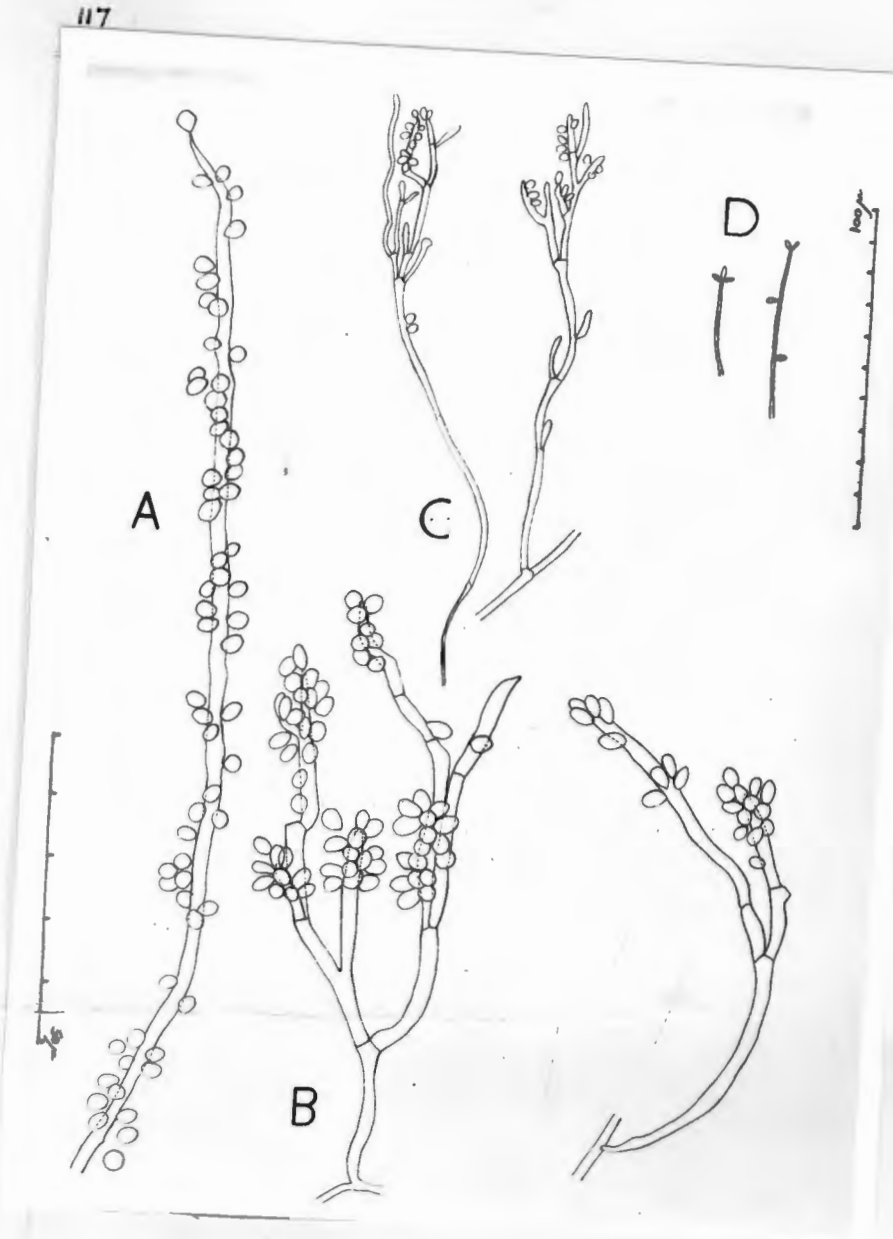

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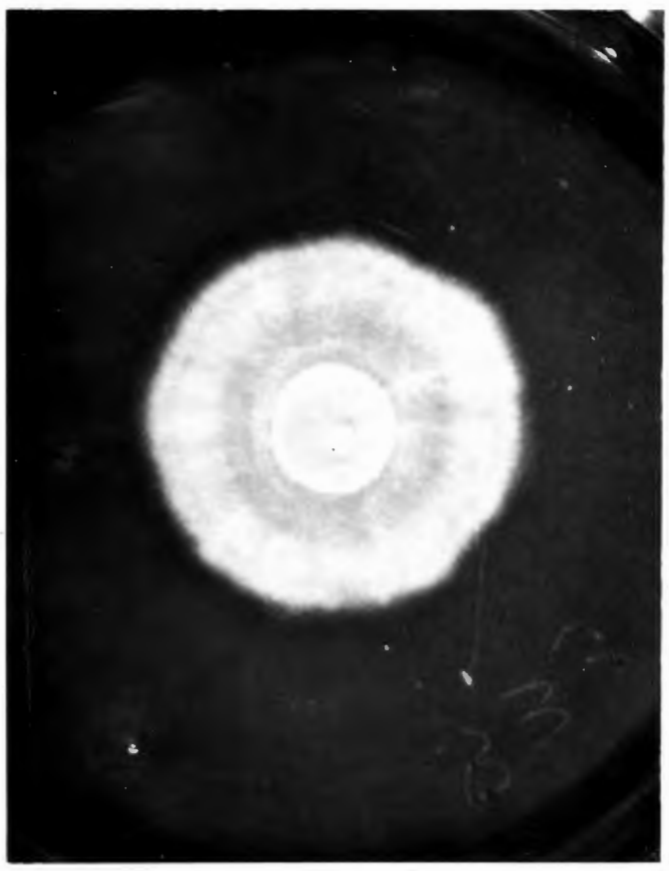
Fig.120. Maize, bottle culture, 3 months old.

Fig.121. Malt plate culture, 12 days old at 25°C.

Fig.122. Maize, same conditions.

120

121



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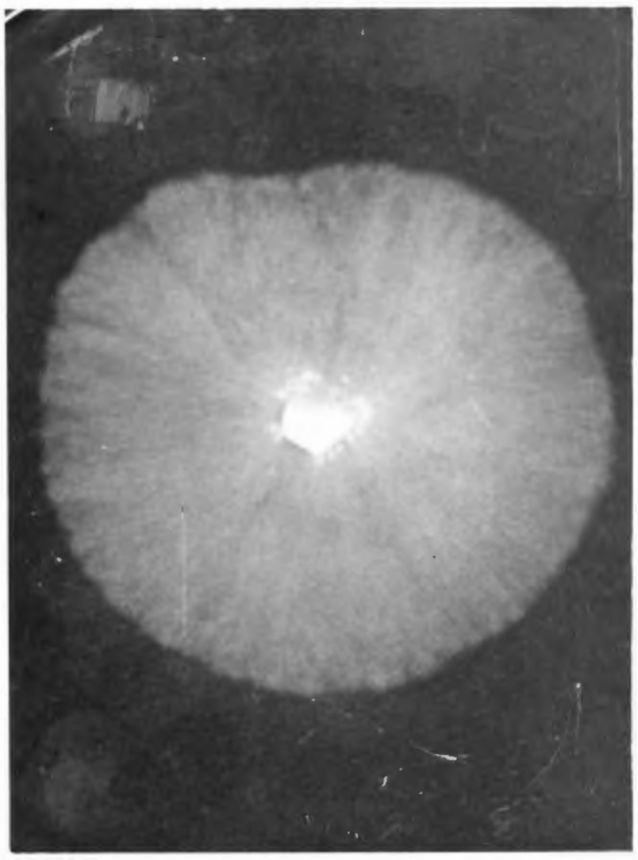
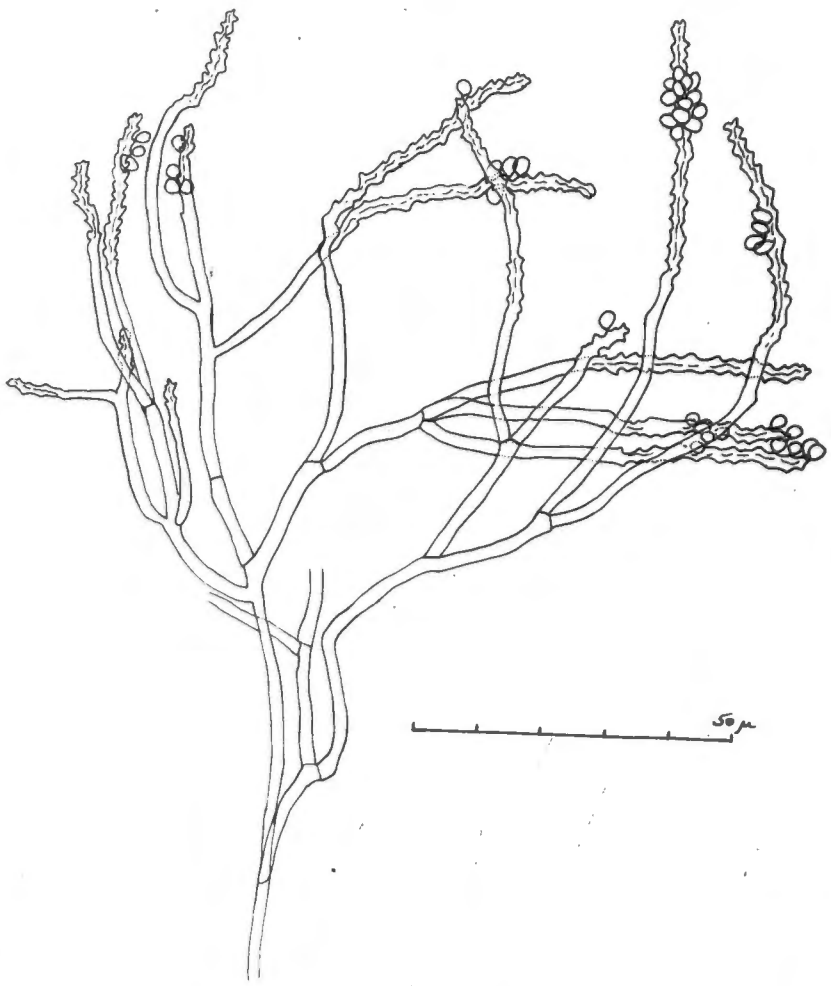


Fig.123. Rosellinia protuberans, 147; conidiophore with indefinite dichotomous branching.

Fig.124. Rosellinia pulveracea, 269; malt bottle culture 3 months old.

123

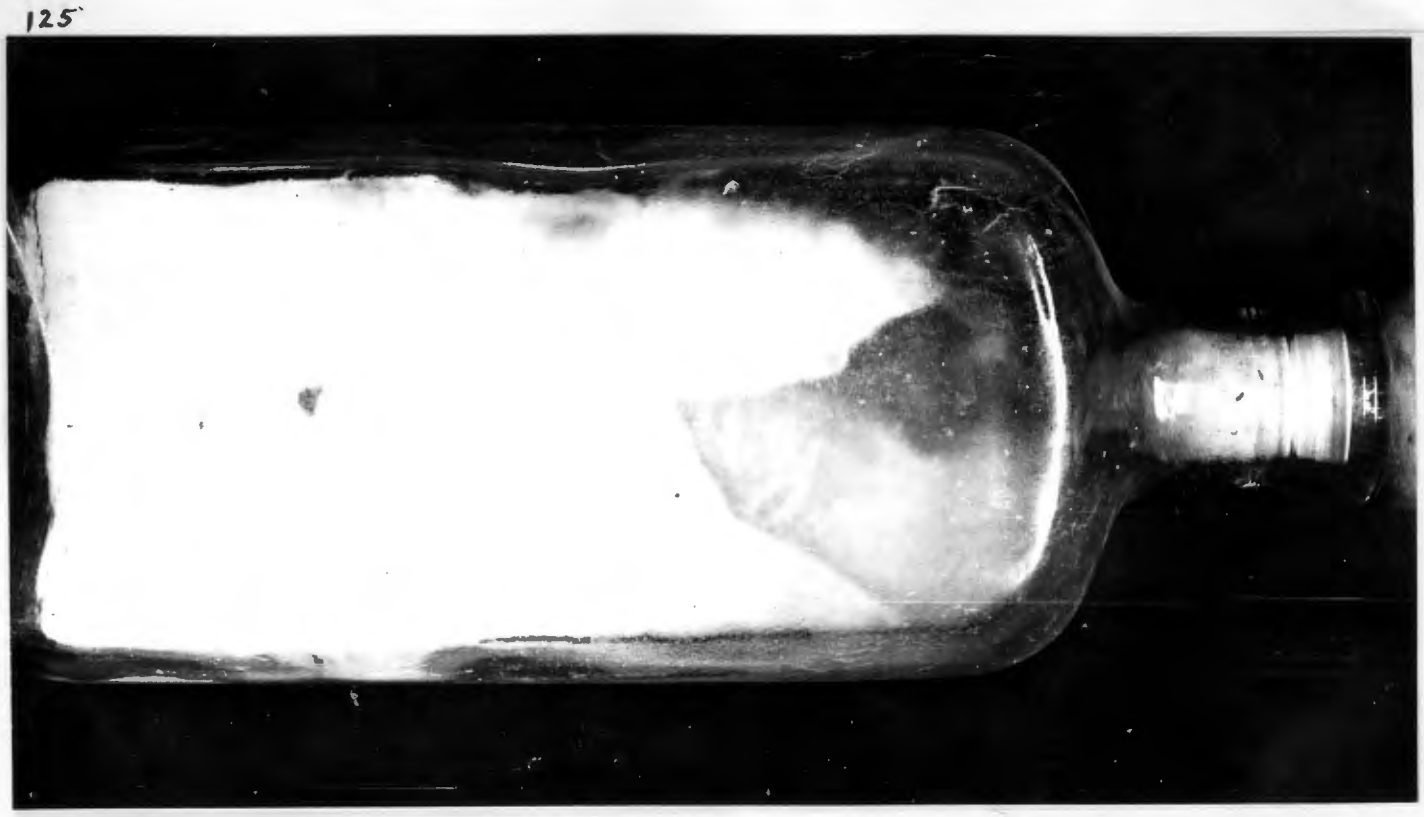


124

Fig.125. Maize, 3 months old.

Fig.126. Leonian's, same age.

125



126

Fig.127. Czapek bottle culture, 3 months old.
Note exuded droplets.

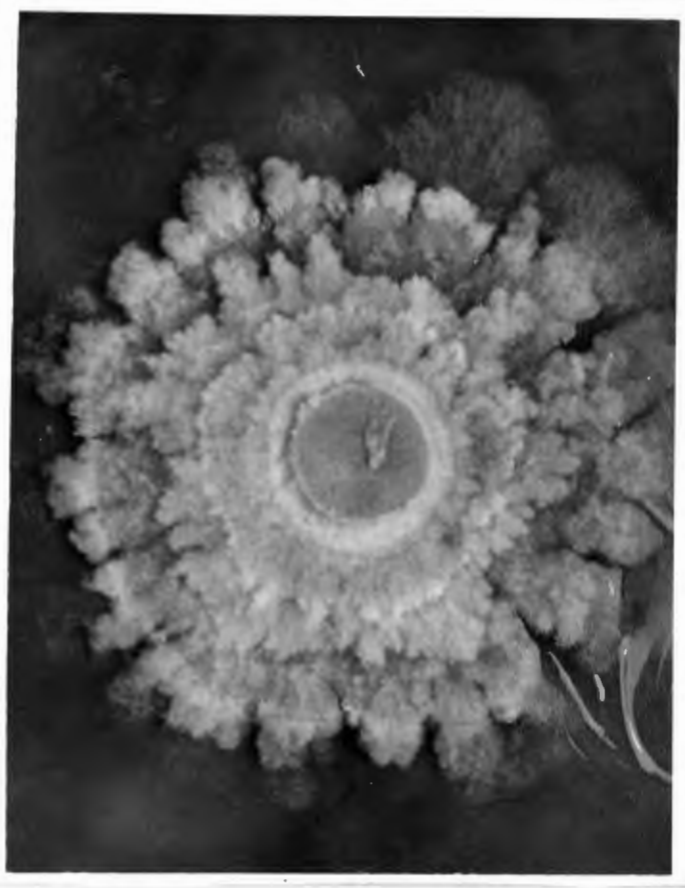
Figs.128,129. Showing variation in appearance of malt plate cultures, 9 and 14 days old, respectively, at 25°C.

Fig.130. Maize plate culture 5 days old at 25°C, enlarged to show fine velvet nature of the mycelium.

127

128

129



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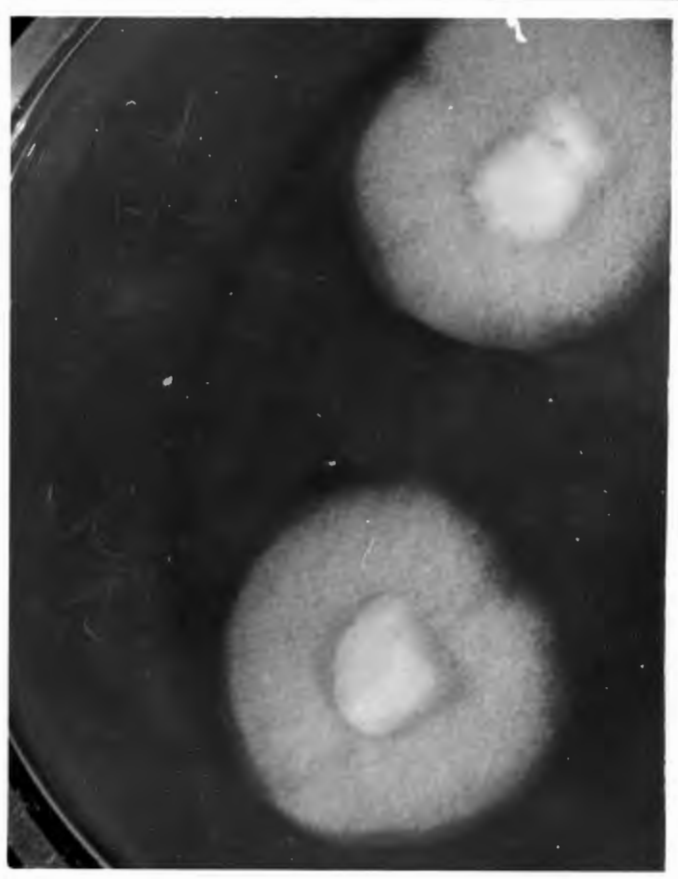

Rosellinia mammoidea, Malt. Bottle culture.

Fig.131. Velvety type, strain 7, 2 months old.

Fig.132. Velvety-fleecy type, strain 433, 2 months old.

131

132

Rosellinia mammoidea.

Fig.133. Maize, bottle culture, strain 7, 2 months old, showing conidia arising in small pulvinate floccules around the side of the inoculum.

Fig.134. Maize, bottle culture, strain 47, same age, with raised mound-shaped areas.

Fig.135. Leonina's plate culture, strain 433, 8 days old at 25°C

Fig.136. Czapek plate culture, strain 433, same conditions.

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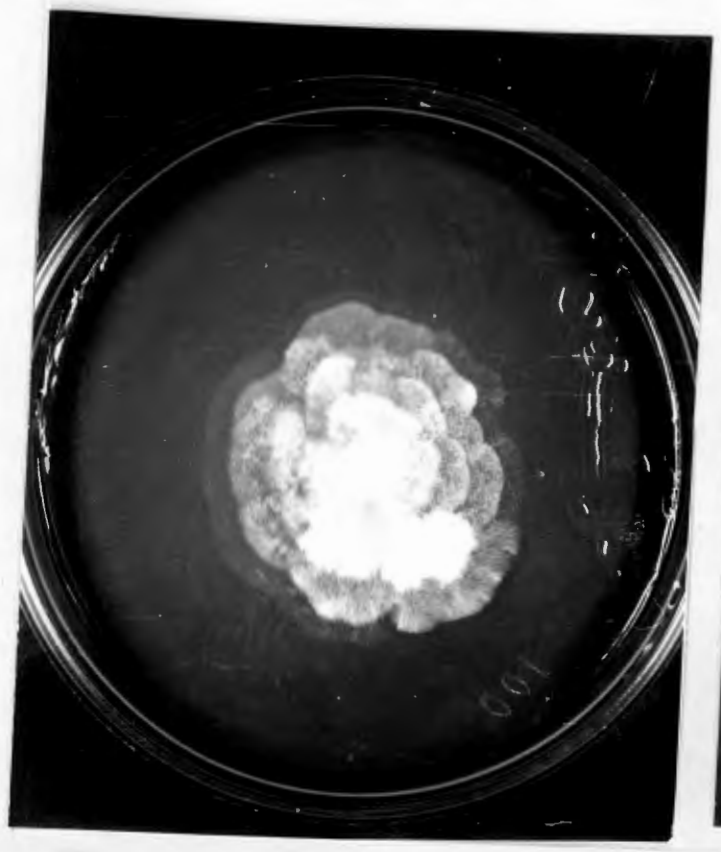

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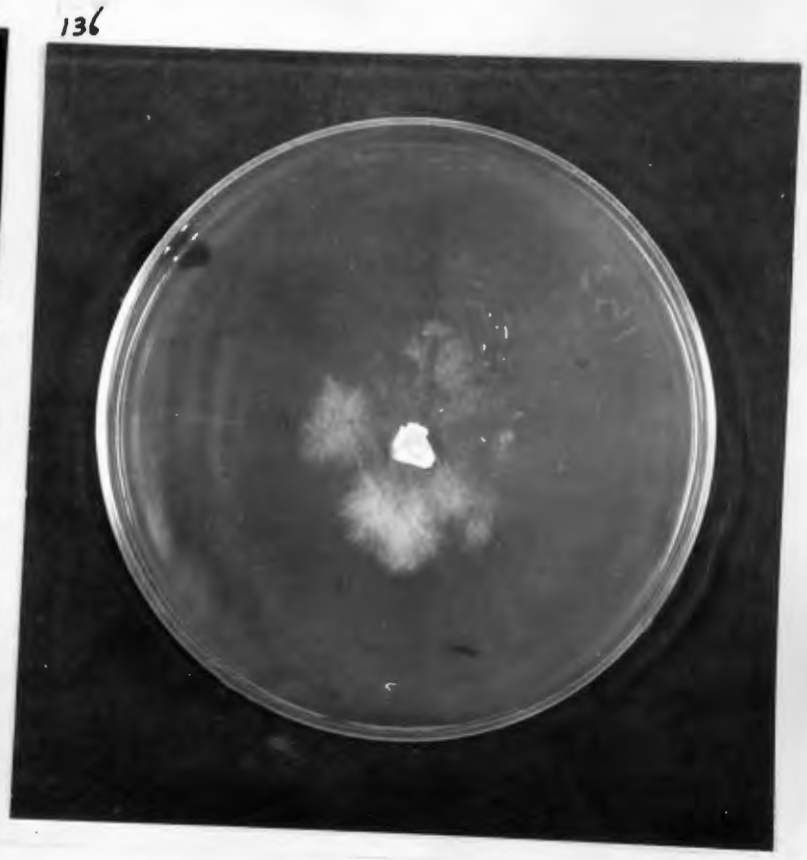


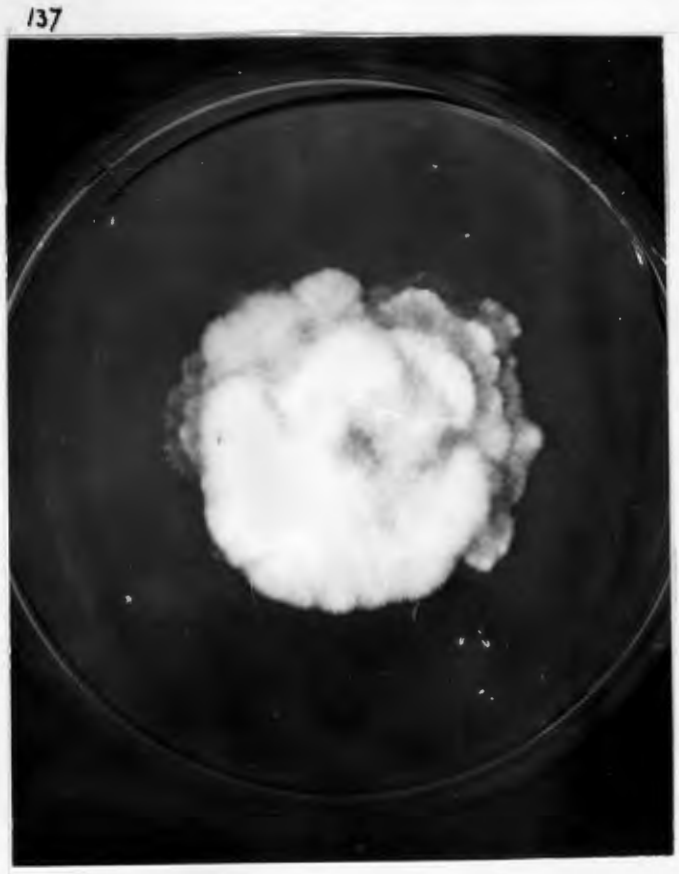
<u>Rosellinia mammoidea</u>, 433; plate cultures.

Fig.137. Malt, 7 days old at 25°C.

Figs.138,139. Old (20 days) and young (10 days) culture at 25°C to show plumose margin of the colony.

Fig.140. Young (7 days) maize culture at 25°C, showing less luxuriant growth than on malt.

137



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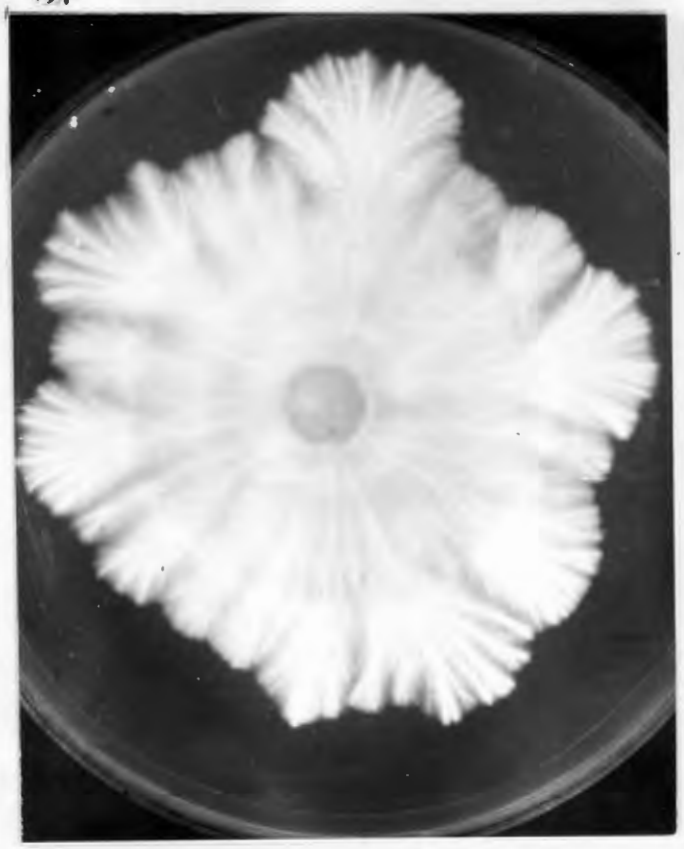

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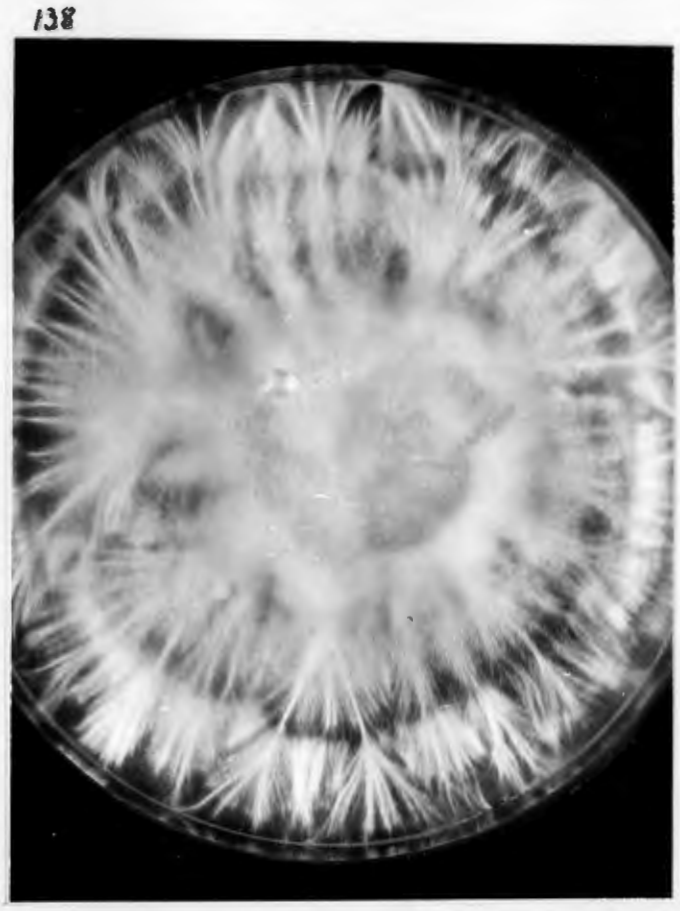

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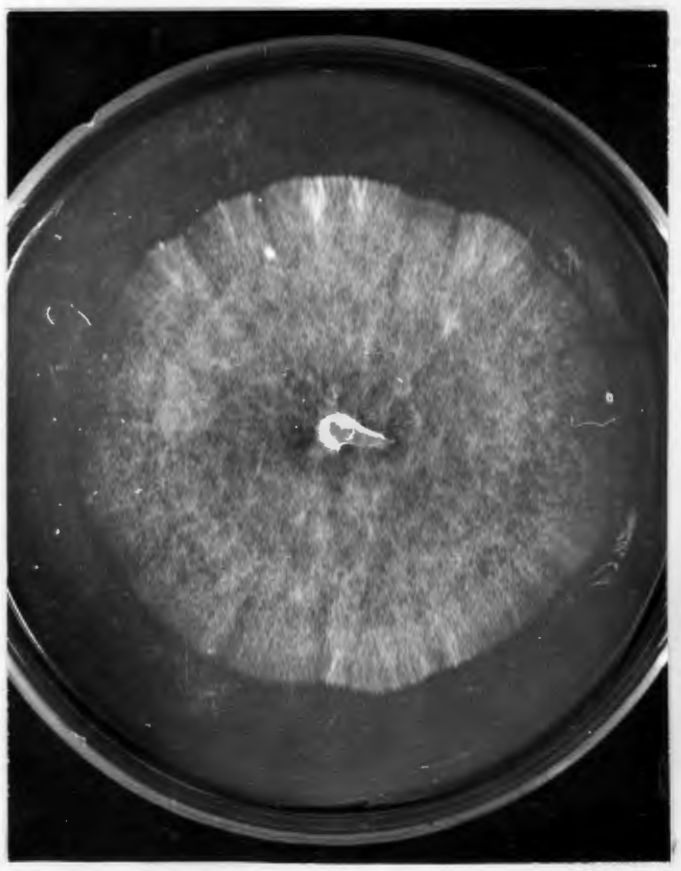
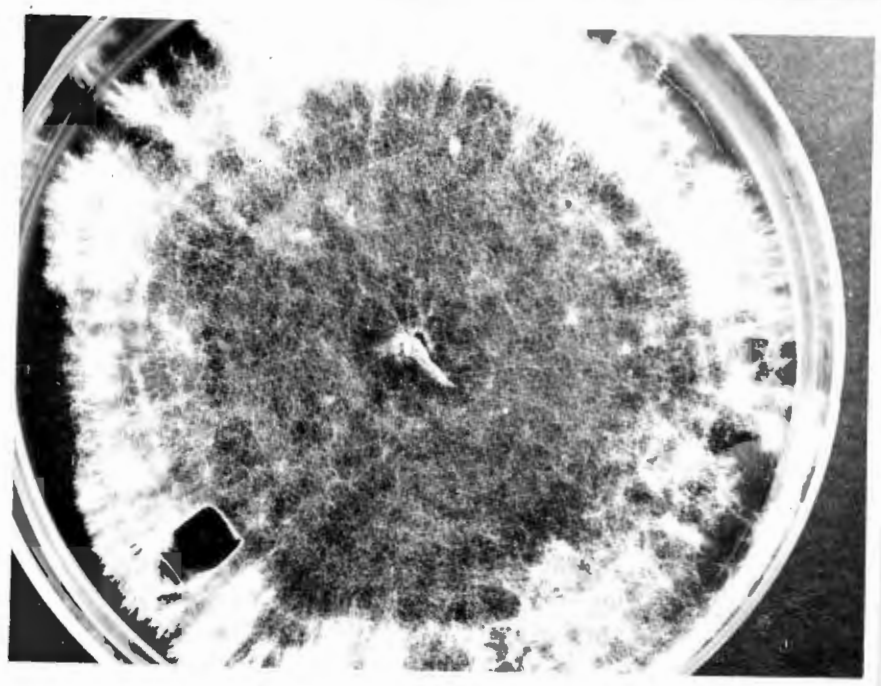


Fig.141. Rosellinia mammoidea. Maize plate culture, same as in fig.140, 20 days old at 25°C, showing typical plumose features.

Fig.142. Rosellinia corticalis, 531; maize battle culture 6 weeks old - (malt similar).

141



142

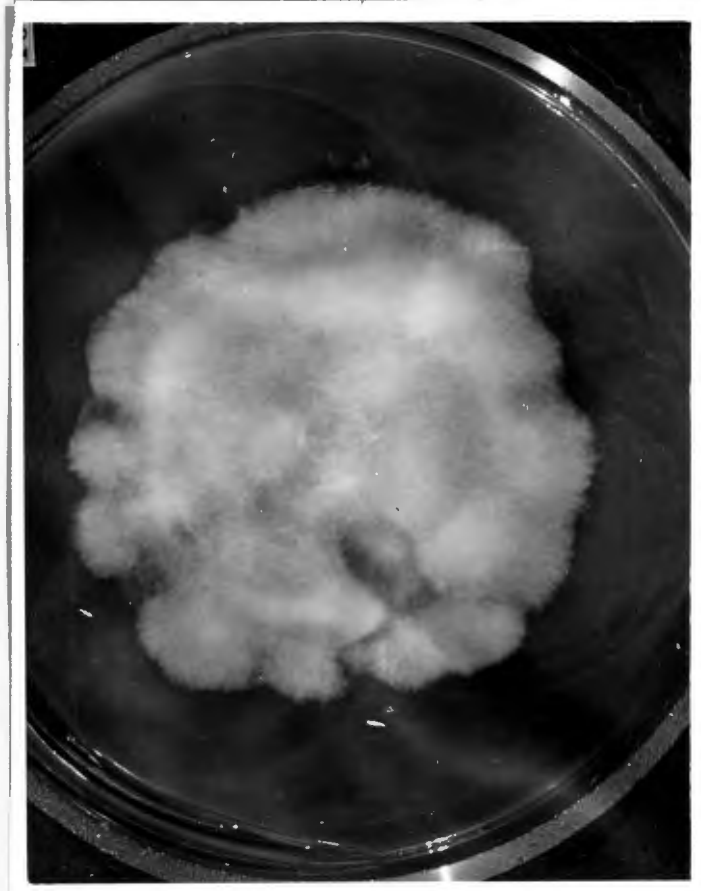
<u>Rosellinia corticalis</u>, 531.

Fig.143. Leonian's, bottle culture, 6 weeks old.

Figs.144,145. Malt plate cultures, 15 days old at 25°C, showing variation in density of mycelium.

143

144



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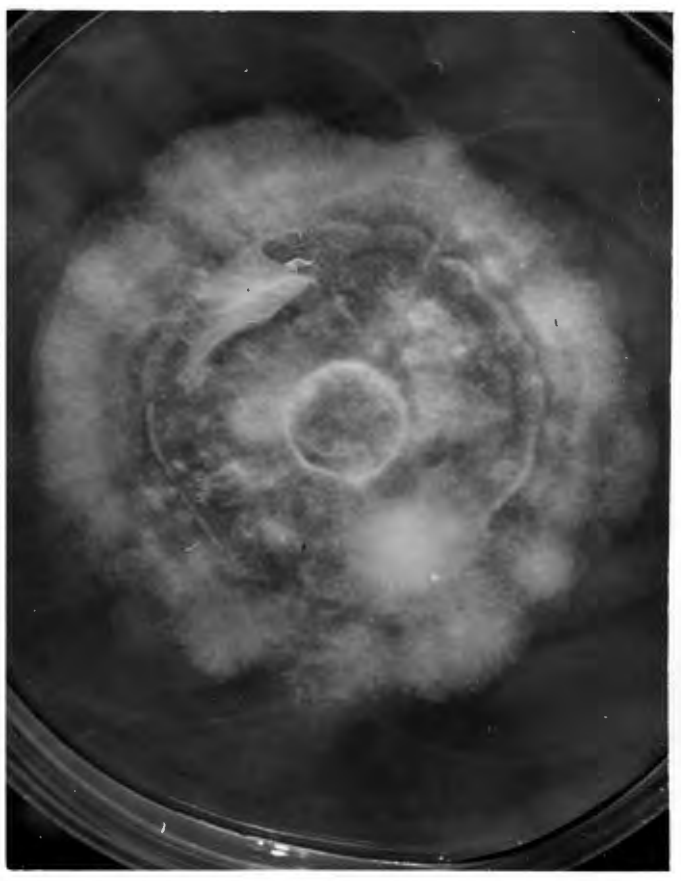


Fig.146. Rosellinia corticalis, 531; Leonian's plate culture, 15 days old at 25°C.

Fig.147. Same species; Czapek, same conditions.

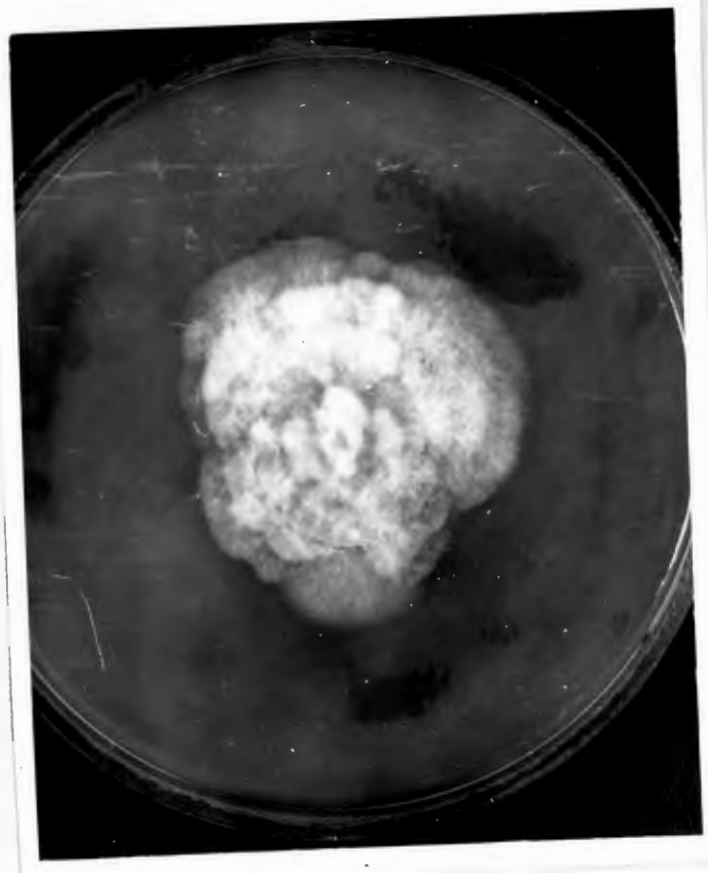
Fig.148. Mycelial characters of Rosellinia mammoidea and Rosellinia corticalis.

A. Rosellinia mammoidea, 433; marginal hypha.

B. Conidiophore of Rosellinia mammoidea, 433.

C. Conidiophore of Rosellinia corticalis, 531.

146



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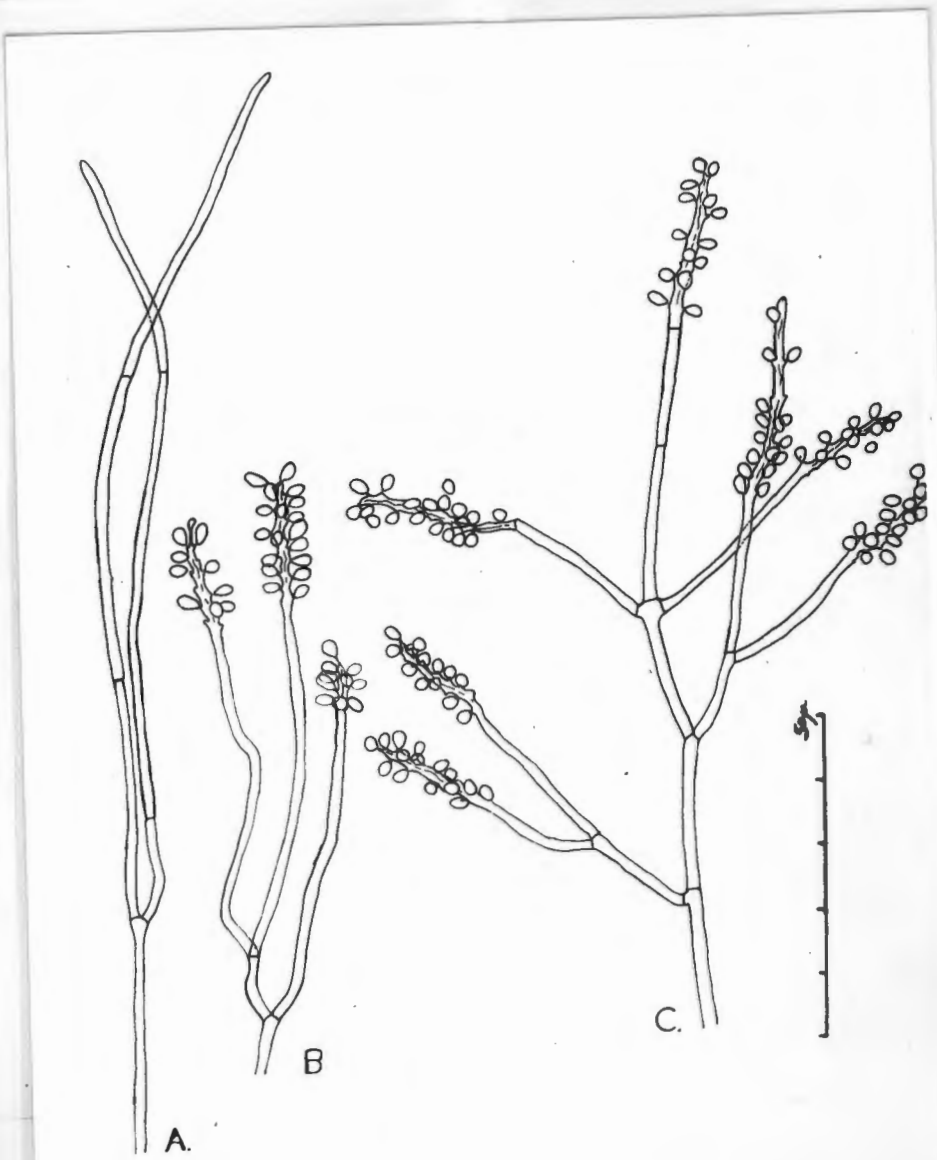


Hypoxylon glomeratum var.3, 396; Bottle cultures.

Fig.149. Malt, 3 months old.

Fig.150. Maize, 2 months old.

149

150

Hypoxylon glomeratum var.3. 396;

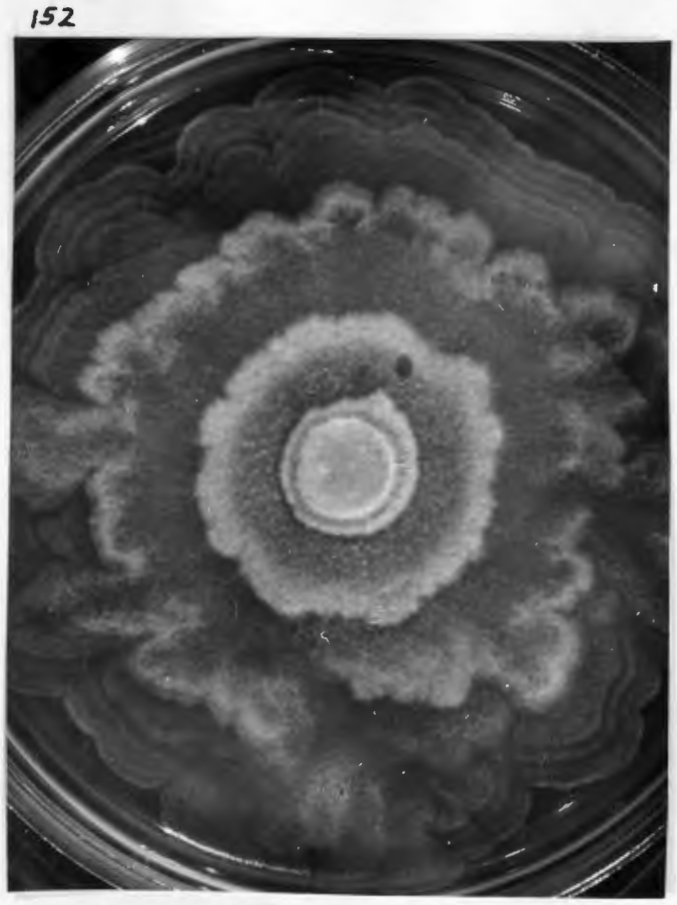
Fig.151. Leonian's bottle culture, 2 months old.

Fig.152. Malt plate culture, 13 days old at 25°C.

Fig.153. Leonian's plate culture, 10 days old at 25°C.

151

152



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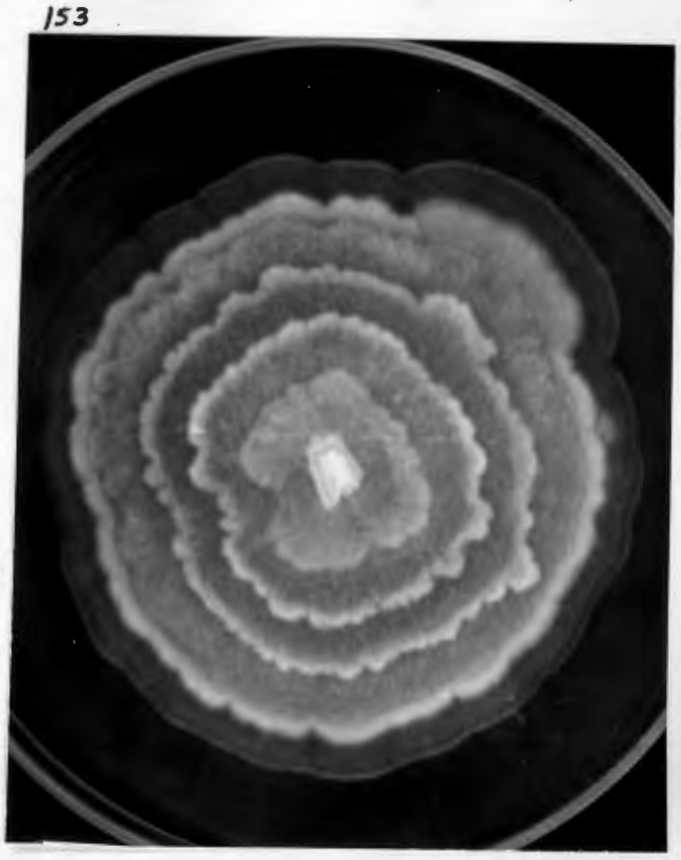
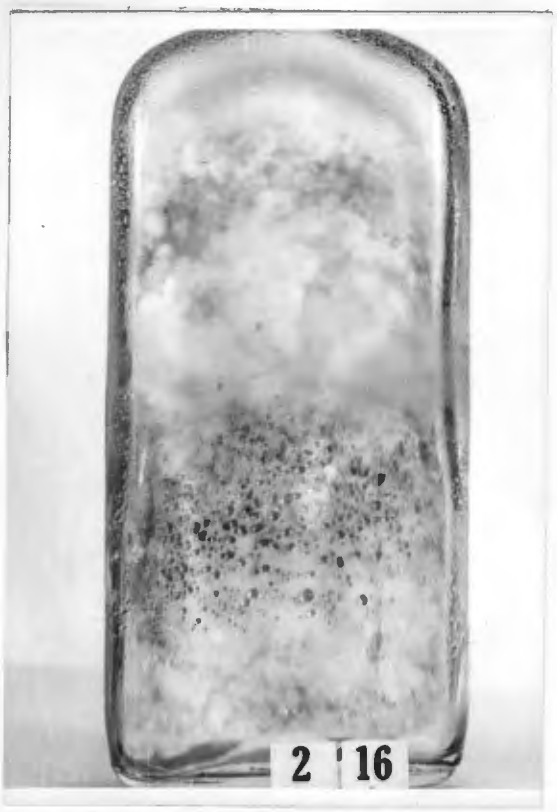


Fig.154. Hypoxylon glomeratum var.3, 396; maize plate culture, 10 days at 25°C, (Czapek similar).

Fig.155. Hypoxylon glomeretum var.4, 335; Czapek bottle culture 3 months old.

Fig.156. Same species, strain 483, malt bottle culture, 2 months old.

155



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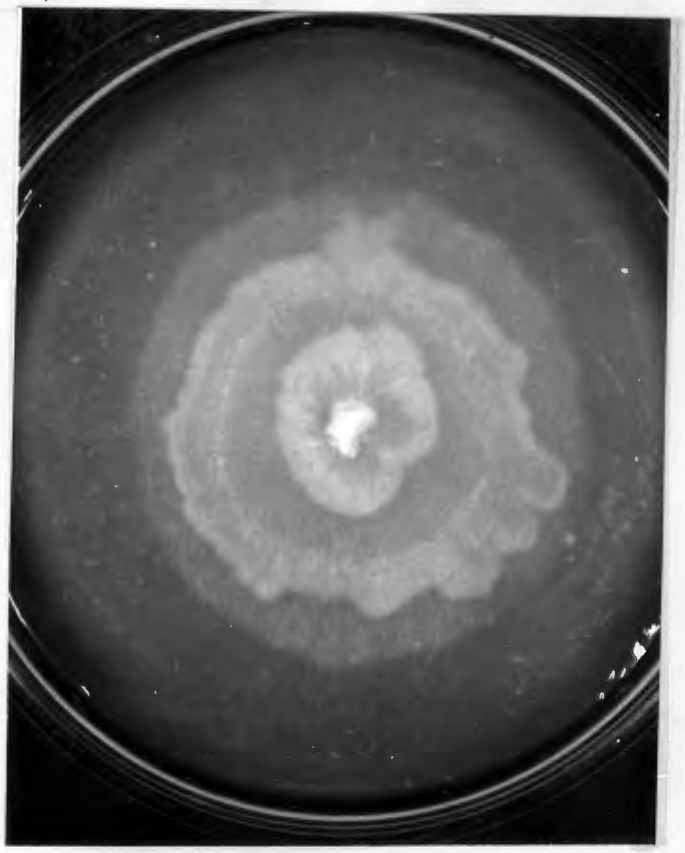


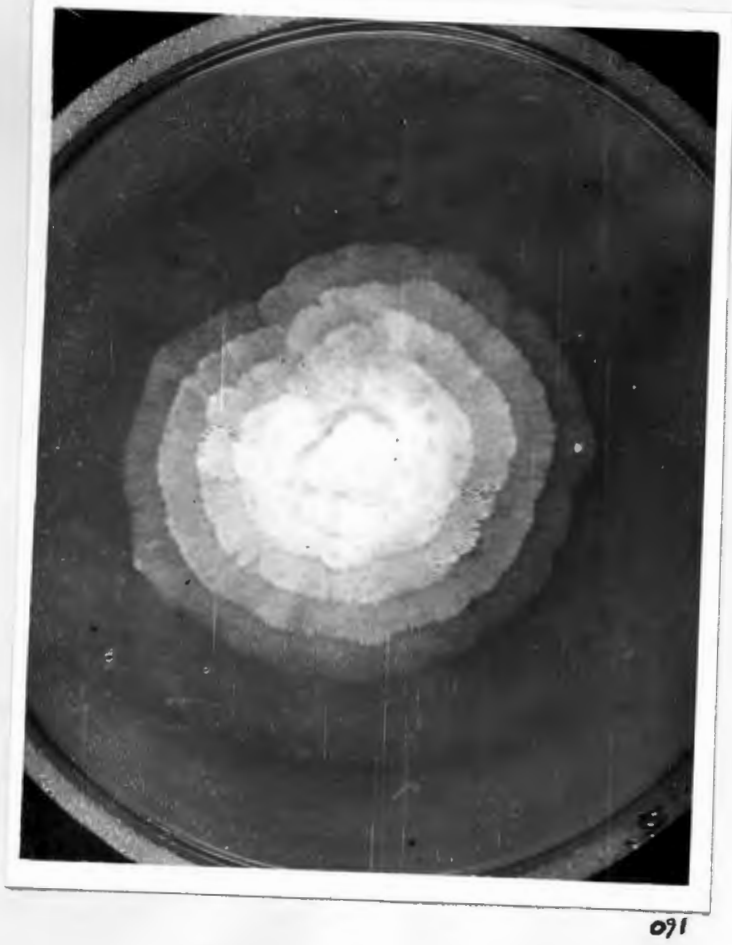
156

Hypoxylon glomeratum var.4. Plate cultures.

Figs.157,158. Malt, strain 335, 10 days old at 25°C, showing normal zonate growth and occasional uniform type.

Fig.159. Leonian's, strain 483, 8 days old at 25°C.

Fig.160. Czapek, same conditions.



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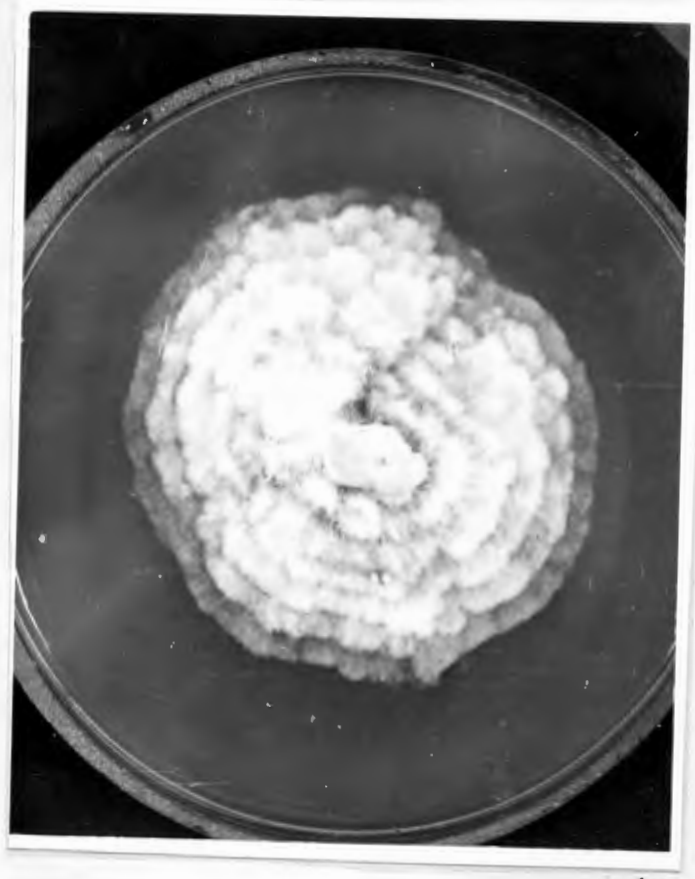

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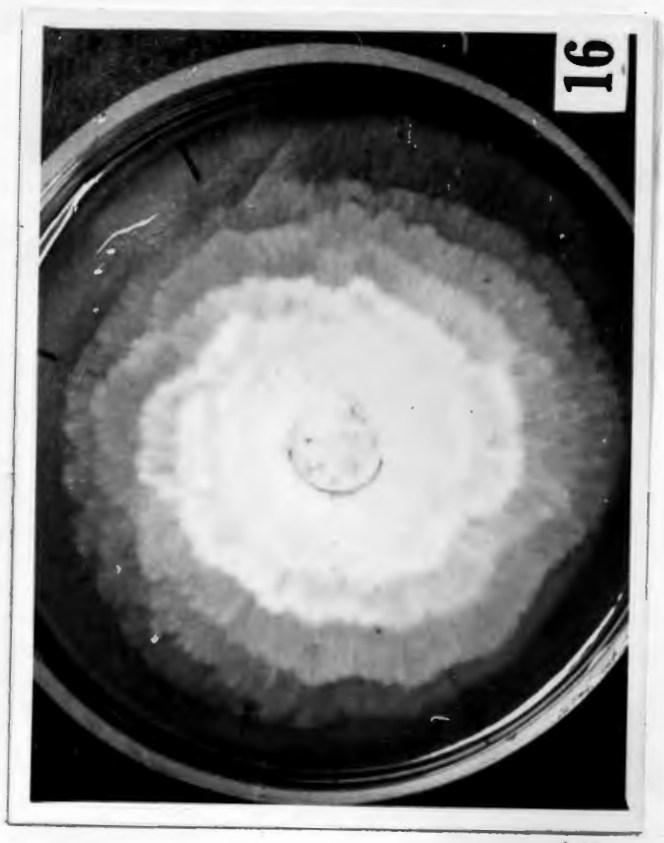


751

Fig.161. Mycelial characters of Hypoxylon glomeratum vars.1 & 4.

A. Hypoxylon glomeratum var.4, 483; Marginal hyphae with bulbous swellings below the septae.

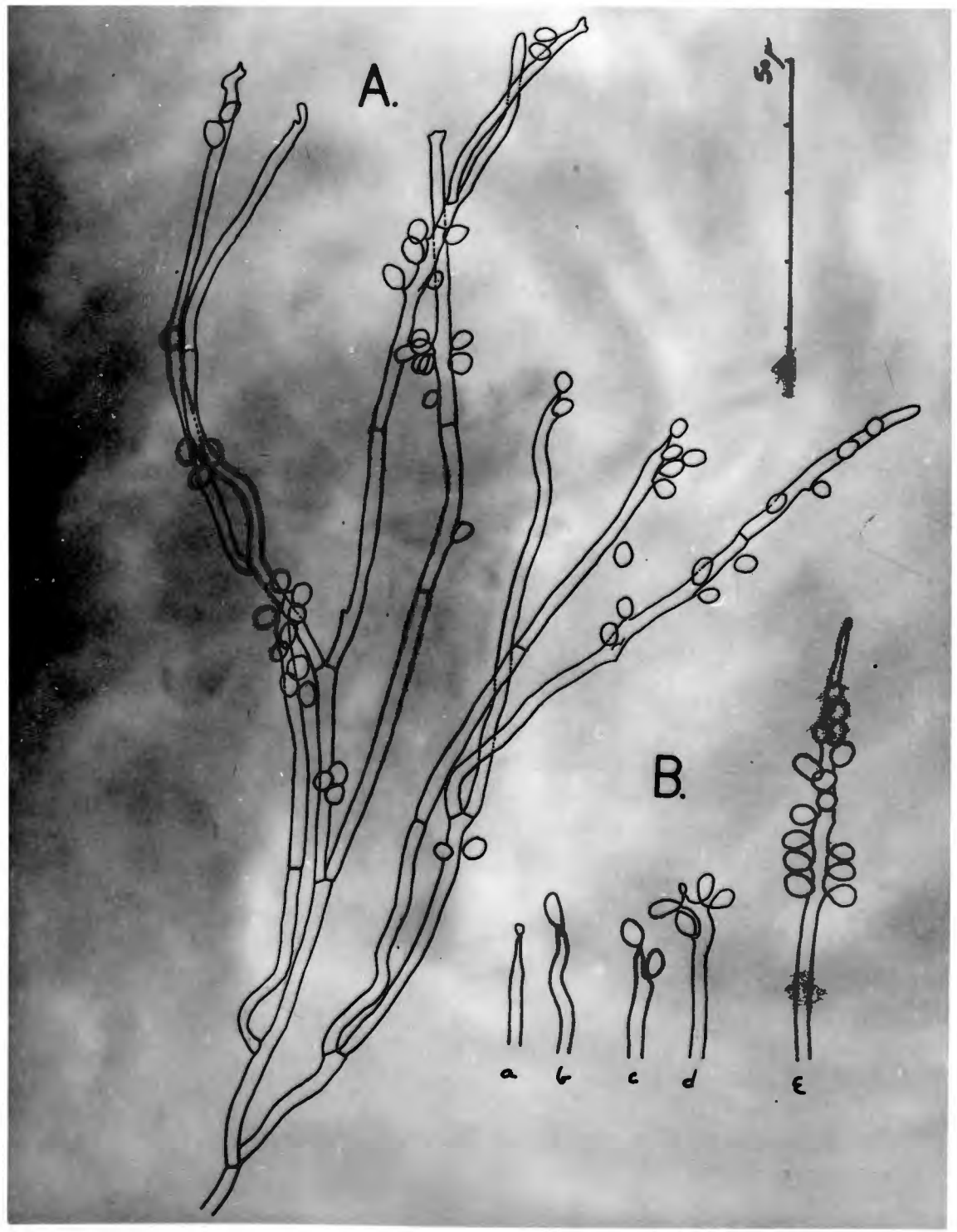
B. Secondary mycelium, same species.

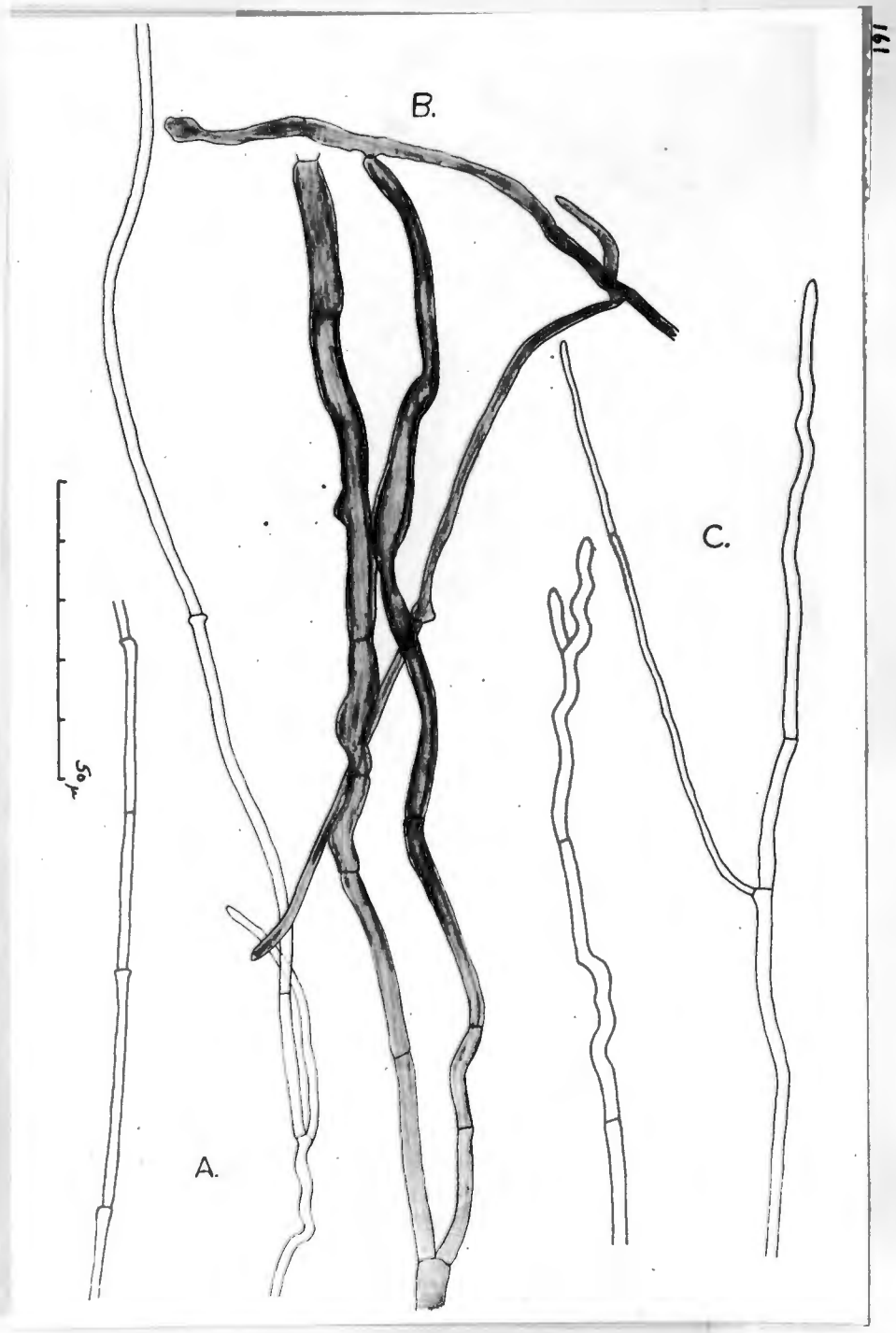
C. Hypoxylon glomeratum var.1, 524; Marginal hyphae. Compare the undulating shape with the straight type of the previous variety.

Fig.162. Hypoxylon glomeratum var.4, 483; Conidiophore.

A. Part of the indefinite racemose system.

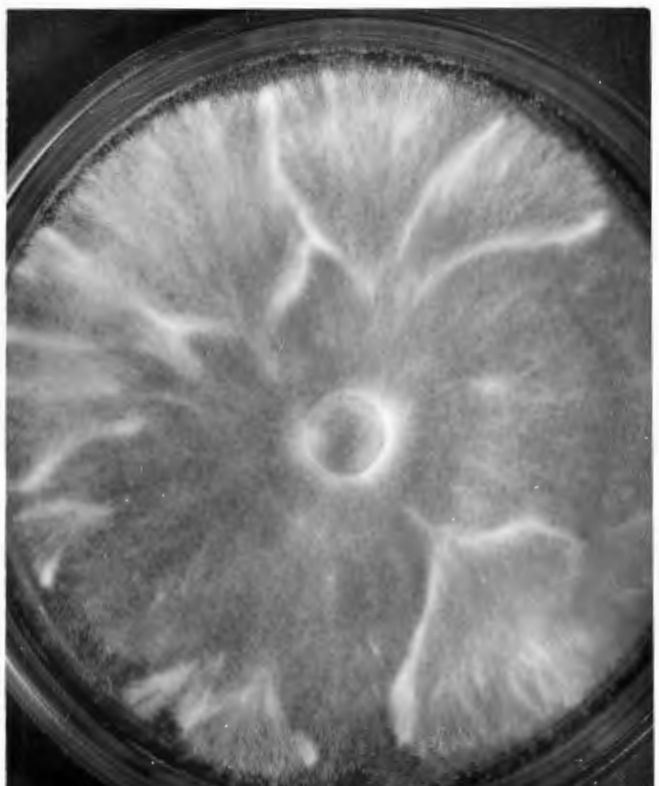
B. Stages in development of the conidia observed in Riddell slide culture; b & c after intervals of 6 hours, d & e after 12 hour intervals.


A.
5μ
B.
a
b
c
d
ε


B.
C.
50μ
A.

163

164



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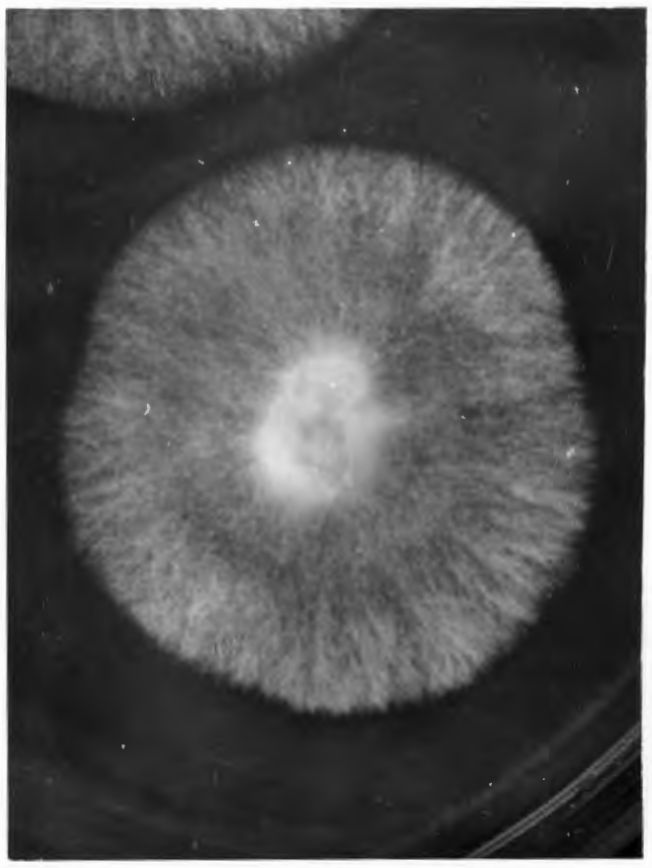

Fig.166. Hypoxylon glomeratum var.5, 397; Czapek plate culture, 8 days old at 25°C.

Fig.167. Nummularia succenturiata, 218; Malt bottle culture, 3 months old.

Fig.168. Same species; Czapek, same conditions.

Fig.169. Same species; Maize, same conditions.

166.

168.

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169.

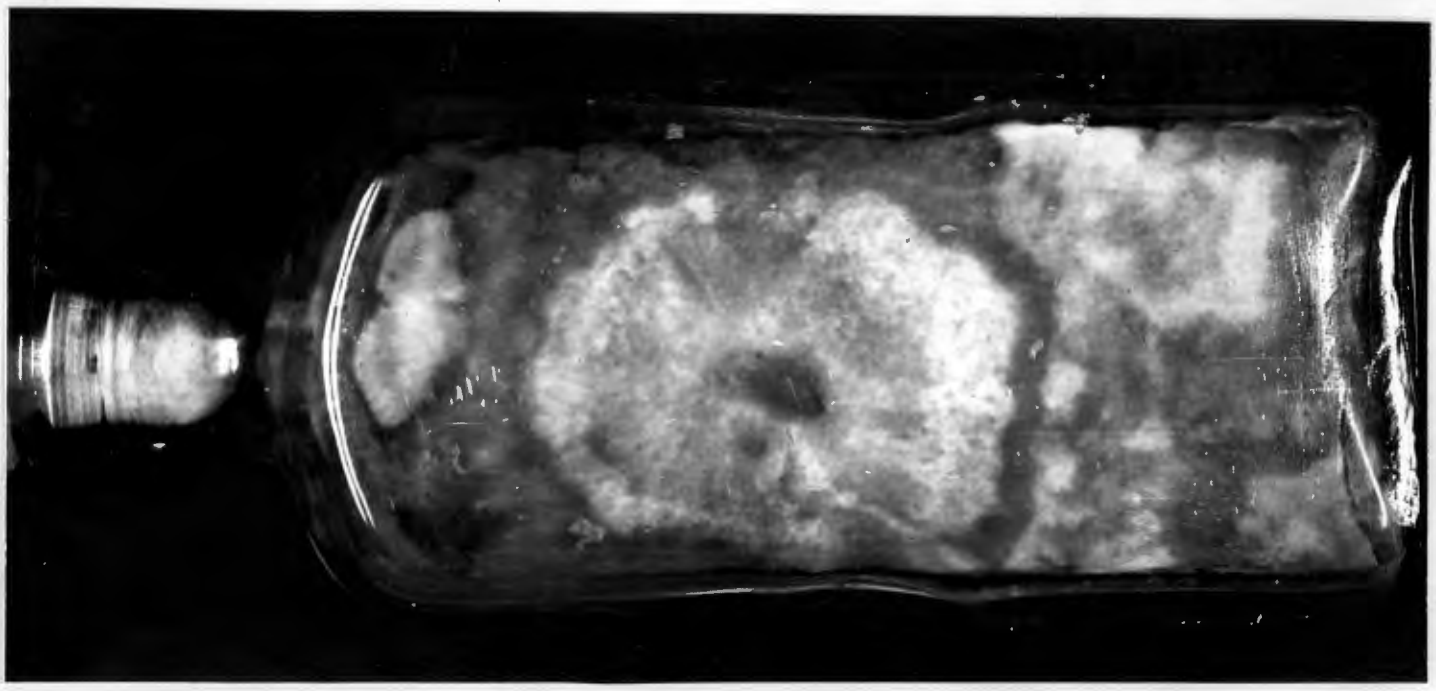


Fig.170. Leonian's bottle culture, 3 months old.

Fig.171. Malt plate culture, 10 days old at 25°C.

170

171

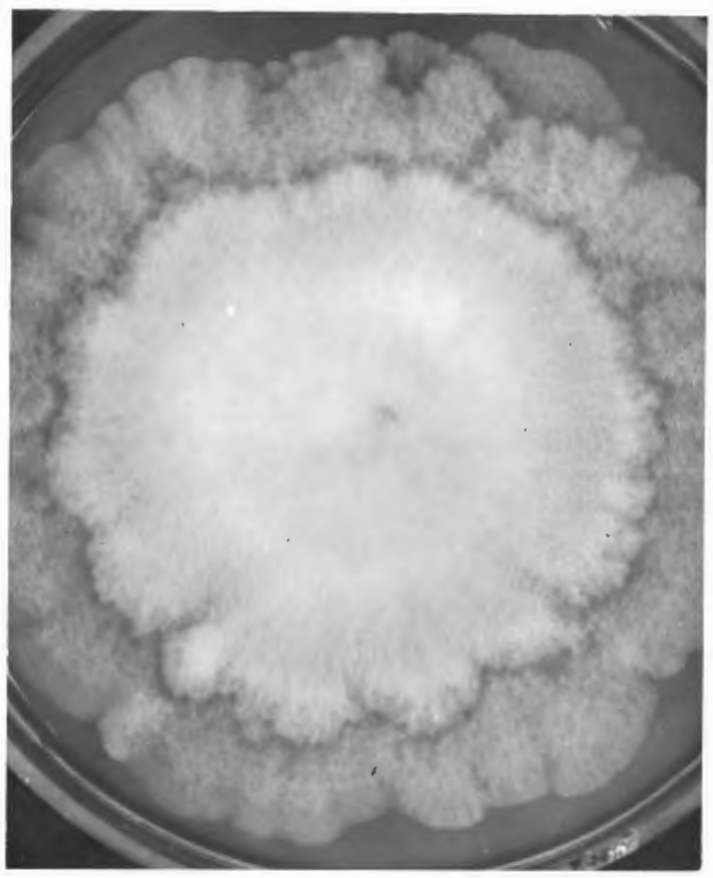
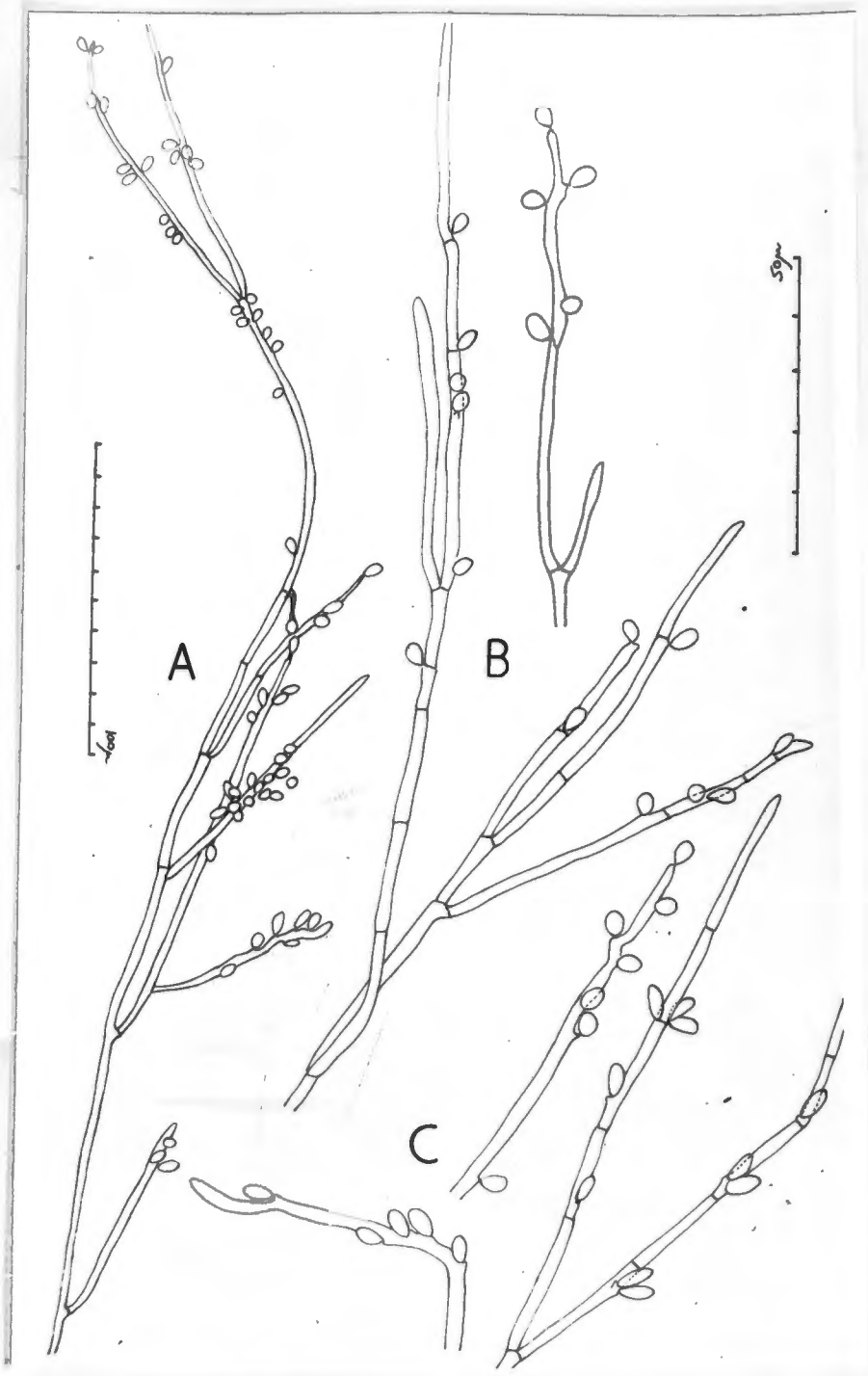


Fig.172. A. Nummularia succenturiata, 218; part of indefinitely branched fertile system, (Hypoxylon glomeratum var.5, also similar in form).

B.C. Enlarged drawings respectively of terminal fertile hyphae of Hypoxylon glomeratum var.5, and Nummularia succenturiata.

Fig.173. Rosellinia thelena, 508; Malt bottle culture, 3 months old.

172



173

Fig.174. Rosellinia thelena, 508; Leonian's bottle culture, 3 months old.

Fig.175. Rosellinia aquila, 361; Malt bottle culture, 3 months old.

174

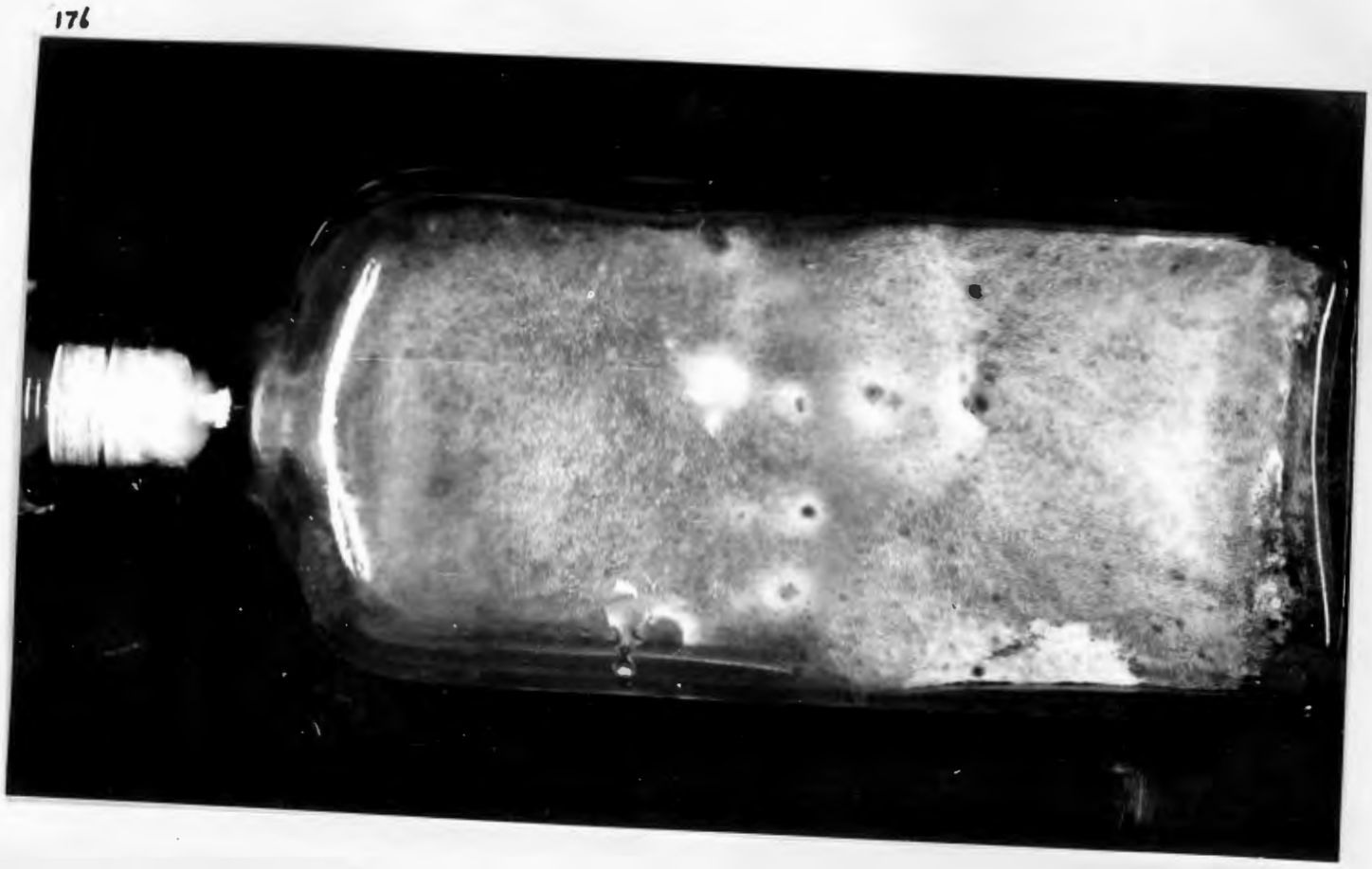
175

Rosellinia aquila, 361.

Fig.176. Czapek bottle culture, 3 months old, showing superficial development of secondary mycelium similar to that found associated with the perfect stage in nature.

Figs.177,178. Malt plate cultures, 5 days old at 25°C, showing variations in silky development.

176



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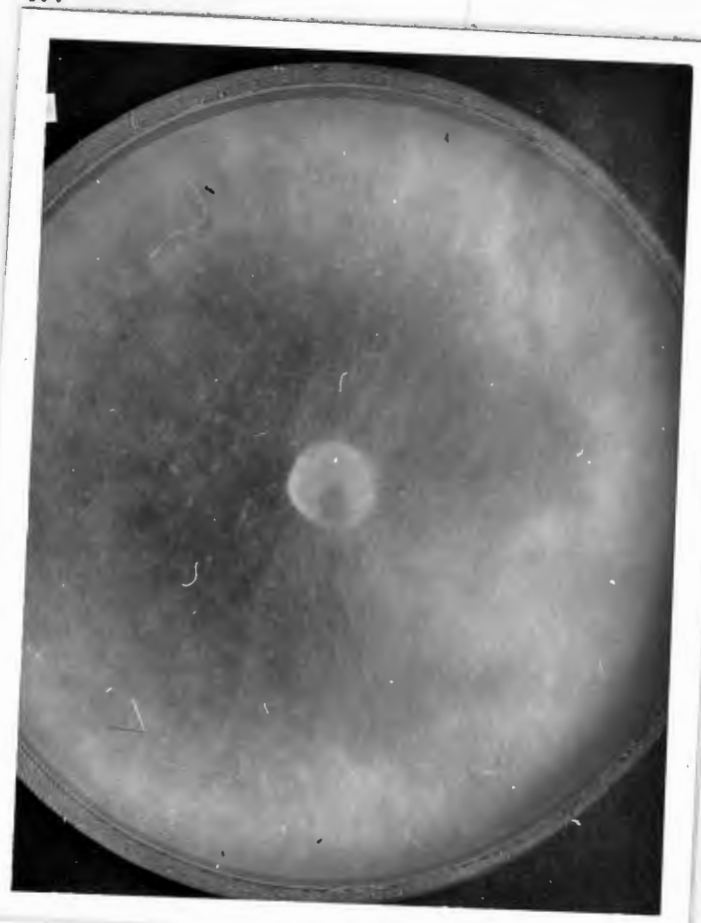

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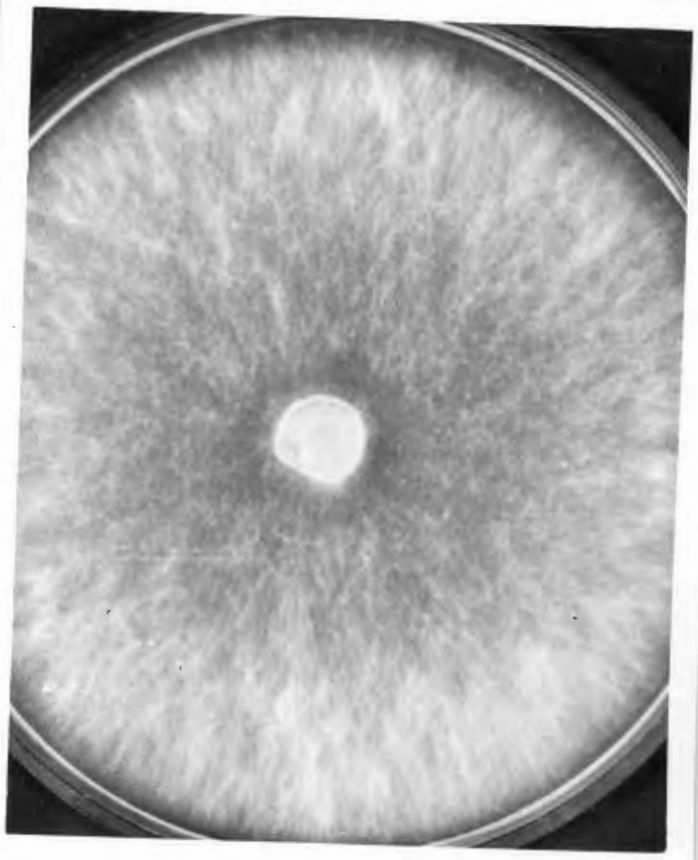


Fig.179. Czapek plate culture, 5 days old at 25°C, showing submersed or appressed type of growth.

Fig.180. Mycelial characters:-

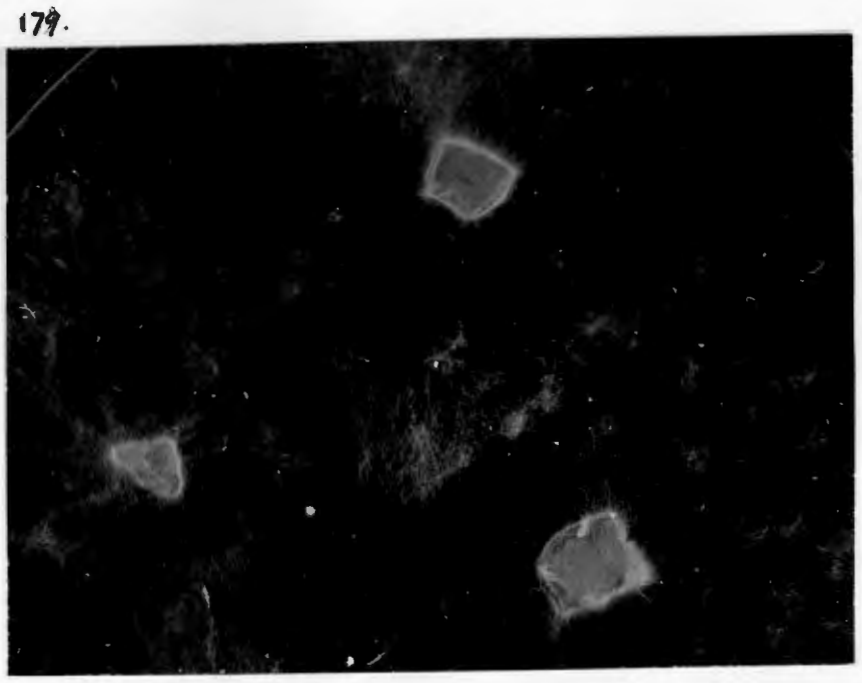
A. marginal hypha.

B. bulbous hyphae of secondary mycelium.

C. normal interlocking hyphae of smaller diameter from the secondary mycelium.

Secondary mycelium from bottle culture is identical in structure to that found associated with the perfect stage in nature.

179.



180

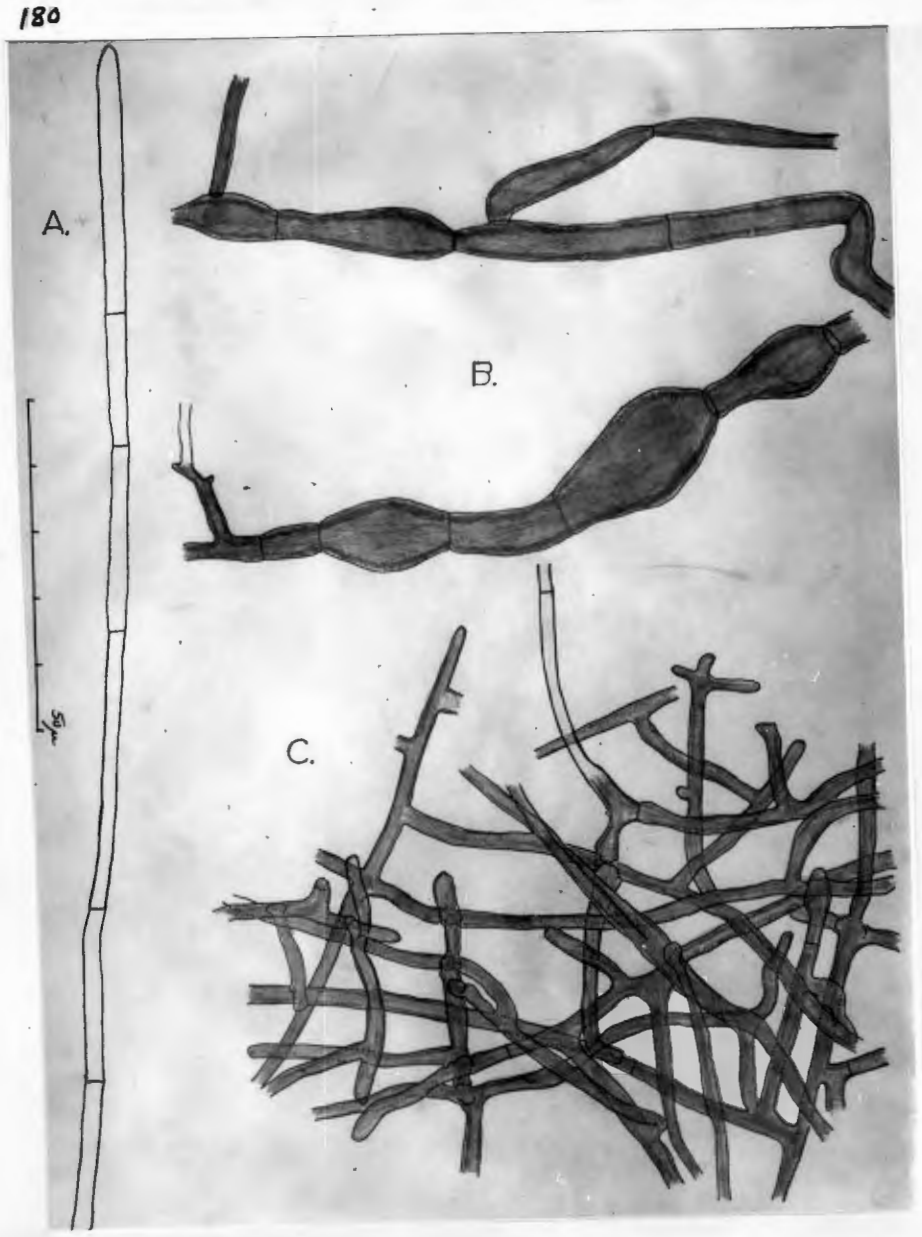
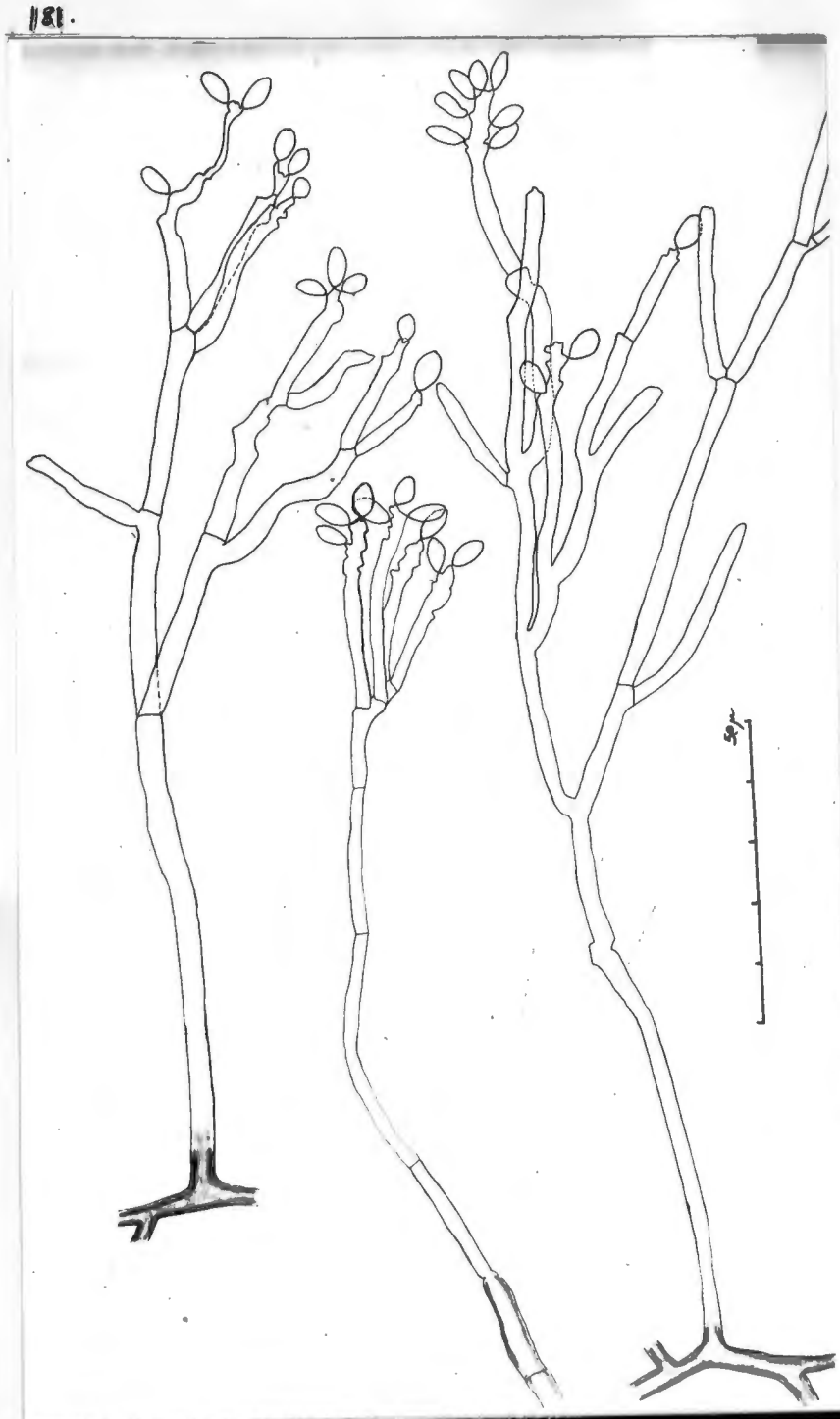


Fig.181. Rosellinia aquila, 361; conidiophores developed from the secondary mycelium on inoculated wood (Olea capensis).
These are identical in structure to those found associated with perfect stages of Rosellinia aquila in nature.

Fig.182. Hypoxylon 13A, 127; Malt bottle culture, 3 months old.

Fig.183. Same species; Leonian's, 6 weeks old.

181.



182.

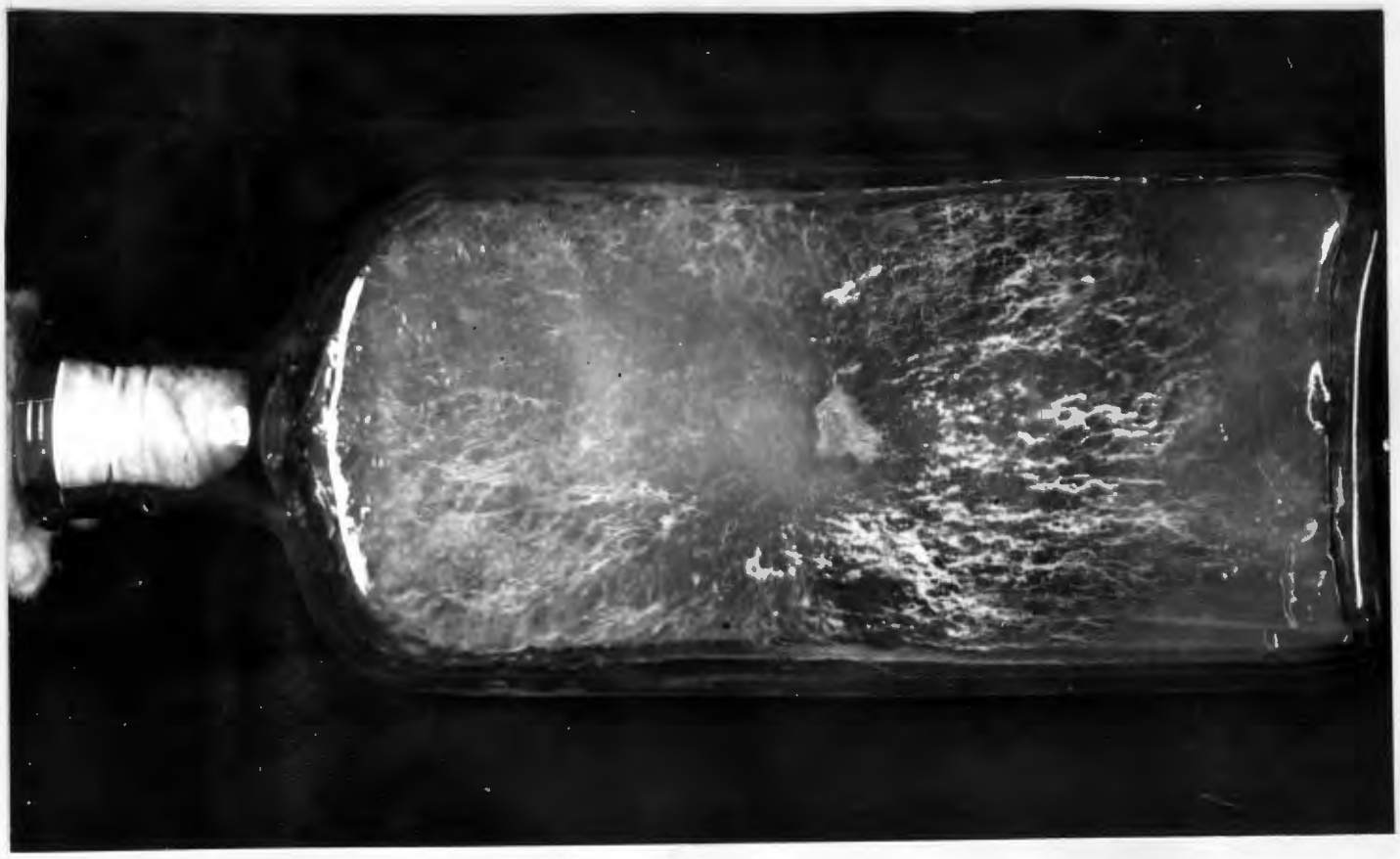
183.

Hypoxylon 13A, 127; Bottle cultures.

Fig.184. Maize, 6 weeks old.

Fig.185. Czapek, same age.

184.



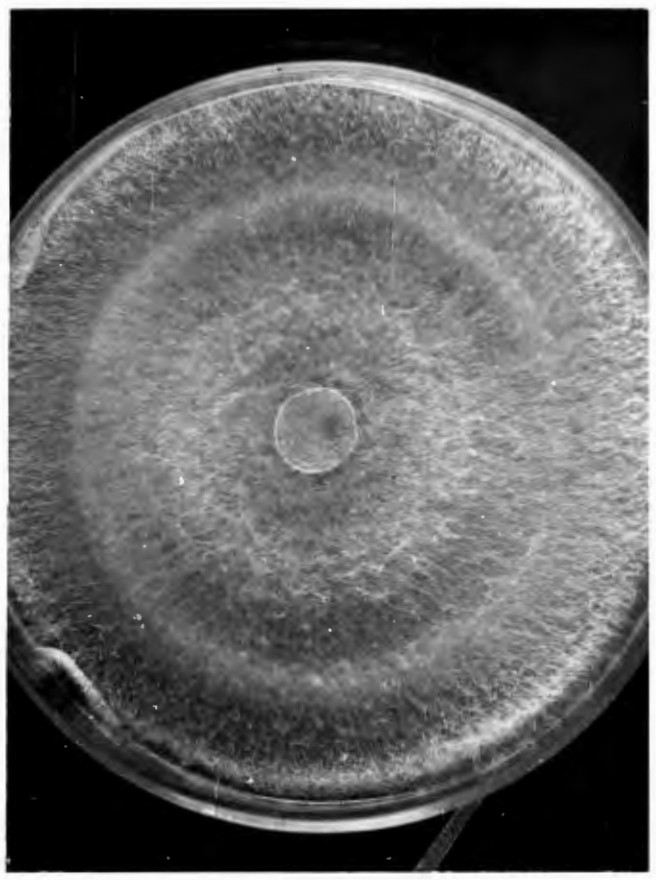
185.

Hypoxylon 13A, 127; plate cultures.

Figs.186,187. Malt, 6 & 4 days old at 25oC.

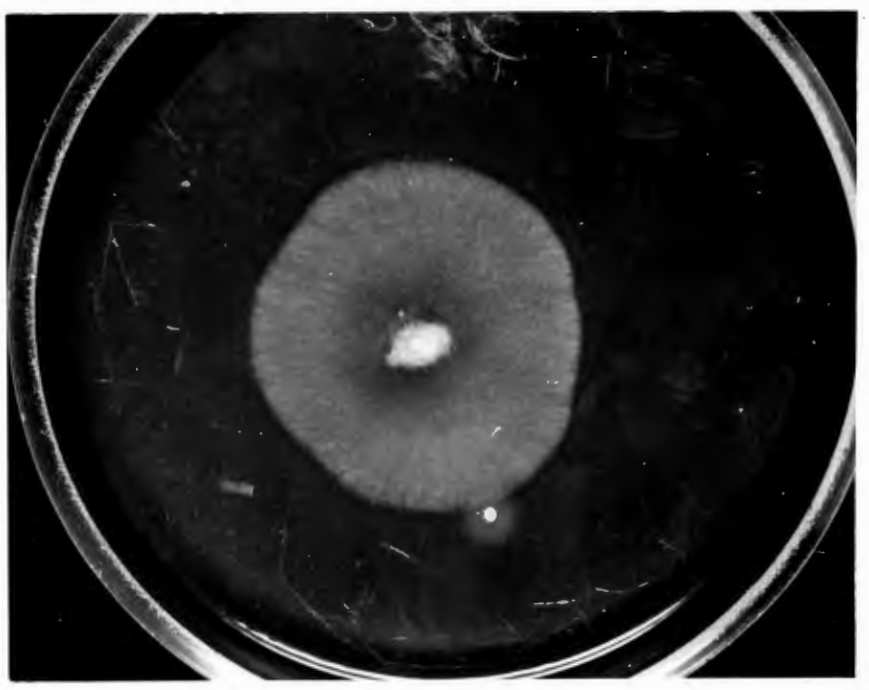
Fig.188. Czapek, 4 days old at 25°C.

186



187

188



<u>Nummularia uni-apiculata</u>, 372.

Fig.190. Malt bottle culture, 2 months old.
(Other cultures similar.)

Figs.191,192. Young (5 days) and older (8 days) malt plate cultures at 20°C.
(Other cultures similar.)

190

191.

192.

Fig.193. Conidiophores of:-

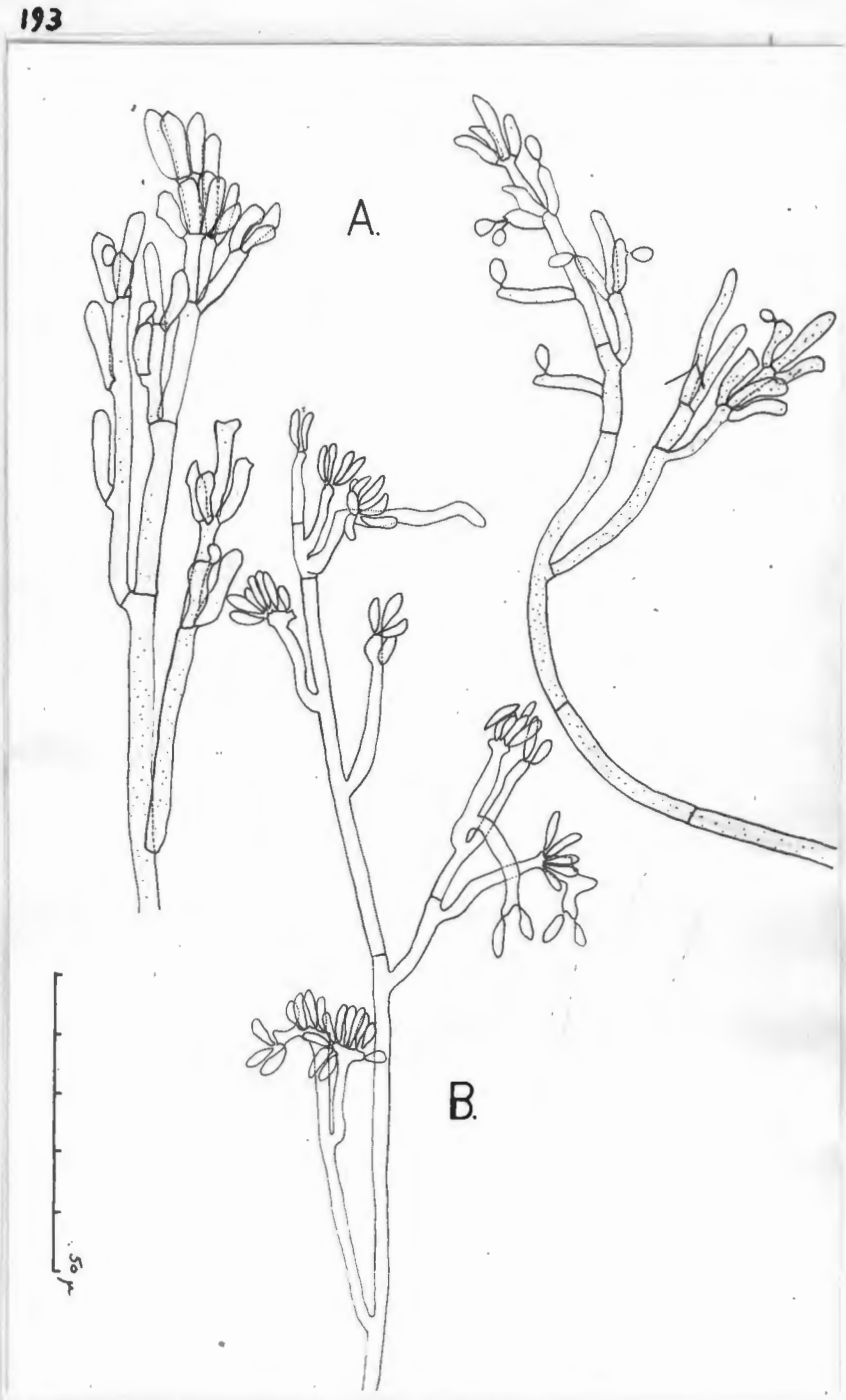
A. Nummularia uni-apiculata, 372; showing variation in compactness of branching.

B. Hypoxylon 13A, 127.

Fig.194. Hypoxylon exutans, 382; malt bottle culture 3 months old.

Fig.195. Same species; maize, 2 months old.

193



194

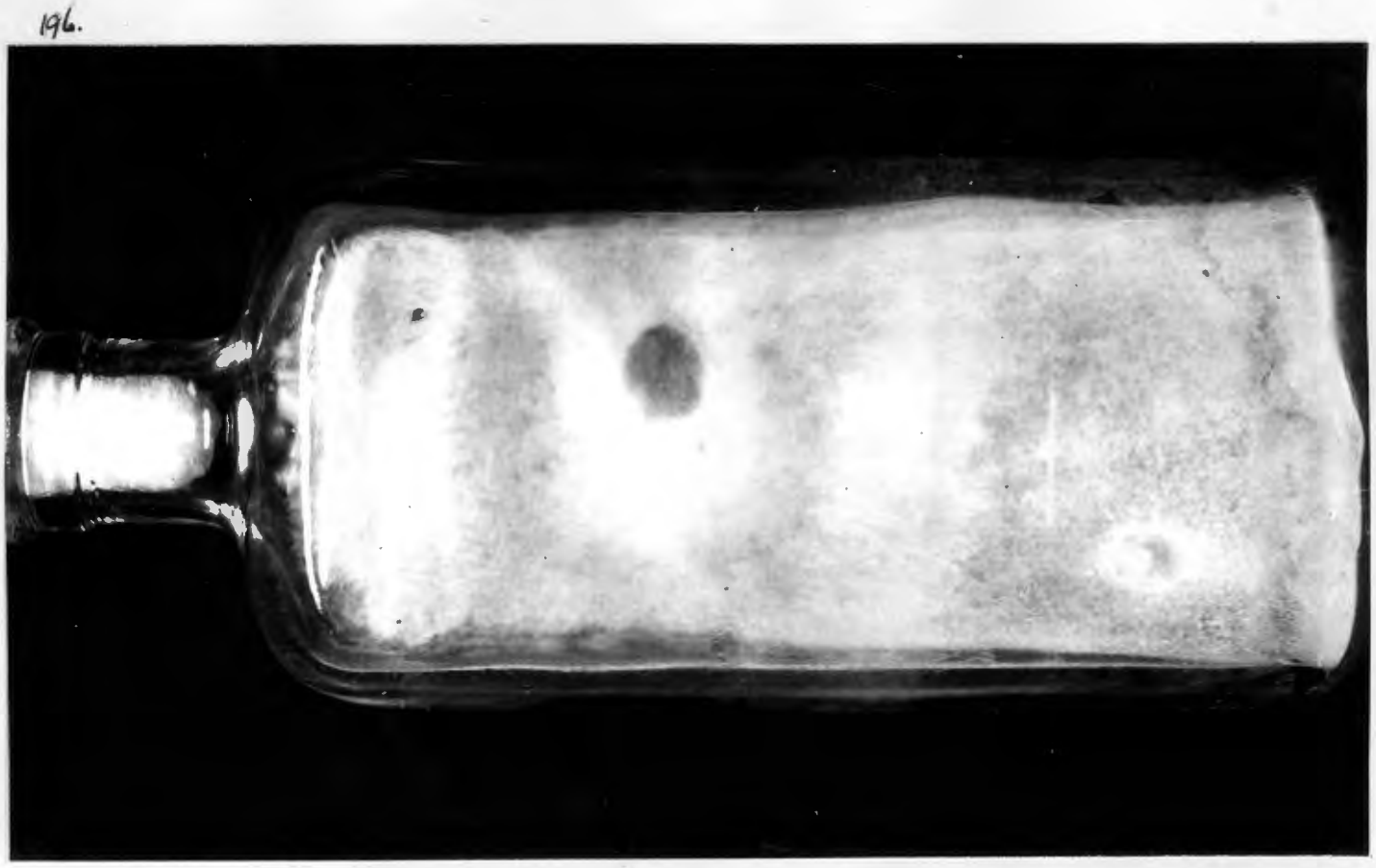
195

<u>Hypoxylon exutans</u>, 382; Bottle cultures.

Fig.196. Leonian's, 2 months old.

Fig.197. Czapek, same age.

196.



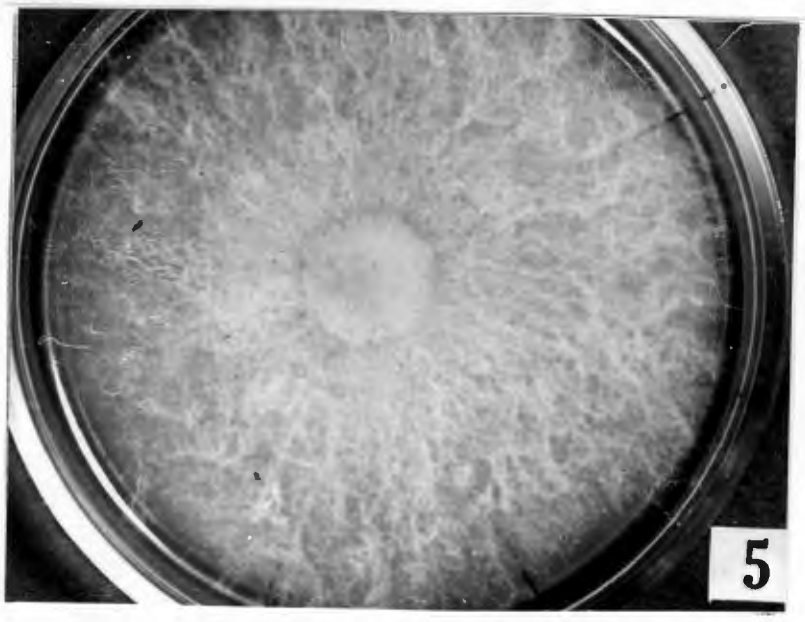
197.

Hypoxylon exutans, 382; Plate cultures.

Figs.198,199. Variation in form of malt cultures, 7 days old at 25°C.

Fig.200. Czapek, same age. Note greater density of the mycelium.

198



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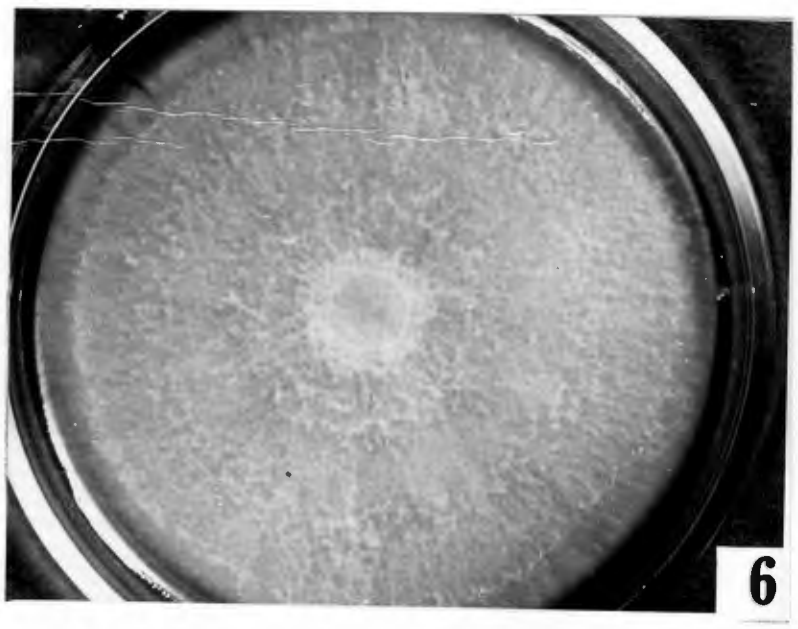
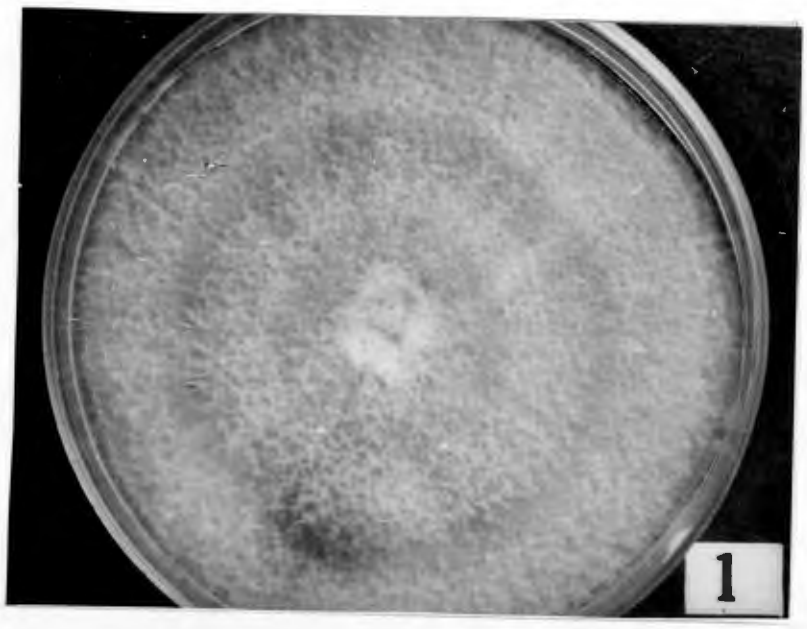


200.



<u>Hypoxylon merrillii</u>, Bottle cultures.

Fig.201. Malt, strain 263, 5 months old. This is typical.

Fig.202. Malt, strain 445, 5 months old, with brownish halo surrounding the central inoculum, and drops secreted on the surface of the mycelium.

202.

201.

Hypoxylon merrillii, strain 449; Bottle cultures.

Fig.203. Malt, 5 months old showing a more floccose type of mycelium than the 2 previous cultures.

Fig.204. Czapek, same age, showing a secondary felty white mycelium overlaying the original coarse one.

203.

204.

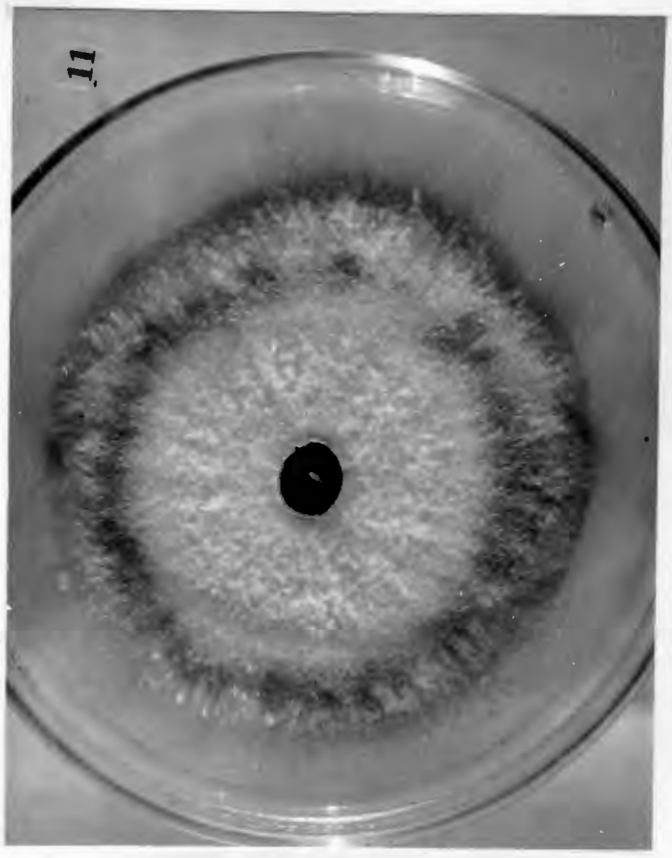
Fig.205. Hypoxylon merrillii, 263; Czapek plate culture 6 days old at 25°C.

Fig.206. Same species, 263; malt plate culture 6 days old at 25°C.

Fig.207. Hypoxylon mediterraneum, 400; malt plate culture 6 days old at 25°C, showing granulate surface for comparison.

205.

206.



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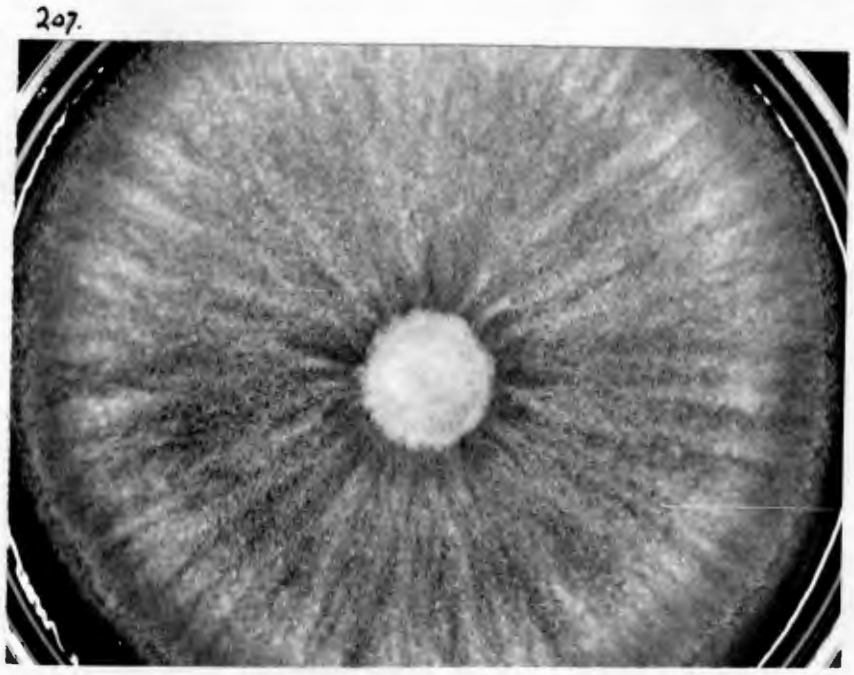


Fig.208. Conidiophores of Hypoxylon merrillii, 447; borne on the vegetative mycelium. The general plan of the conidiophore is typical for the whole Nummularium group except Nummularia succenturiata and Hypoxylon asarcodes.
Note determinate growth in contrast to most species of Rosellinia and Endoxylon-Hypoxylon.

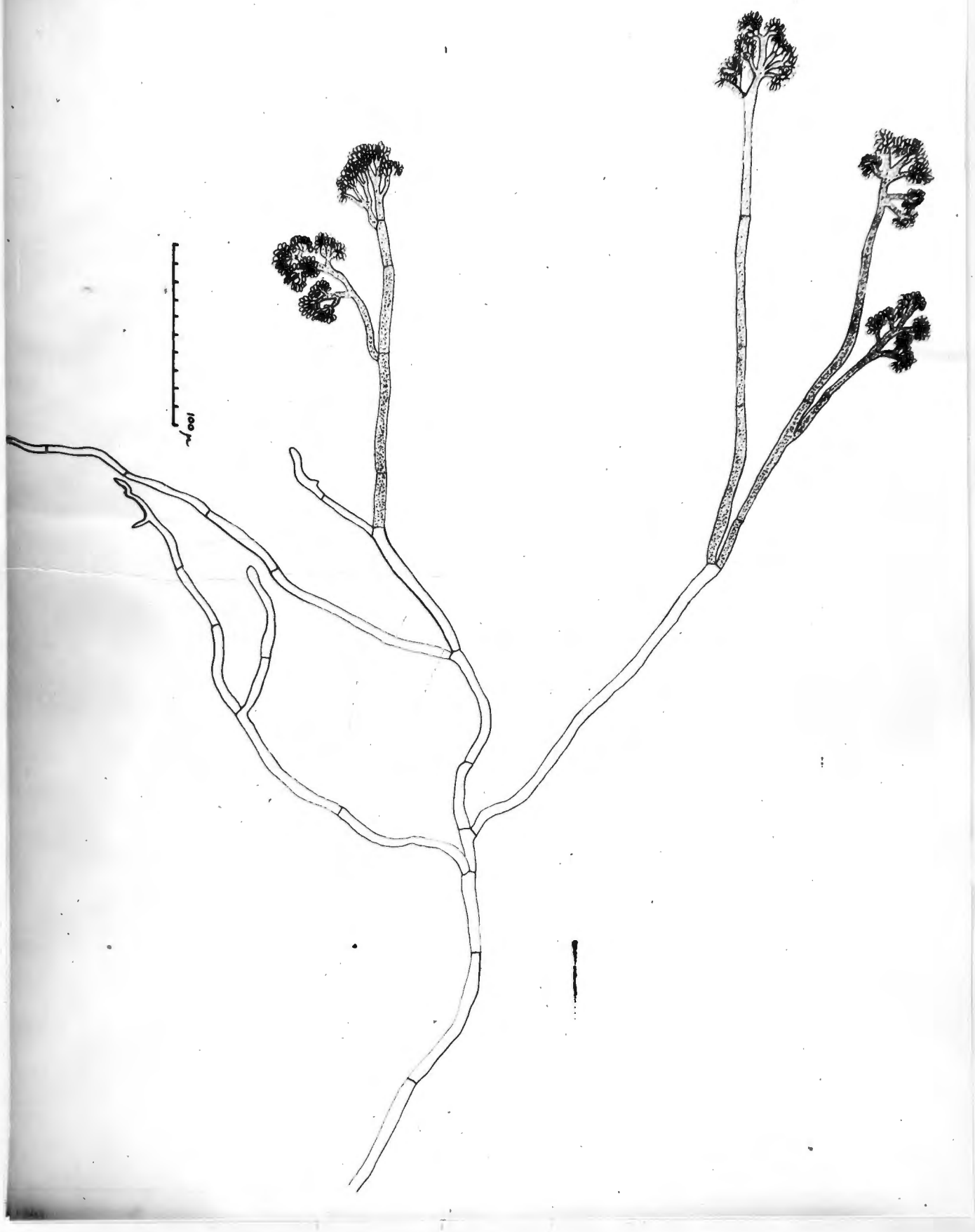

100 µm

Fig.209. Conidiophores, enlarged, of:-

A.B. Hypoxylon merrillii, 445 & 447; showing differences in organization.

C. Hypoxylon nummularium, 275.

Fig.210. Hypoxylon mediterraneum, conidiophores & conidia

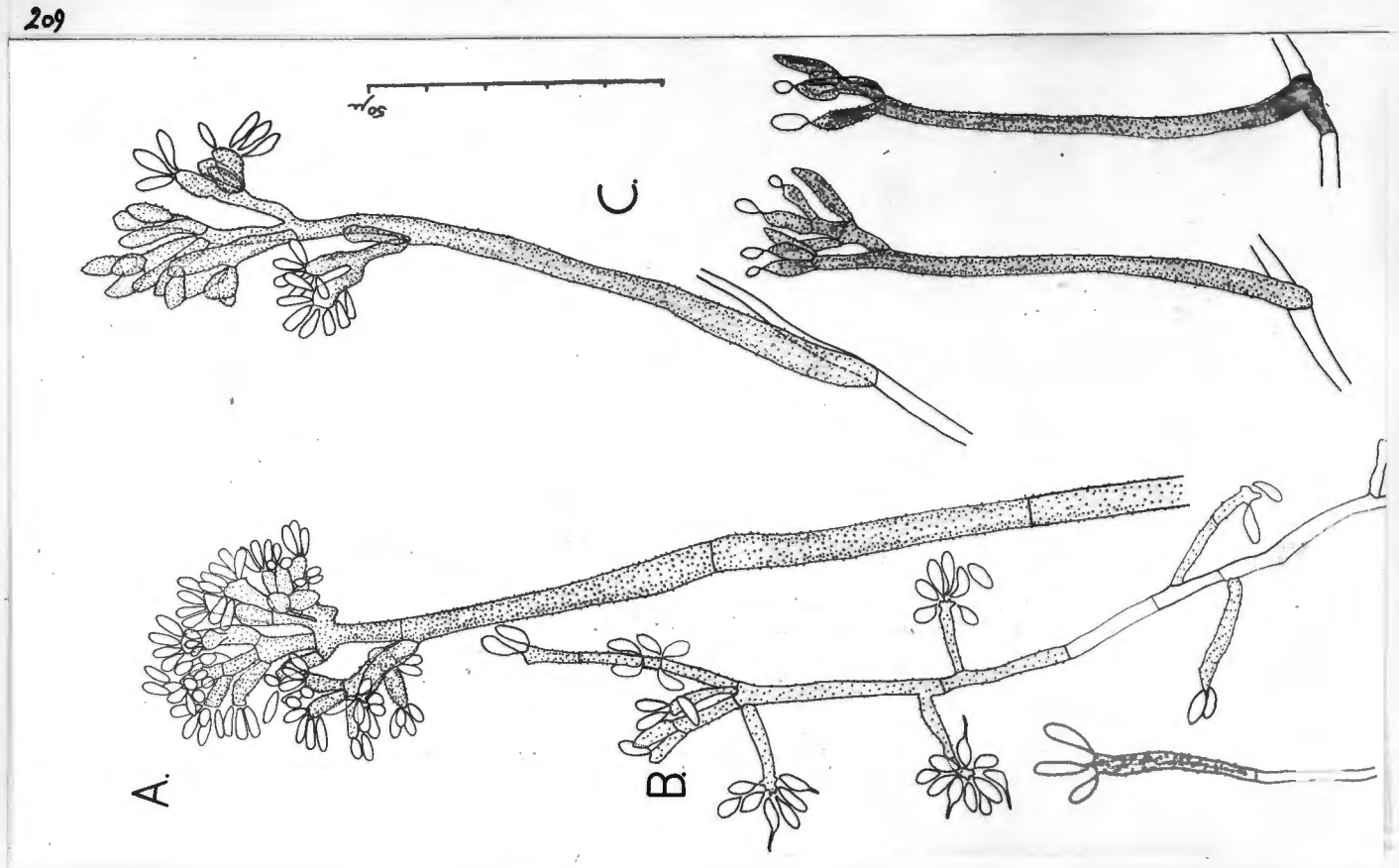
A. Strain 31. Fertile branches arising at random or grouped in whorls.

B. Strain 31. Short conidiophores arising from the side of the mycelium.

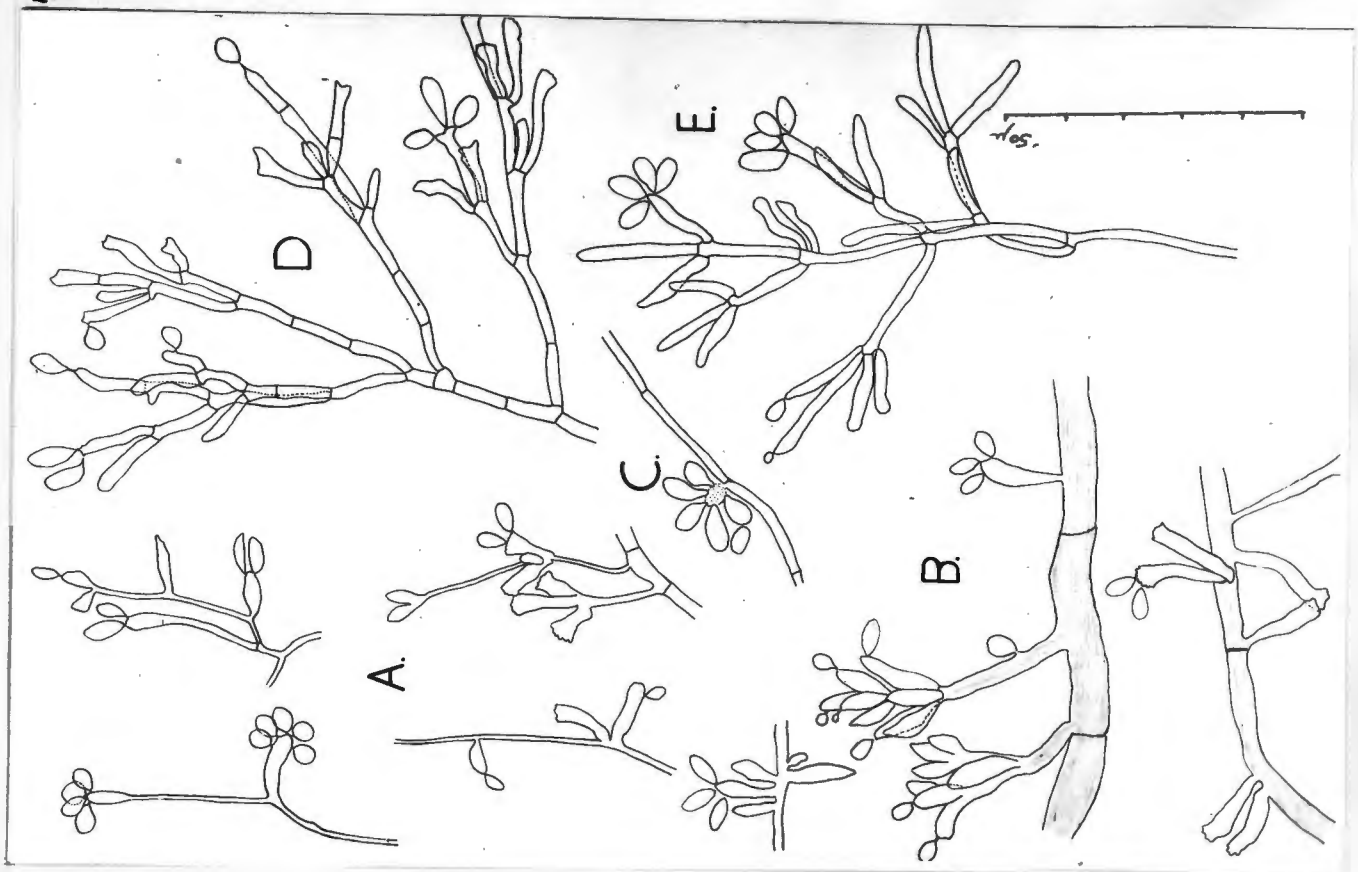
C. Strain 400. Conidia arising off the sides of the mycelium.

D. E. Strain 400. Lax conidiophores with whorled branches bearing apical clusters of conidia.

209



210



Hypoxylon mediterraneum, 31; Bottle cultures.

Fig.211. Leonian's, 2 months old.

Fig.212. Czapek, same age.

211.

212.

Hypoxylon mediterraneum. Plate cultures.

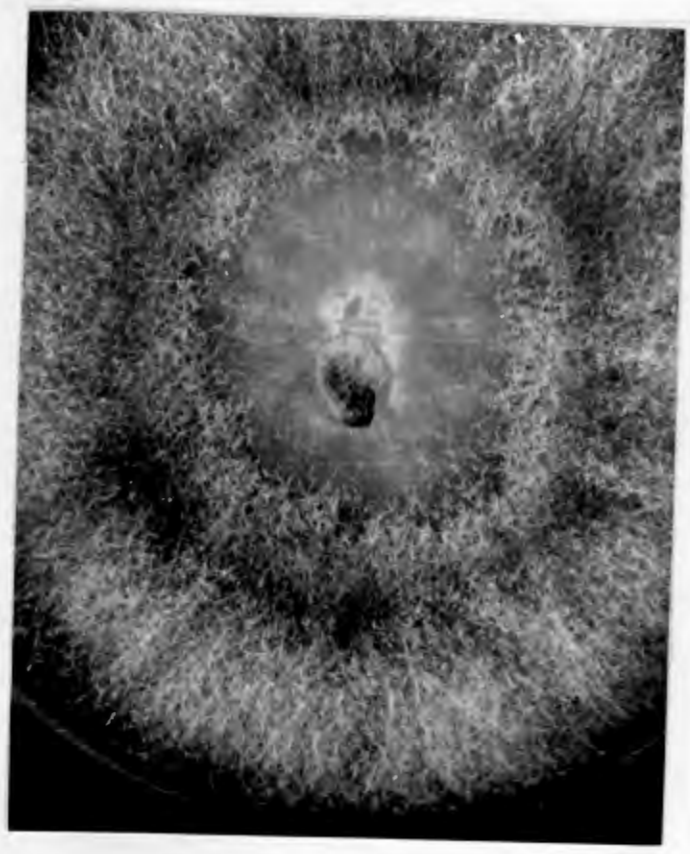
Fig.213. Strain 425, Leonians, 9 days at 25°C.

Fig.214. Strain 400, Leonian's, 16 days at 25°C, showing conidia near the rim of the plate.

Fig.215. Maize, 6 days at 25°C.

Fig.216. Czapek, same conditions.

213



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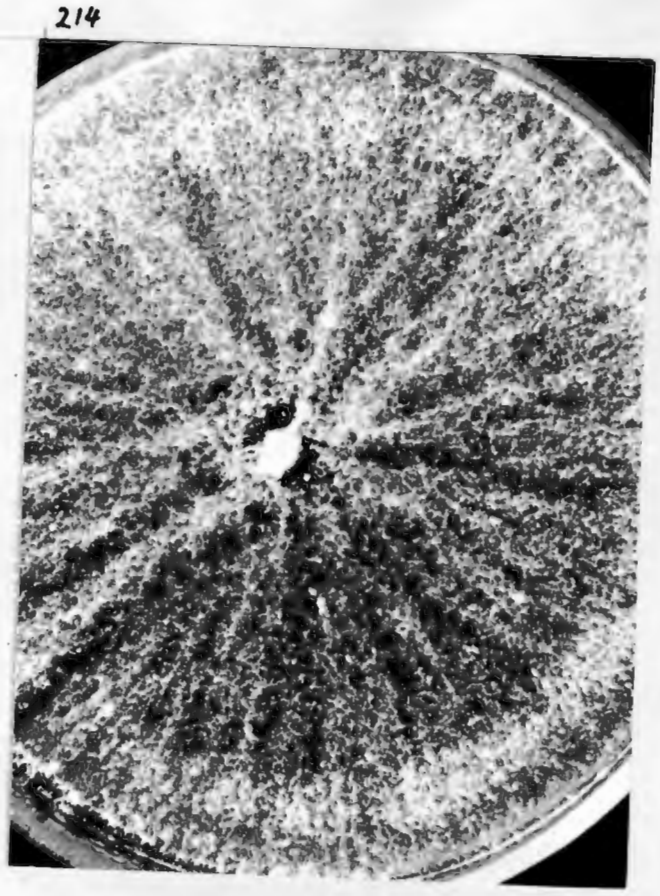

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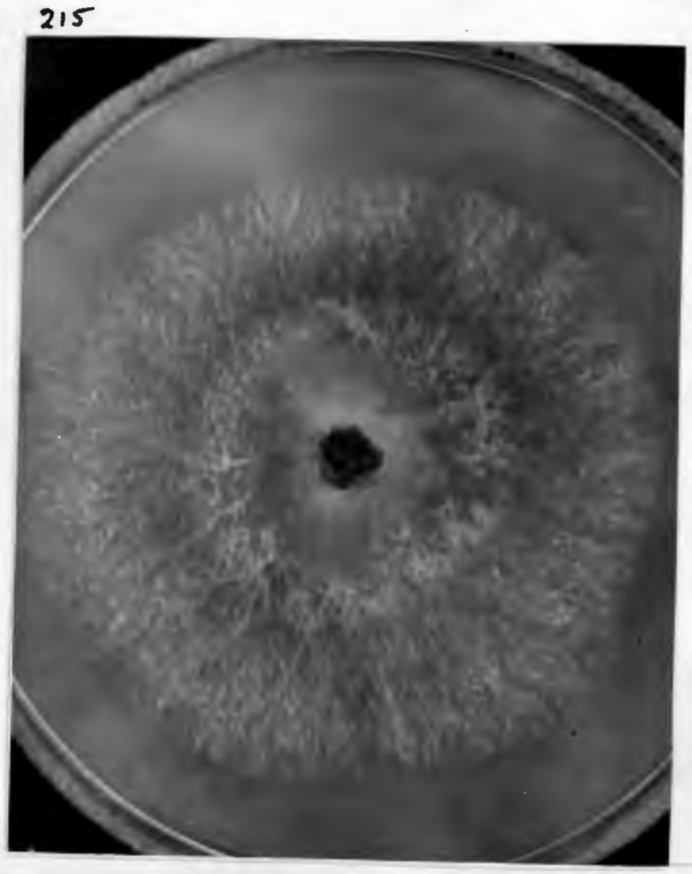
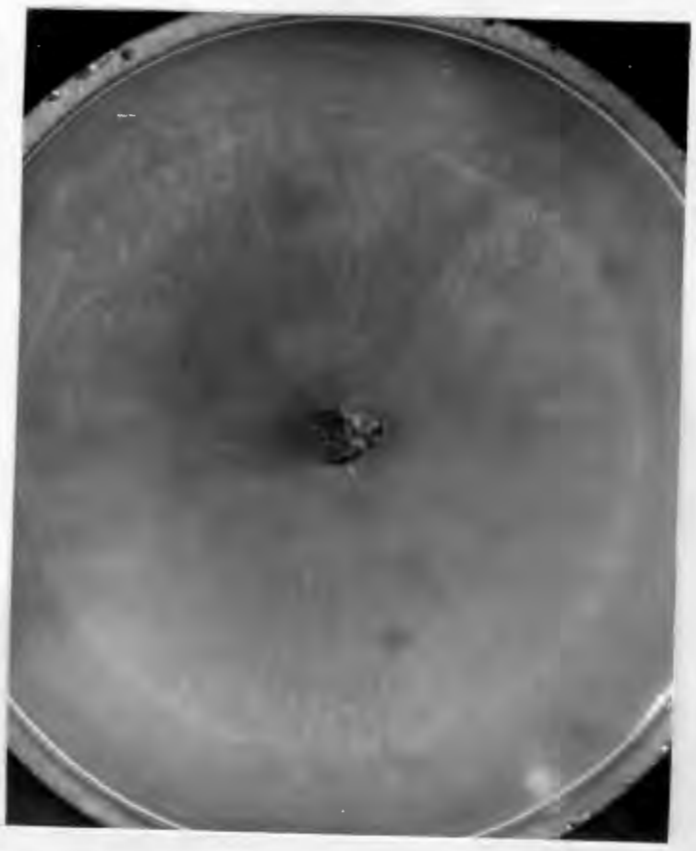


216



Hypoxylon nummularium, 275; Bottle cultures.

Fig.217. Malt, 1 month old.

Fig.218. Leonian's, same age; mycelium paler in hue.

217.

218.

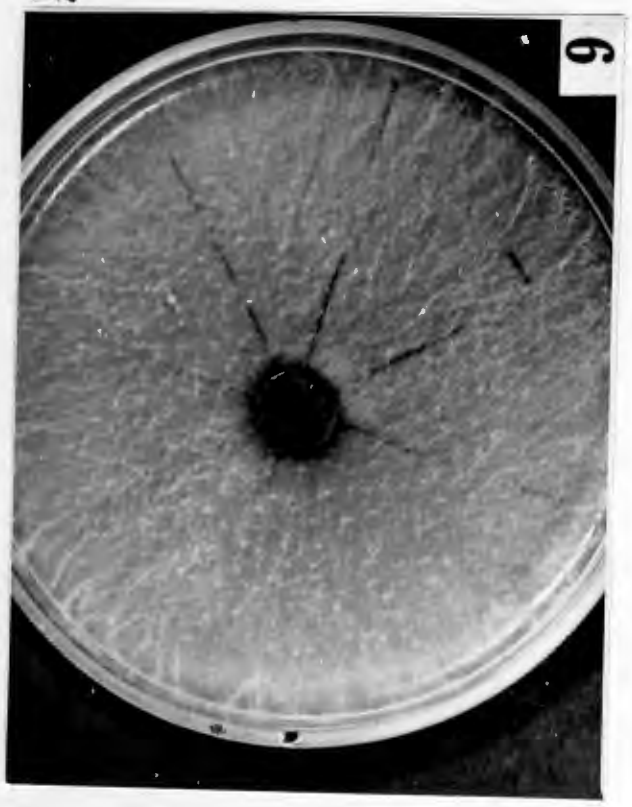
Hypoxylon nummularium, 275; Plate cultures.

Figs.219,220. Malt, 10 days old at 25°C.

Fig.221. Leonian's, 7 days old at 25°C.

Fig.222. Czapek, same age, with typical purple colouration; conidia fawn purple near centre of colony.

219.



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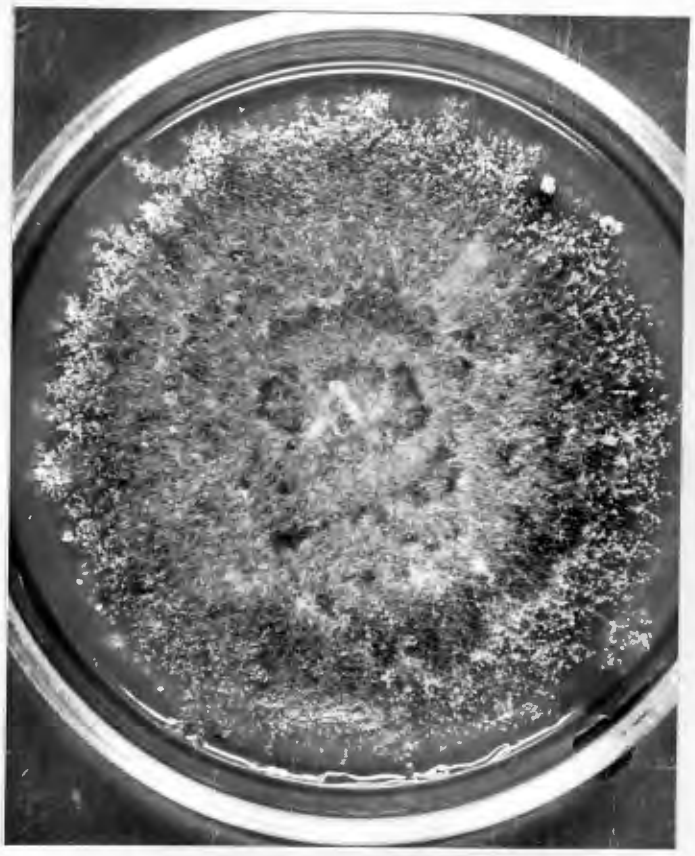

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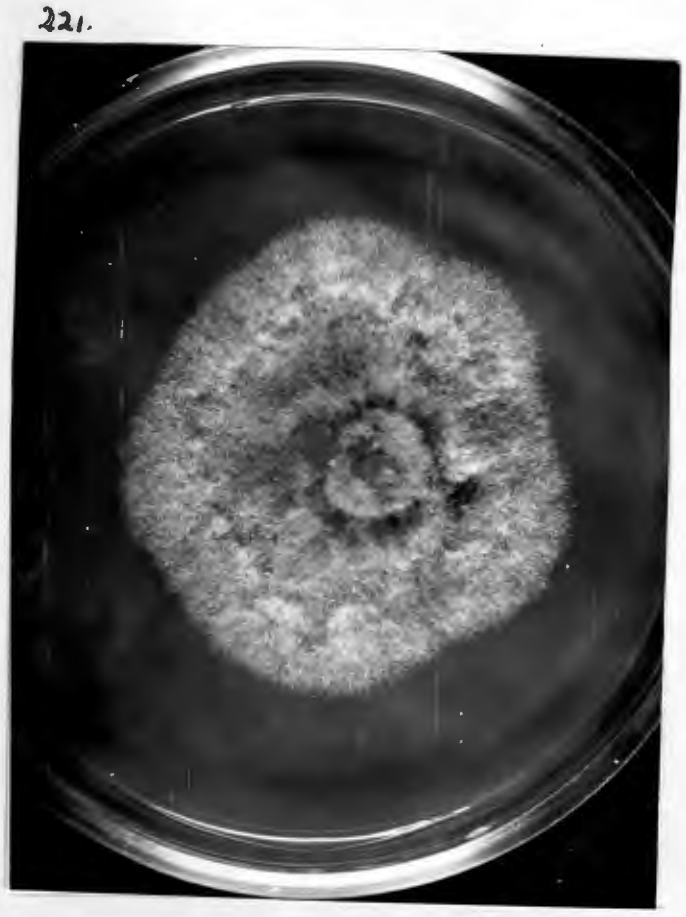

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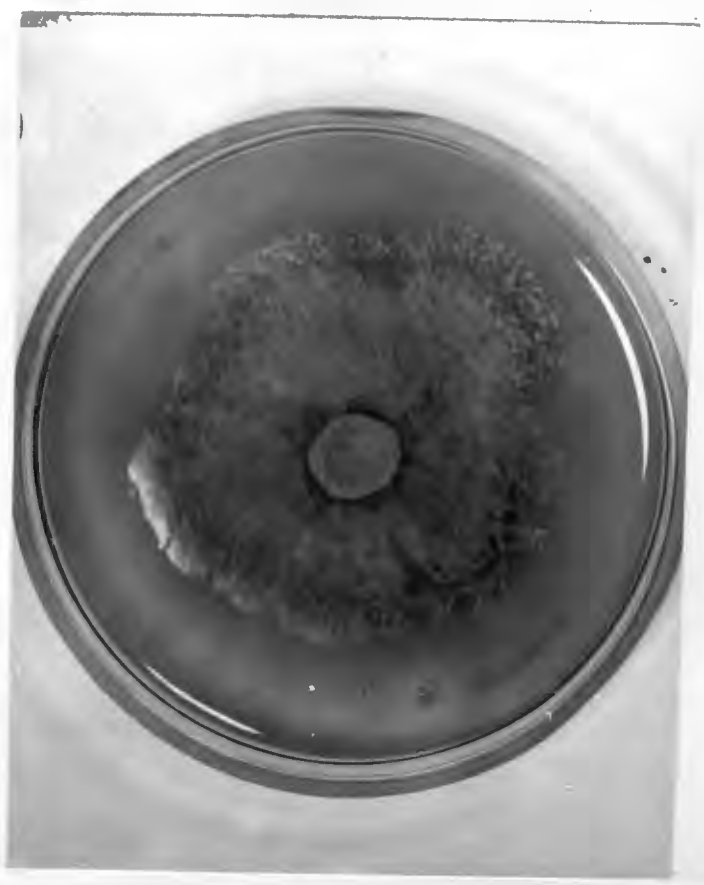


Fig.223. Marginal hyphae of:-

A. Hypoxylon glomeratum var.5, 397.

B. Hypoxylon asarcodes, 262.

C. Nummularia succenturiata, 212.

D. Hypoxylon merrillii, 529.

E. Hypoxylon nummularium, 275.

F. Hypoxylon mediterraneum, 31.

G. Nummularia uni-apiculata, 372.

H. Hypoxylon 13A, 127.

I. Hypoxylon exutans, 382.

J. Nummularia kalchbrennera, 402.

Fig.224. Marginal hyphae of:-

A. Rosellinia pulveracea, 269.

B. Rosellinia obtusissima, 259.

Fig.225. Secondary mycelium of:-

A. Hypoxylon glomeratum var.5, 397.
(Also typical of Nummularia succenturiata)

B. Hypoxylon merrillii, 447.
(Also typical of Hypoxylon nummularium, 275, and Hypoxylon 13A, 127.)

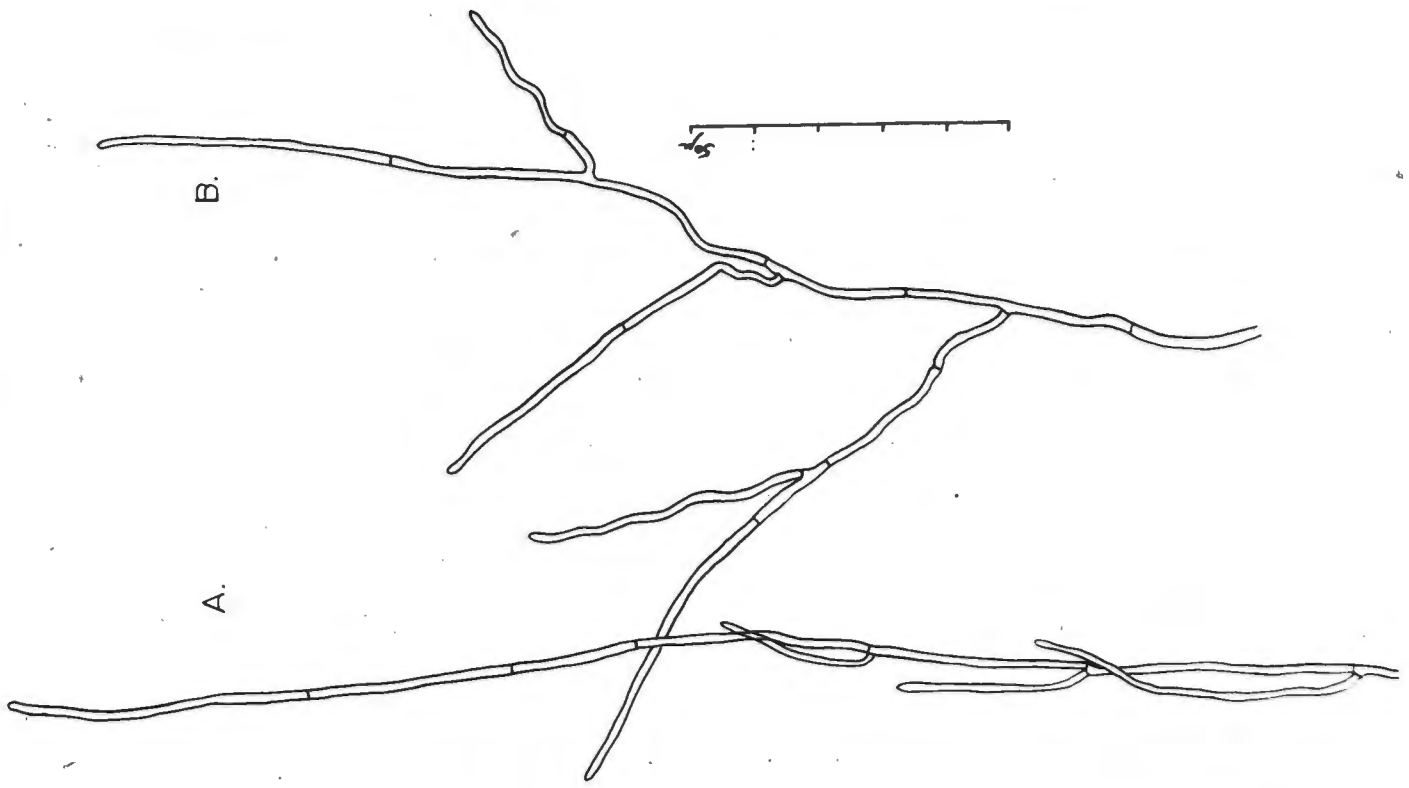
C. Hypoxylon exutans, 382.

The figure on the upper right shows young mycelium; that on the left older mycelium in typical beaded formation.

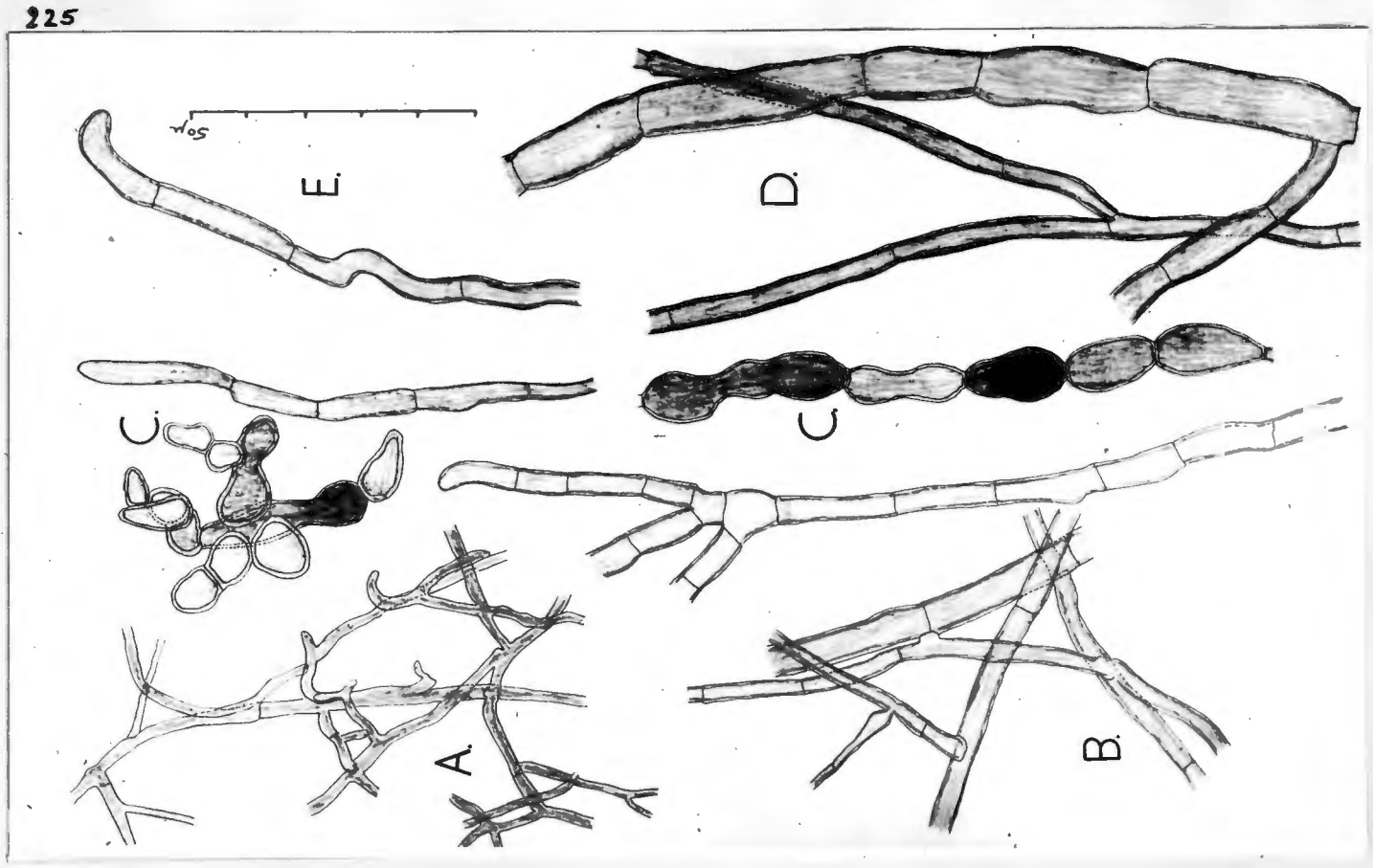
D. Hypoxylon mediterraneum, 31.
Hyphae larger than those of Hypoxylon merrillii and anastomosing less frequently.
(Also typical of Nummularia uni-apiculata)

E. Nummularia kalchbrennera, 402.
Hyphae of similar diameter range to Hypoxylon merrillii but anastomosing less frequently.

224



225



Nummularia kalchbrennera. Bottle cultures.

Fig. 226. Malt, strain 35, 3 months old.

Fig. 227. Leonian's, strain 402, 2 months old.

226.

227.

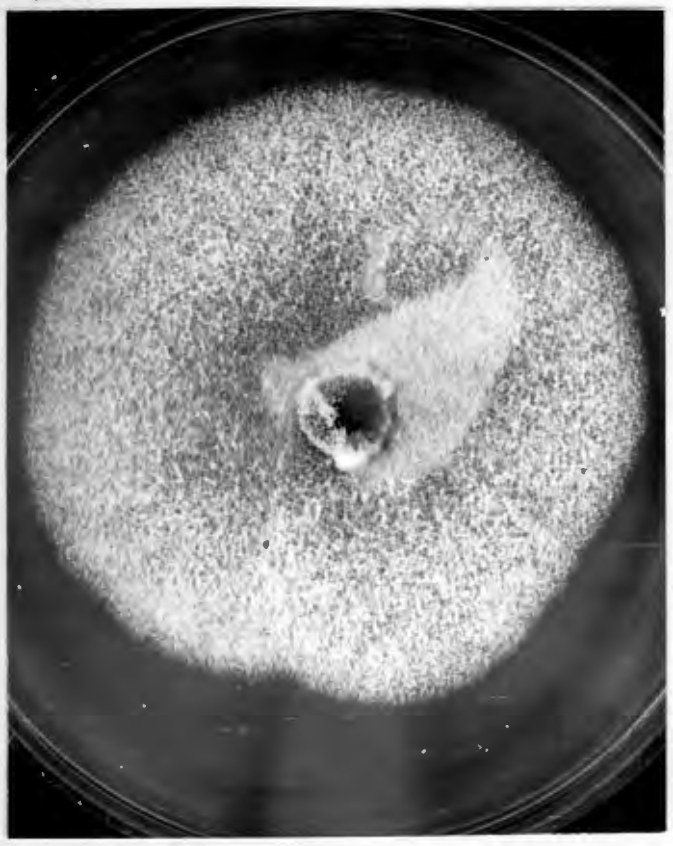
Fig.228, 229. Malt, 10 days old at 25°C.

Fig.230. Maize, 8 days old at 25°C.

Fig.231. Leonian's, same conditions.

Nummularia Kalchbrenneri, 402; Plate cultures.

228.



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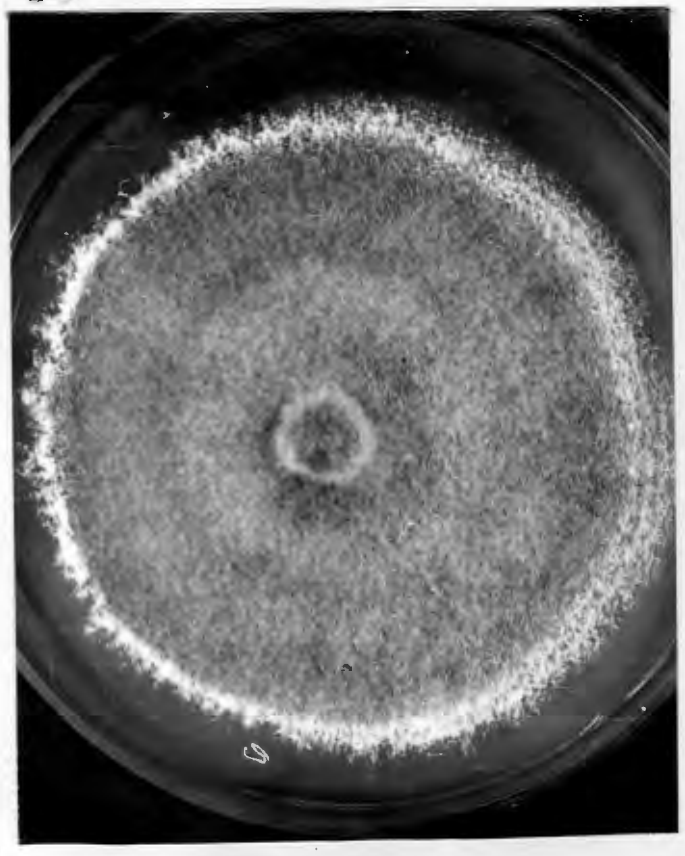

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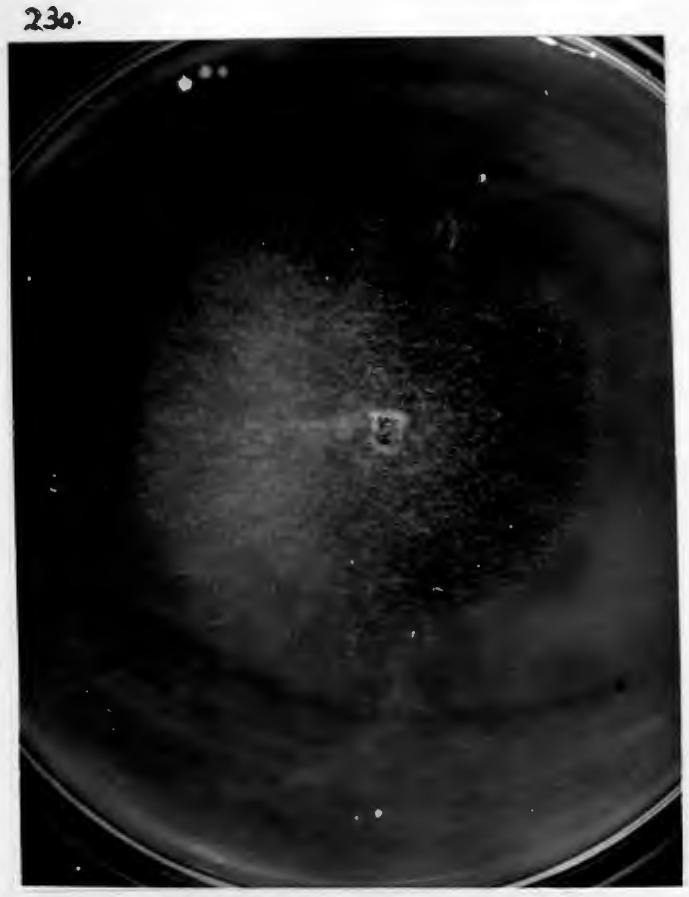

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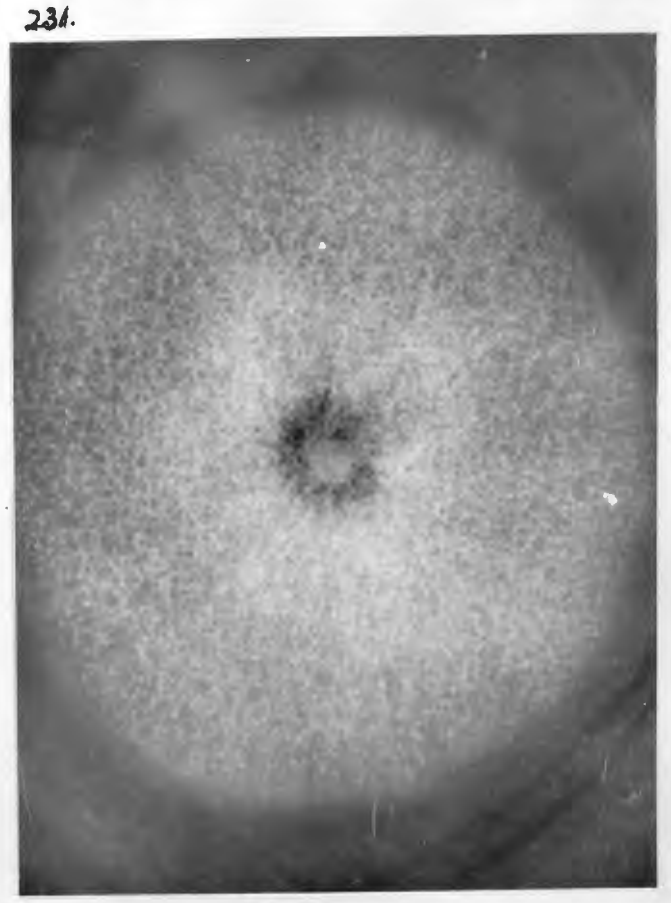


Fig.232. Conidiophores of:-

A. Hypoxylon exutans, 382.

Note range in form.

B. Nummularia kalchbrenneri, 402.

C. Chlamydospores of Hypoxylon asarcodes, 262.

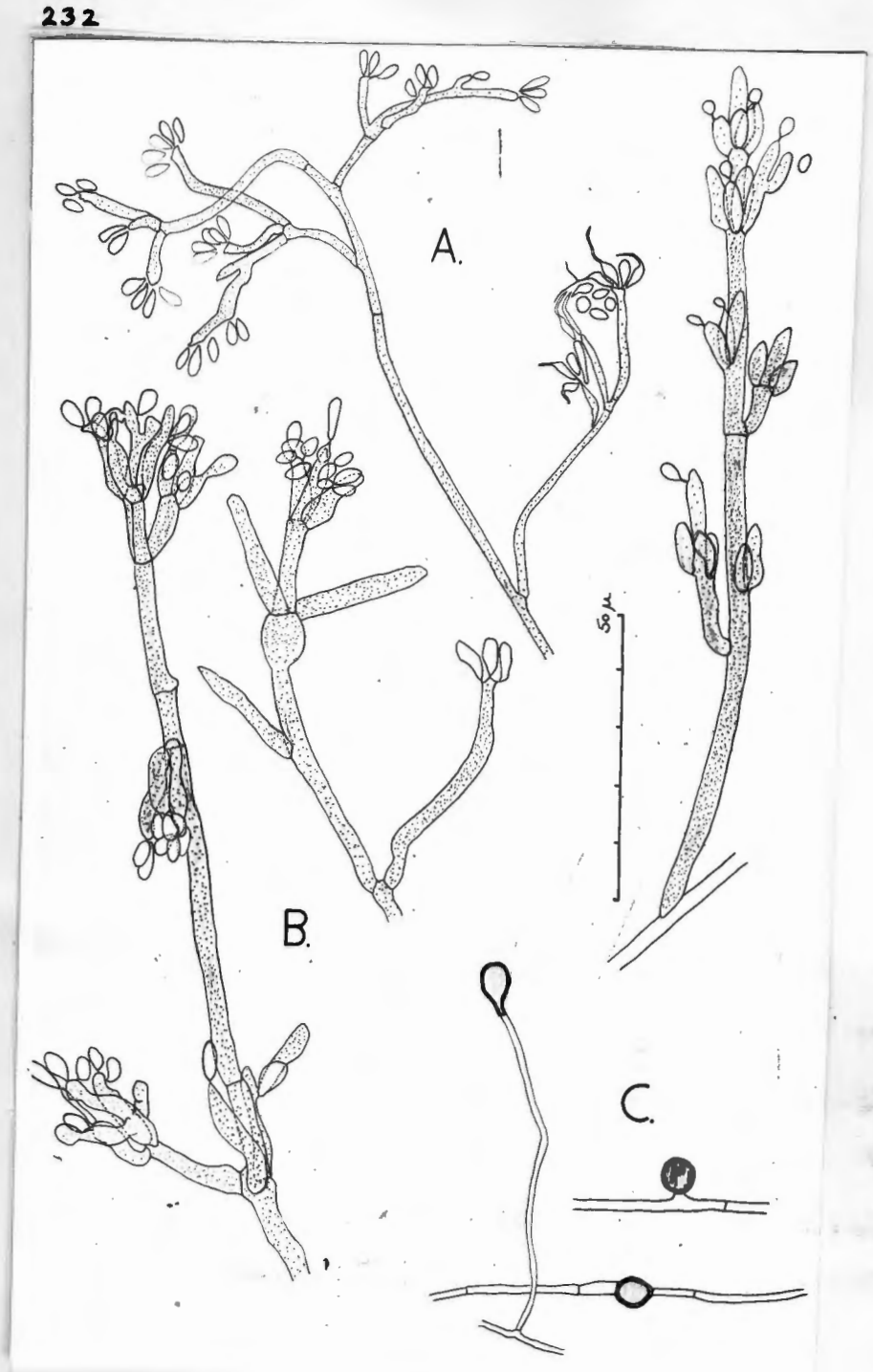
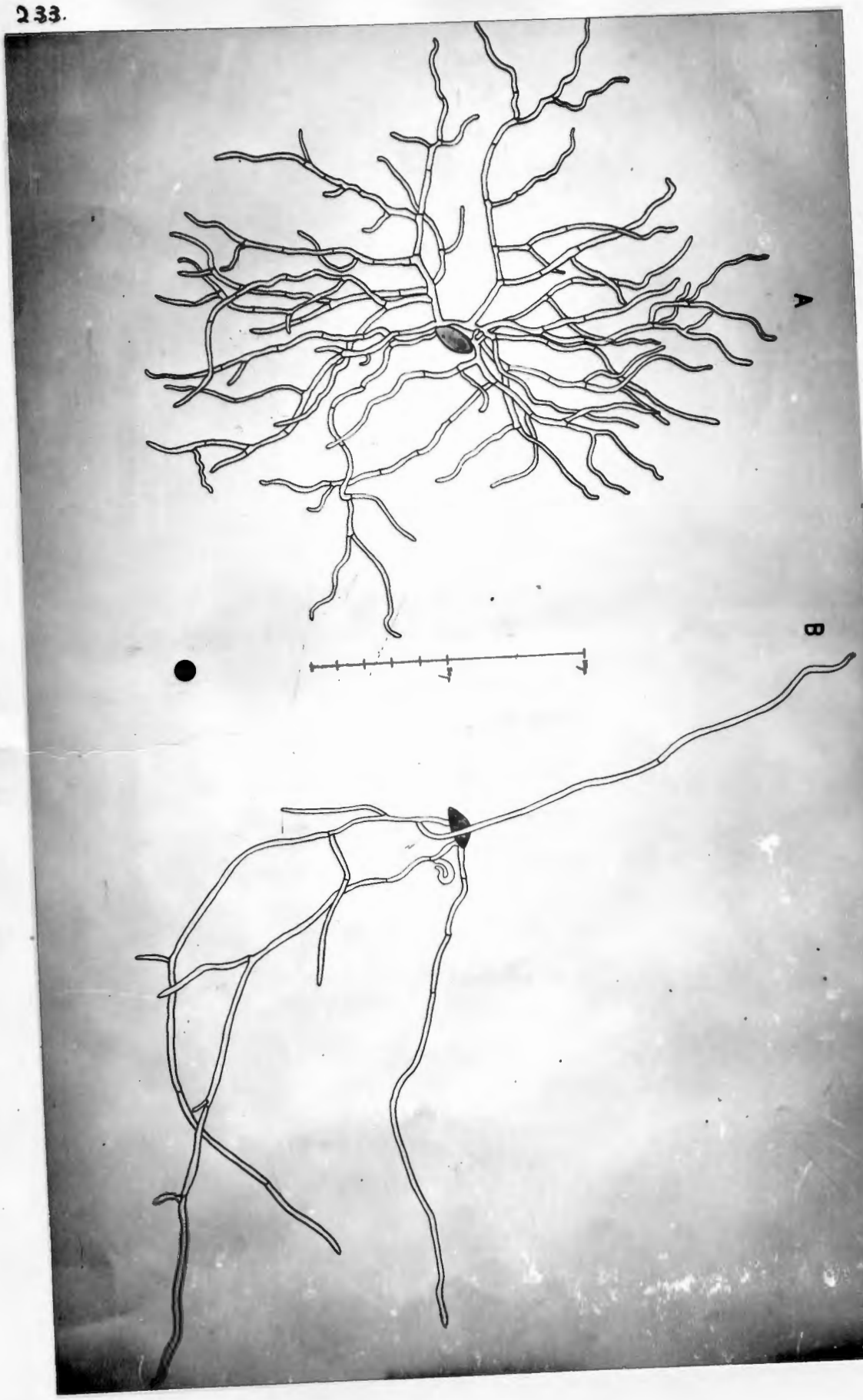

A.
50 µ.
B.
C.

Fig.233. To show the difference in germination pattern between:-

A. The Rosellinia type (Rosellinia mammoidea)
Characteristic of all Rosellinias investigated except Rosellinia thelena and Rosellinia aquila.

B. The Hypoxylon type (Penzigia Sp.362)
Characteristic of Rosellinia thelena and Rosellinia aquila, & all Hypoxylon, Penzigia and Xylaria species studied.


A
B