Taxonomic Studies of Japanese Diaporthaceae with Special Reference to Their Life-Histories*

By

Takao KOBAYASHI(1)

Contents

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(1) Chief, Forest Pathology Unit, Forest Pathology Section, Government Forest Experiment Station, Shimomeguro-5, Meguro, Tokyo, Japan.

I. Introduciton

Since the last decade of the nineteenth century, the actual beginning time of mycological and phytopathological works by the Japanese pioneers, more than 7,300 species of fungi have been recorded from the four main islands that make up Japan, and neighbouring Far East area (HINO 1949, HARA 1954, ITO 1965). Among these species the large number of fungi inhabiting woody plants are also contained. However, the majority of them are occupied by the Basidiomycetous fungi and only a relatively small number of Ascomycetous fungi have been recorded hitherto, in spite of the efforts of many pioneers in the fields of mycology and plant pathology in Japan.

Recently, Japanese forest pathologists have often encountered unknown or unidentified fungi inhabiting cankered bark of trees. This situation is mainly brought about with the increase of tree species for cultivation and enlargement of planted areas under unsuitable environmental conditions for trees.

On the other hand, it was pointed out by BISBY (1945) and MARTIN (1951) that if a critical restudy was made on the hitherto described species, many synonymous species would be found and the number of species of fungi might decrease to about one-third. In Japan, such critical and monographic studies on Ascomycetous fungi have been scanty, especially on the fungous groups associated with tree cankers. As pointed out by WEHMEYER (1926a-1941a) and recently by DOI (1966), connection of the imperfect state to its ascigerous state seems to be one of the important elements available for the systematic classification of Pyrenomycetes. To confirm the relationship between perfect and imperfect states of the fungus, it is necessary to culture the fungus by means of monospore-isolation and to compare the conidia produced on culture with the conidial state found on the host plant.

To solve the above-mentioned problems, the author has undertaken the critical and life-historical studies on the Diaporthaceous fungi inhabiting woody plants in Japan, which constitute the main group of fungi associated with tree cankers, utilizing fresh and herbarial materials. In some species described from Japan, neither fresh nor herbarial materials were available unfortunately, consequently criticism on them has, of necessity, been based only on the descriptions and figures.

On the other hand, several species of Diaporthaceae have been known on herbaceous plants in Japan. The author has the opportunity to examine several exsiccati of these species. Though no fresh materials of these species were available for the author in the course of this study, results of the critical examination on these exsiccati were added to those on the fungi inhabiting woody plants.

Another purpose of this compilation is to present a critical review of the hitherto listed genera under Diaporthaceae and to formulate a key for them. Such a review seems to be convenient for further studies and will no doubt aid investigators.

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II. Materials and methods

1. Materials

Both herbarial and fresh materials collected from various localities in Japan and various tree species are presented summarily in Table 1.

As shown in Table 1, the number of materials collected from the western and southern areas are noticeably fewer than those from the eastern and northern areas of the country. In fact, it may be said that the present work is mainly concerned with Diaporthaceous fungi distributed in the eastern part of Japan.

2. Methods

Majority of fresh materials were hand-sectioned and to ascertain whether they belonged to the member of Diaporthaceae or related families. Then, the fungus was isolated by means of a modified KEIT's method (KEIT 1915, KAWAMURA 1934). For the germination bed 2% sucrose agar poured into dishes was used. Germinating spore was transferred to potato-sucrose agar slant in a test tube. Such tubes were incubated at 20°C for about a month. Then, a half of them was transferred to the dark room kept at between 10 and 20 °C, and another lot was placed in the laboratory room under variable conditions in temperature and light intensity.

Production of imperfect state, sometimes perfect state, was usually observed within one to two months after isolation, not only under dark and cool condition, but also under variable conditions in the laboratory.

In order to examine fine morphology of the fungi, several adequate pieces made by hand-sectioning were placed in a drop of SHEAR's mounting fluid[*1] (ITO 1959) and sealed with cover-glass and Canada balsam. Besides, perithecium stripped from the substratum was squashed in a mixed drop of MELZER reagent[*2] (DENNIS 1960) and SHEAR's fluid, and sealed also with balsam.

Fruiting body produced on cultural medium was usually squashed in the SHEAR's fluid or MELZER reagent, and in some cases it was sectioned and treated in the same manner as mentioned above.

[*1] Potassium acetate 1 g., Alcohol 30 cc., Glycerine 20 cc., Distilled water 50 cc.

[*2] Potassium iodide 1.5 g., Iodine 0.5 g., Distilled water 20 cc., Chloral hydrate 20 cc.

Table 1. Distribution and number of materials utilized in the present paper

Locality / Family and genus of host plant		Hokkaidô	Honshû						Shikoku	Kyûshû	Total
			Tôhoku	Kantô	Chûbu	Hokuriku	Kinki	Chûgoku			
Pinaceae	*Abies*	3		1	1						5
	Cedrus			1							1
	Larix	3	1	2	7	1					14
	Picea	2			3						5
	Pinus	3		1	7		1				12
	Pseudotsuga	3	2	1							6
	Tsuga			2							2
Taxodiaceae	*Cryptomeria*		1	8	6				1	6	22
	Cunninghamia			1							1
	Metasequoia									1	1
	Sequoia		1								1
Cupressaceae	*Chamaecyparis*			2	4				2	1	9
	Thuja		1								1
Gramineae	*Molinia*				1						1
	Oryza				2						2
	Phyllostachys						1	2			3
	Pseudosasa								1		1
	Sasa		1						1		2
	Sinobambusa						1				1
Salicaceae	*Populus*	38	10	47	3	2	2				102
	Salix				2						2
Juglandaceae	*Juglans*	1	2	6	1						10
	Pterocarya		1		1						2
Betulaceae	*Alnus*	14	11	4	3						32
	Betula	34		5	7						46
	Carpinus			1	2						3
	Corylus			2	1						3
Fagaceae	*Castanea*		5	44	13		1	1	1	1	66
	Castanopsis			4							4
	Fagus			1							1
	Quercus	2	5	19	23		1				50
Ulmaceae	*Ulmus*							1			1
	Zelkowa			2							2
Moraceae	*Morus*			3	4						7
Magnoliaceae	*Liriodendron*			1							1
	Magnolia				2						2
Saxifragaceae	*Hydrangea*			1	1						2
Hamamelidaceae	*Liquidamber*			1			1				2
Malaceae	*Malus*	3	3		1						7
	Pyrus			1							1
	Sorbus	3		2	6						11
Rosaceae	*Rosa*			1							1

Family and genus of host plant / Locality		Hokkaidô	Honshû						Shikoku	Kyûshû	Total
			Tôhoku	Kantô	Chûbu	Hokuriku	Kinki	Chûgoku			
Rosaceae	*Rubus*				1						1
Amygdalaceae	*Prunus*	7	1	1	2						11
Leguminosae	*Albizzia*		1								1
	Amorpha			1							1
	Apios		1								1
	Azukia		1								1
	Maackia				1						1
	Sophora				1						1
Rutaceae	*Orixa*			1							1
Meliaceae	*Melia*			2							2
Euphorbiaceae	*Aleurites*			1							1
	Bischofia						1				1
	Mallotus			1							1
Anacardiaceae	*Rhus*		1		1	1					3
Celastraceae	*Euonymus*				1						1
Aceraceae	*Acer*		1	6	2						9
Rhamnaceae	*Rhamnus*						1				1
Theaceae	*Thea*				3						3
Guttiferae	*Hypericum*			1							1
Thymelaeaceae	*Edgeworthia*				1						1
Elaeagnaceae	*Elaeagnus*		1								1
Myrtaceae	*Eucalyptus*			1							1
Ericaceae	*Rhododendron*		1								1
Oleaceae	*Forsythia*		1								1
Verbenaceae	*Clerodendron*			1							1
	Vitex			1							1
Scrophulariaceae	*Paulownia*	3	1	9	1						14
Caprifoliaceae	*Weigela*				1						1
Total		119	54	190	116	4	10	4	6	9	512

3. General reference and abbreviation

Scientific name of the trees generally followed OHWI's "Flora of Japan, revised edition" (1965) and in some cases WATANABE's "Dictionary of world Trees" (1936), excepting *Alnus*, as to which MURAI's monograph (1964) was referred to.

In this paper the following abbreviations are used:

a) Herbarium name:

FPH: Herbarium of Forest Pathology, Government Forest Experiment Station, Tokyo.
NSM: Herbarium of National Science Museum, Tokyo.
HUH: Herbarium of Faculty of Agriculture, Hokkaido University, Sapporo.
HYU: Herbarium of Faculty of Agriculture, Yamaguchi University, Yamaguchi.

b) Collector's name:

T.K.: Takao KOBAYASHI

T.U.: Tadashi UOZUMI

III. Historical review on the concept of Diaporthaceae

In the earlier classic system of mycology (FRIES 1823) only a moderate number of genera have been listed in the Pyrenomycetes. Thereafter, the fungi belonging to Pyrenomycetes were rearranged on their systematic position followed by addition of a great number of the species and the findings of useful characteristics to rearrange them. At that time, Pyrenomycetes, the large fungous group characterized by the closed ascocarp, perithecium, was classified to an order or a family based on such superficial criteria as presence or absence of stroma, colour and persistency of perithecium and/or stroma, and position of ascocarp. Mode of septation and presence or absence of pigment in ascospore were utilized as important characteristics to separate genera from each other.

For instance, LINDAU (1897), who directed his purpose towards natural classification of the Pyrenomycetous fungi, characterized Valsaceae in the Sphaeriales as follows: "Perithecium is produced in a stroma composed of both fungous and substrate tissues, and conidial state is produced in pycnidium", and included ten genera in this family. At the same time, he recognized Melanconidaceae, being distinguishable only by the type of conidial state, and placed it near to Valsaceae.

SACCARDO (1899) also included forty-five genera under Valsaceae to which he used the mixed concept of LINDAU's four families having stroma, namely Valsaceae, Melanconidaceae, Diatrypaceae and Melogrammataceae. Through the final decade of the nineteenth century to the earlier years of the twentieth century, a similar concept based on the employment of superficial criteria mentioned above has been accepted by many other workers on this fungous group.

Since the second decade of this century, the Pyrenomycetous fungi were subjected again to a big alteration in their systematic position owing to the change of criteria acceptable for classification. Criteria noticed by recent mycologists, who attempted to construct a natural system of Pyrenomycetes, are the structure of ascus membrane and the perithecial nucleus or centrum, and their imperfect state. Attempts to disintegrate a classic system and to rebuild a natural one of Pyrenomycetes have been made by many mycologists utilizing such criteria up to the present time. LINDAU's Valsaceae and related families were also subjected to these attempts and rearrangement was tried by several mycologists.

Von HÖHNEL (1917a) established a new family, Diaporthaceae, instead of Valsaceae with thirty-three genera collected under the following bases: "Ascus membrane is thin excepting its tip where it furnishes apical ring and fine pore with negative iodic reaction; perithecium is filled with many asci at various heights resulting from their different length of stalk; paraphyses is usually absent; ascospore is always hyaline". At the same time, he pointed out that such type of perithecium was the one out of two important types within Sphaeriales, and another type might be represented by *Pleospora*.

Genera of Gnomoniaceae in the classic system, which inhabit leaves and have no stroma, were first united with Diaporthaceae by him. Although a part of his criteria was revised and more detailed characters to distinguish this fungous group from the other were reported by later research workers, most of genera included in Diaporthaceae by him are maintained as acceptable members of that family in the present sense.

The author regrets to say, however, HÖHNEL (1918) rejected his good reasoning only a year later by the establishment of Allantosphaeriaceae in which almost all the genera of Pyrenomycetes having allantoid ascospore were placed. Thus, genera of Valseae, a subfamily separated from another subfamily Diaportheae by its allantoid ascospore, were transferred entirely to the new family Allantosphaeriaceae.

SACCARDO (1928) accepted HÖHNEL's earlier pronouncement (1917a) but used the family name of Valsaceae instead of Diaporthaceae.

WEHMEYER (1926a) discussed relationship between genera belonging to HÖHNEL's Diaporthaceae and related families, and presented his conclusive grouping based on the morphological and life-historical studies. Importance of imperfect state to confirm affinity between genera or species was emphasized by him. He revised the bases on the distinction of HÖHNEL's two subfamilies noted above to the difference in their morphology of imperfect state, viz. subfamily Valseae having multilocular pycnidium and allantoid conidium, and the other Diaportheae having simple pycnidium or exposed conidial layer. *Melanconis* and related genera producing imperfect state on the exposed layer were first included in this family by him. He demonstrated distinct points to distinguish the family Diaporthaceae from Allantosphaeriaceae emended by him.

Several years later, NANNFELDT (1932) published an epoch-making system of Ascomycetes. An important criterion used by him is the structure of ascus, namely, the ascus membrane is either double (bitunicate) or simple (unitunicate). In addition to this criterion, structure of ascocarp as noticed by HÖHNEL was utilized to classify Ascomycetous fungi into order and family. His Euascomycetes was divided into three groups. One of them is Plectascales which is separated from the other two by its special mode of ascus production. The large remainder including classic Pyrenomycetes and Discomycetes was divided into two subclasses on the basis of different structure in ascus, viz. Ascoloculares having bitunicate ascus and Ascohymeniales having unitunicate ascus. His concept allocating old Pyrenomycetous fungi into two groups was followed by later workers. Two subfamilies in Diaporthaceae (HÖHNEL 1917a, WEHMEYER 1926a) were leveled up to order rank respectively as Diaporthales and Valsales in his Ascohymeniales with quite brief descriptive account. The reason for separating them from Sphaeriales is that they do not form hymenial layer along perithecial wall, or, otherwise expressed, the mature perithecium is filled with free asci detached from the parent tissue. Difference of the shape of ascospore, allantoid or not, is the only basis for the distinction between Valsales and Diaporthales.

GÄUMANN (1949) broadly agreed with NANNFELDT's treatment on the fungous group in question, but he united two orders into a single order Diaporthales.

On the other hand, MILLER (1949) retained the fungous group as a family of Sphaeriales, Diaporthaceae HÖHNEL, and listed fifteen chief genera in it.

LUTTRELL (1951) attempted to clear up the criteria used for the classification of Pyrenomycetes. He conclusively emphasized the importance of two chief criteria, one of which is the structure of ascus membrane, and the other is the centrum structure of perithecium. Various status in the development of perithecial centrum in the Pyrenomycetous fungi were first reviewed clearly by him. He treated Diaporthales as an independent order and included two families. These were Diaporthaceae, and Melanosporaceae which was newly transferred from Hypocreales by its devlopmental type of centrum. In addition to these two families, he placed here Ceratostomataceae, but not without some doubt.

MUNK (1953, 1957) also put forward a similar opinion to that of LUTTRELL with regard to grouping the Diaporthaceous fungi, but he treated them as a family of Sphaeriales and divided them into three subfamilies; namely, Rhamphorioideae, Melogrammatoideae and Diaporthoideae. According to him, thirty genera are recognized in this family.

Gilman et al. (1957, 1959) described many genera of Diaporthaceae under two subfamilies of Valseae and Diaportheae. Genera recognized by them agreed, in the main, with those of Wehmeyer.

Dennis' concept of Diaporthaceae (1960) is narrower than that of the investigators cited above in respect of excluding Melanosporaceae, Ceratostomataceae and genera of Valsaceae having allantoid ascospore. His conception is similar to Höhnel's later one (1918), excepting additions of *Amphisphaeria* and related genera to this family.

Von Arx and Müller (1954) first segregated Diaporthaceous fungi from Sphaeriales as an independent order Diaporthales with two families, Valsaceae and Diaporthaceae. Later, they (Müller and Arx 1962) revised their earlier opinion by uniting two families into one family of Sphaeriales, namely Diaporthaceae. Their concept on the fungous group in question is, as a whole, similar to Höhnel's earlier (1917a) and Wehmeyer's (1926a-1941a) sense, excepting the separation of *Cryptosporella* and related genera from Diaporthales (Arx and Müller 1953).

Judging from the foregoing review on the concept of many investigators pertaining to Diaporthaceous fungi, and from the result of examination on these fungi in Japan, the author ranks these fungous group as a family of Sphaeriales in Ascohymeniales, Ascomycetes. Diaporthaceae Höhnel (1917a) is accepted as the family name, though its concept is amended in certain aspects. Treatment which divides Diaporthaceae into two subfamilies, namely Valseae having allantoid ascospore and Diaportheae having the other type of ascospore, seems to be unjustifiably judging the correlation of the morphological characters in the perfect and imperfect states among the genera belonging to these two subfamilies. Therefore, the author does not accept such division in Diaporthaceae based on the shape of ascospore. Moreover, the author does not agree with the treatments adopted by several investigators, whereby the *Ceratostomella* group (Munk 1957), *Amphisphaeria* group (Dennis 1960), *Melanospora* group (Luttrell 1951) were combined with Diaporthaceae, and the *Cryptosporella* group (Arx & Müller 1954) was segregated from the family. Details of the common morphology of Diaporthaceae will be mentioned in the following chapter.

IV. Morphology of Diaporthaceae

ASCOSPORE: All types other than "phaeosporae" and "dictyosporae" distribute in this family. No correlation is found between spore type and affinity of genera. Occurrence of dictyospore type cases is very rare in Ascohymenial or unitunicate fungi, whereas phaeosporous type occurs rather commonly in the other families of Sphaeriales. The reason why no phaeosporous type is found in this family is uncertain. Presence or absence of pigmentation, in some cases septation, seems to be variable and can not be used for the division of genera. Ascospore and ascus membrane of the members in this family do not react to Melzer reagent.

ASCUS: Cylindric to clavate or fusoid shape are found. Ascus usually contains four or eight spores, rarely mono- or multispores, and arranges uniseriate or biseriate, rarely fascicular or irregular. Membrane is thin excepting its tip where it becomes thick and usually furnishes apical ring. At mature stage, asci are loosed from the adhering tissues and floated irregularly in perithecium by dissolving their bases. In some overmatured materials, ascus dissolves before ejection and slimy spore mass fills perithecial cavity.

PARAPHYSIS is not persistent or entirely lacking. If it is present, it is quite irregular in shape and size, and constant filiform paraphyses, common in the other families of Sphaeriales or Discomycetes, are not recognized.

PERITHECIUM is generally formed within subsaratum with or without stroma, solely or in group, and have schizogeneous long slender, or short broader neck. Neck bears from the top of perithecium, or the side in the case of horizontally placed perithecium, and is pierced by the pore furnishing many hyaline periphyses. Wall of perithecium is distinct, brown to black, and is generally divided into two layers. Outer layer is composed of angular to globular, usually isodiametric, thick-walled, and brown to dark-coloured cells, and continues to the wall of neck where cells are prolonged and lined plectenchymatously. Inner layer which fuses to the inner layer of neck bearing periphyses is composed of strongly flattened, thin-walled and hyaline cells.

Perithecium originates as ascogonium arising from vegetative hyphae and ascogonium is surrounded by a sphaerical hyphal mass developing in later stage to perithecial wall (MILES 1921, LUTTRELL 1947, 1951, etc.). Interior of perithecium in young stage is filled with hyaline pseudoparenchymatous tissue, then many asci arise from the lower portion or the basal and ventral portion of perithecium. As the asci develop, parenchymatous tissue gradually disappears excepting thin-layer near the wall and top of perithecium. In some genera, irregular band-like paraphyses appear at this stage instead of parenchymatous tissue. At a more advanced stage, perithecium is filled with free asci containing mature ascospores by dissolving their basal stalk and detaching from their parent tissue.

STROMA: Various developmental types, from none to rich, are shown. In the case of genera having stroma, ectostroma consisting of plectnechymatous tissue or clypeus consisting of pseudoparenchymatous tissue develop generally within bark or leaf tissue, and imperfect state is often produced in or on it. In many stromatic species perithecium is produced beneath or around the ectostroma, and schizogeneously elongated neck penetrates through ectostroma. In the case of quite poor development of stromatic tissue, only loose hyphae twist around the neck.

Development of distinct entostroma is generally rare, but in some genera perithecium is embedded entirely within entostroma fused continuously to ectostroma. Some genera develop a distinct black zone which surrounds stromatic area or perithecial pustules, and sometimes its dorsal part is absent. This black zone generally consists of black thick-walled cells of the fungus.

Colour of stroma is various, usually white to gray or dark brown, and less commonly greenish or orange.

V. Revision and description of Japanese species

In HARA's list (1954), sixty-two species of twelve genera which were placed in the members of Diaporthaceae were recorded from Japan Islands and neighbouring Far East area. On the other hand, thirty-five species of fifteen genera were also listed on both herbaceous and woody plants in "Common names of economic plant diseases in Japan" published in 1965. Some of them are doubtful regarding their distribution in Japan or their independency. In the following part the present author undertakes to describe Japanese species of Diaporthaceae with some criticism on the hitherto listed species in Japan.

1. ***Melanconis*** **TULASNE**, Ann. Sci. Nat. Ser. IV, 5 : 109, 1856; SACCARDO, Syll. Fung. 1 : 602, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 776, 1887; ELLIS & EVERHART, N. Amer. Pyren. 521, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 470, 1897; WEHMEYER, Amer. Jour. Bot. 13 : 638, 1926; Univ. Michig. Stud. Sci. Ser. 14 : 17, 1941; MUNK, Dsk. Bot. Ark. 15 (2) : 81, 1953; 17 (1) : 235, 1957;

GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 335, 1959; DENNIS, Brit. cup fungi, 195, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11 (2) : 717, 1962

Type species: *Melanconis stilbostoma* (FR.) TUL.

Synonym: *Calosposa* NITSCHKE ap. FUCKEL (non SACCARDO 1883), Symb. Myc. 190, 1869

Melanconiella SACCARDO, Syll. Fung. 1 : 744, 1882; LINDAU, Engl. Naturl. Pflfam. I, 1 : 470, 1897, MUNK, Dsk. Bot. Ark. 15 (2) : 81, 1953; 17 (1) : 239, 1957; DENNIS, Brit. cup fungi, 196, 1960

Melanconidium KUNTZE Rev. Gen. plant. 3 (2) : 493, 1898

Macrodiaporthe PETRAK, Ann. Myc. 17 : 94, 1919

Neokeissleria PETRAK, Ann. Myc. 17 : 87, 1919

Phaeodiaporthe PETRAK, Ann. Myc. 17 : 99, 1919

Pseudodiaporthe PETRAK, Ann. Myc. 19 ·· 94, 1921

Discodiaporthe PETRAK, Hedwigia 62 : 293, 1921

Conidial state: *Melanconium* LINK ex FRIES, *Discosporium* PETRAK

Ectostroma distinct, composed of compact parenchymatous to plectenchymatous tissue around perithecial necks, immersed within bark tissue, then broken through the bark epiderm as conic to truncate conic pustules with white to gray or greenish disc at the surface, dotted gregariously at the centre part by the black tip of necks, with or without conidial layer, sometimes cleft irregularly at their marginal zone and oozed out conidial masses. Perithecia clustered into one to two layers beneath ectostroma, globular to subglobular, brown to dark brown or black, surrounded by loose hyphal twines with decomposed tissue of substratum forming entostromatic area, with neck at the top. Necks long cylindric, collectively erumpent through ectostroma as papillae, pierced by the pore furnishing many hyaline periphyses. Blackened zone separating perithecial group from the other absent. Perithecial wall constituted from two layers; outer layer composed of angular to subglobular, black to dark brown, thick-walled cells and jointed to the wall of neck where cells vertically prolonged and lined parallel as plectenchyma; inner layer composed of flattened, hyaline, thin-walled cells and continued to inner layer of neck bearing periphyses. Asci clavate to cylindric-clavate, short-stalked, 8-spored, at first lined in a layer along inner wall of perithecia, then detached from adherent tissue by dissolving of stalk to fill irregularly the whole perithecial cavity. Ascus membranes hyaline, thin excepting the thickened tip furnishing apical ring and fine pore. At immatured stage, hyaline, broad, irregular and band-like paraphyses present, but conglutinated or disappears in more advanced stage. Ascospores irregularly uniseriate or biseriate, 2-celled, hyaline or brown to greenish brown, elliptic to oblong-elliptic or fusoid, often furnished hyaline appendage on the ends.

Imperfect state belongs to the form-genus *Melanconium* LINK ex FR., *Discosporium* PETR. or *Cryptosporiopsis* BUB. et. KAB. Besides these conidial types, so-called B-spore or beta conidium are often observed together with common conidia, called A-spore or alpha conidium. Beta conidia are usually hyaline, one-celled, straight or curved, and ingerminable. Many species of *Melanconis* were critically proved as of imperfect state by WEHMEYER (1941 a).

The genus *Melanconis* was established by TULASNE in 1856 based on *Sphaeria stilbostoma α papula* FR., but his bases stood upon the superficial characters as mentioned in the earlier chapter. His *Melanconis* contained species having either two-celled or many-celled ascospore. Species having the latter type of ascospore were segregated from *Melanconis* by CESATI and DE NOTARIS and the genus *Pseudovalsa* was established for them.

The genus *Calospora* NIT. ap. FUCK. was based on *C. occulta* NIT. ap. FUCK. However, SACCARDO (1882, 1883) transferred *C. occulta* to the genus *Melanconis* and newly authorized *Calospora platanoides* (PERS.) NIESSL as the type species of genus *Calospora* with amendment of genus character as having phragmosporous ascospore. Later, PETRAK (1919) established a new genus *Macrodiaporthe* for *Calospora occulta* by its scanty development of ectostroma. *Calospora occulta* or *Macrodiaporthe occulta* was later united again with *Melanconis* by WEHMEYER (1938, 1941 a) and MÜLLER and ARX (1962), and both genera *Calospora* NIT. ap. FUCK. and *Macrodiaporthe* PETR. were included in the synonym of the genus *Melanconis*. SACCARDO's *Calospora* was also treated as the synonym of *Pseudovalsa* CES. et DE NOT. by WEHMEYER (1941 a).

In 1882, SACCARDO divided *Melanconis* into two groups, and one of which having hyaline ascospore was retained under the genus *Melanconis*. For the other one having coloured ascospore, he established a new genus *Melanconiella*. This segregation has long been recognized by many later mycologists (e.g. LINDAU 1897, PETRAK 1921, MUNK 1957, DENNIS 1960). On the other hand, WEHMEYER (1941 a) considered SACCARDO's separation to be invalid and united *Melanconiella* again with *Melanconis*, chiefly based on the inconstancy of pigmentation in ascospore and common relation of the imperfect state between both genera. GILMAN et al. (1959) and MÜLLER and ARX (1962) accepted WEHMEYER's opinion. The present author also agrees with WEHMEYER's treatment on these genera.

KUNTZE (1898) also allocated the genus *Melanconis* into two groups. Species having no appendage, equivalent to LINDAU's subgenus Eumelanconis, were maintained in *Melanconis*. LINDAU's subgenus Melanconidium having appendage on ascospore was ranked in the genus. This separation was not accepted by later mycologists because of its unnatural criterion.

Monotypic genus *Phaeodiaporthe* was erected by PETRAK (1919), but later (1921 a) he considered it to be identical with *Melanconiella* when he erroneously called it *Pseudodiaporthe*. Naturally, these two genera were contained in the synonyms of the genus *Melanconis* (WEHMEYER 1941 a).

Similar case was shown in the genus *Discodiaporthe* PETRAK. First, PETRAK (1921 a) united two species with a new separate genus *Discodiaporthe* based on their hyaline conidia, but later (1923) he denied its independency and replaced them again in the geuns *Melanconis*. Thus, the genus *Discodiaporthe* is also a synonym of *Melanconis*.

The genus *Neokeissleria* established by PETRAK (1919) based on *Ceriospora ribis* HENN. et PLOTTN. having no or scanty ectostroma was first treated as a synonym of *Sydowiella* by MUNK (1957) and later of *Melanconis* by MÜLLER and ARX (1962), by its common morphological characters to *Melanconis*.

In contrast with these segregations, the genus *Massariovalsa* SACC. was synonymously included as a subgenus of *Melanconis* by WEHMEYER (1941a). Judged from its conspicuous characters represented by the presence of mucous epispore on ascospore and pycnidial type of the imperfect state, *Massariovalsa* would be maintained as an independent genus as pointed out by PETRAK (1952 b) and by MÜLLER and ARX (1962).

The genus *Melanconis* was considered to be a member other than Valsaceae or Diaporthaceae by the earlier mycologists (e.g. LINDAU 1897, HÖHNEL 1917a, 1918) chiefly by its imperfect state forming exposed layer and a hymenial arrangement of asci. Later, it and its related genera were included in Diaporthaceae by WEHMEYER (1926a, 1941a) through his detailed morphological and life-historical studies.

In Japan, two species of the genus *Melanconis* were recently reported by the author (KOBAYASHI 1966), though several species of the form-genus *Melanconium* have been reported on various herbaceous and woody plants (HARA 1954, Anonymous 1965, KOBAYASHI 1968). In addition to them, five species of *Melanconis* including three new species are described in the following part. Differentiating points of Japanese species mainly based on their shape and size of ascospore are presented in Figure 1 and the following key.

Key to Japanese species of *Melanconis*

A_1: Ascospore hyaline, never brown at maturity
  B_1: Beta conidium none, alpha conidium elliptic, olive-brown to dark brown
    C_1: Ascus more than 100 μ in length, ascospore more than 7 μ in width,
      conidium 20～25×9～12 μ, on *Juglans*…………………………………… *M. juglandis* (p. 21)
    C_2: Ascus less than 100 μ in length, ascospore less than 7 μ in width,
      conidium 14～19×6.5～9 μ, on *Pterocarya* ………………………… *M. pterocaryae* (p. 24)
  B_2: Beta conidium present
    C_1: Alpha conidium ovoid, olive-brown
      D_1: Ascus more than 100 μ in length, alpha conidium 9～17×5～7.5 μ,
        ascospore without appendage, on *Betula* ………………………… *M. stilbostoma* (p. 13)

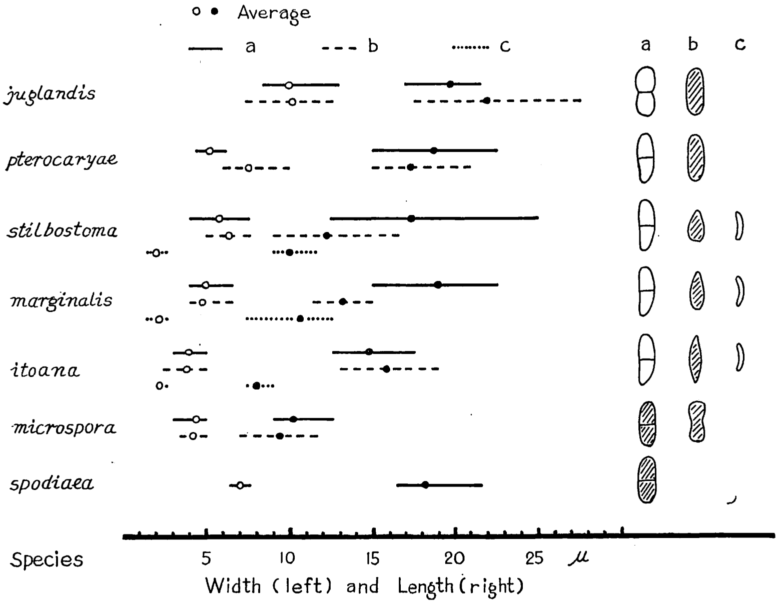

Figure 1. Shape and size of ascospore (a), alpha conidium (b) and beta conidium (c) of *Melanconis* in Japan.

D_2: Ascus less than 100 μ in length, alpha conidium 11～15×4.5～5.5 μ,
on *Alnus* and *Sorbus* ………………………………………………… *M. marginalis* (p. 15)

C_2: Alpha conidium long-fusoid, greenish brown to brown, 13～18×3～4.5 μ,
ascospore with appendage, on *Betula*……………………………………… *M. itoana* (p. 19)

A_2: Ascospore brown in full maturity

B_1: Ascospore 9～13×3～5 μ, conidium constricted at median part, on *Castanea*
……………………………………………………………………………… *M. microspora* (p. 26)

B_2: Ascospore 17～22×6.5～7.5 μ, on *Castanea* ……………………………… *M. spodiaea* (p. 28)

1) ***Melanconis stilbostoma*** (FRIES) TULASNE, Ann. Sci. Nat. Ser. IV, 5 : 109, 1856 ——(Figure 2, Plate I : A～E)—SACCARDO, Syll. Fung. 1 : 602, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 277, 1887; ELLIS & EVERHART, N. Amer. Pyren. 522, 1892; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 14 : 21, 1941; MUNK, Dsk. Bot. Ark. 15 (2) : 81, 1953; 17 (1) : 235, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci 33 : 338, 1959; DENNIS, Brit. cup fungi, 195, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11 (2) : 719, 1962; KOBAYASHI, Jour. Jap. For. Soc. 48 : 30, 1966

Synonym: *Sphaeria stilbostoma α papula* FR., Syst. Myc. 2 : 404, 1823
Valsa stilbostoma FR., Sum. Veg. Scand. 412, 1849
Sphaeria socialis KTZE. ap. WALLR., Fl. Crypt. 2 : 819, 1832
Sphaeria pulchella CURR., Trans. Linn. Soc. Lond. 22 : 280, 1858
Valsa bloximi CKE., Grevil. 14 : 47, 1885
Diaporthe bloximi (CKE.) BERL. et VOGL. in SACC., Syll. Fung. 1～4add.: 105, 1886
Melanconidium bicolor (NEES) KZE., Rev. Gen. Plant. III, 2 : 493, 1898

Conidial state: *Melanconium bicolor* NEES, Syst. d. Pilze, 32, 1817; SACCARDO, Syll. Fung, 3 : 775, 1884; GROVE, Coelom. 2 : 312, 1937; WEHMEYER, Univ. Michig, Stud. Sci. Ser. 14 : 23, 1941; KOBAYASHI, Jour. Jap. For. Soc. 48 : 30, 1966 (=*Melanconium betulinum* SCHM. et KZE., *Didymosporium betulinum* GREV., *Melanconium elevatum* CDA., *Didymosporium elevatum* LK., *Naemospora crocea* (PERS.) FR., *Naemospora aurea* FR., *Libertella betulina* DESM.)

Pustules on bark of cankered or diebacked branch or young stem; ectostroma first immersed under epidermal layer, then erumpent and broken through the bark, elevated as conical white to pale yellowish disc, 1～2 mm in diam., usually plectenchymatous. Perithecia clustered in a layer beneath or around ectostroma, embedded within bark tissue, globular or somewhat flattened at the bottom, 450～800 μ in diam., prolonged black neck from the top; outermost perithecia lies horizontally or obliquely, bearing lateral and strongly bent neck. Perithecial wall constituted from two layers of cell; outer layer composed of angular, somewhat flattened, black, thick-walled cells, inner one composed of flattened, hyaline, thin-walled cells. Necks 0.5～1 mm in length, convergent to disc penetrating through ectostroma, composed of longitudinal cells lined parallel, pierced by a pore furnishing hyline periphyses. Asci clavate to cylindric-clavate, thin-walled, with apical ring at swollen tip and basal evanescent stalk, 85～125×10～15 μ in size and 99.6×11.5 μ in average, 8-spored, loosed irregularly in perithecium in later stage. Ascospores irregularly biseriate, elliptic to fusoid, straight or inequilateral, slightly constricted at the septum in full maturity, 2-celled, hyaline, 13～25×4～7.5 μ in size, mostly 15～20×5～7 μ and 17.4×5.8 μ in average, without appendage.

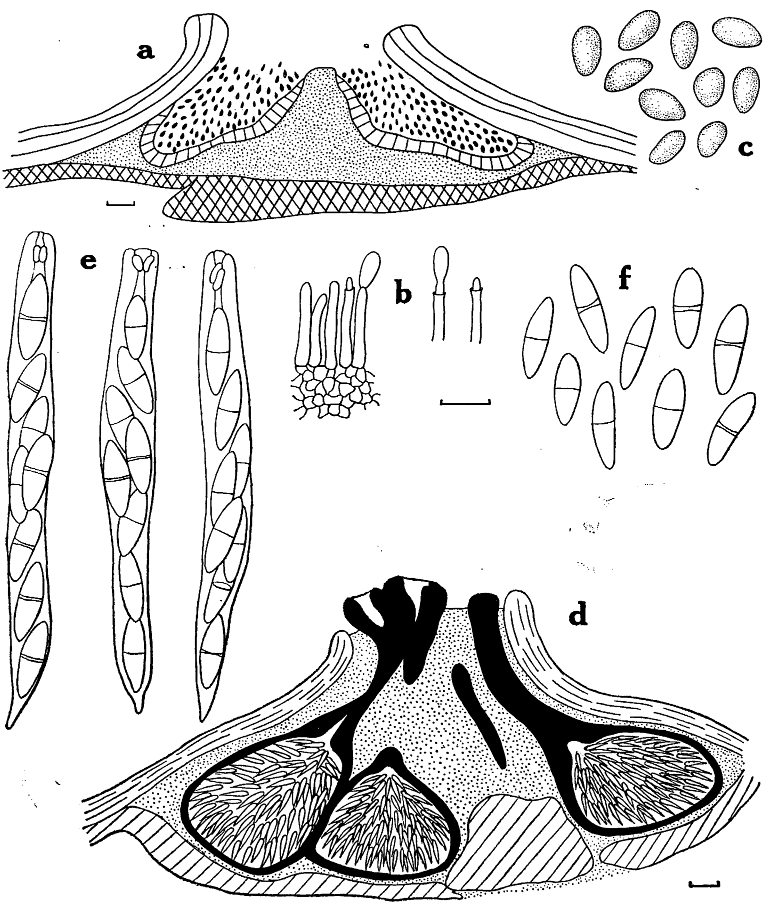

Figure 2. *Melanconis stilbostoma* (Fr.) Tul.

a: Conidial stroma　b: A part of acervulus showing annellation at the tip of conidiophores　c: Conidia　d: Perithecial stroma

e: Asci and ascospores　f: Ascospores (└─┘: a, d=100μ; b, c, e, f,=10μ)

Inperfect state develops separately or sometimes simultaneously to the perithecial formation. Acervuli are formed in the marginal part of ectostroma and composed of conidiophores and their basal cell layers. Conidiophores are hyaline to subhyaline, simple, 13～35×1.5～2.5 μ in size, and produce conidia acrogeneously and successively, resulting in scar as distinct annellation. Conidia are ovoid, somewhat acute at one end and obtuse at the other, brown to olive-brown, unicellular, 9～16.5×5～7.5 μ in size, mostly 9～14×5.5～7 μ and 12.1×6.4 μ in average. In some cases, another type of conidia, so-called conidiola or beta conidia, are produced in one acervulus mixed with common conidia. These conidia are cylindric to crescent or allantoid, obtuse at each end, unicellular, hyaline, 9～11.5×1.5～2.5 μ in size and 10×2.1 μ in average.

Host and Material: *Betula maximowicziana* Regel (Udai-kanba) —— Yamabe, Hokkaido, IX-25, 1964, by T.K. (FPH-2478). *Betula platyphylla* var. *japonica* (Miq.) Hara (Shira-kanba) —— Asama, Nagano, XI-6, 1961, by Y. Zinno (FPH-1025); IX-21, 1965, by T.K. (FPH-2627, 2676, 2679, 2710); Kushiro, Hokkaido, IX-25, 1965, by T. Oguchi (FPH-3040). *Betula verrucosa* Ehrh. ——

Nopporo, Hokkaido, VI-3, 1966, by T. Oguchi (FPH-3039). *Betula* sp. —— Kuriyama, Hokkaido, IX-22, 1964, by T.K. (FPH-2469).

Conidial state only: *Betula maximowicziana* —— Koshunai, Hokkaido, VII-14, 1962, by T. Oguchi (FPH-3031); Yamabe, Hokkaido, IX-25, 1964, by T.K. & T. Oguchi (FPH-2474); Sapporo, Hokkaido, VIII-13, 1965, by T.U. (FPH-2654). *Betula ermanii* Cham. (Dake-kanba) —— Yamabe, Hokkaido, IX-25, 1964, by T.K. (FPH-2467). *Betula platyphylla* var. *japonica* —— Daimon, Nagano, IV-15, 1961, by T.K. (FPH-1168); Niikappu, Hokkaido, V-10, 1962, by T. Oguchi (FPH-3044); Koshunai, Hokkaido, IV-12, 1963, by T. Oguchi (FPH-3050); Sapporo, Hokkaido, VIII-13, 1965, by T.U. (FPH-2635); VI-8, 1966, by T. Oguchi. *Betula pubescens* Ehrh. —— Koshunai, Hokkaido, IX-23, 1964, by T.K. (FPH-2465). *Betula papyrifera* Marsh. —— Yamabe, Hokkaido, IX-25, 1964, by T.K. (FPH-2466)

Distribution: Asia (Japan), Europe and North America.

Note: *Melanconis stilbostoma*, the type species of the genus *Melanconis*, widely distributes throughout the northern hemisphere with its host plant *Betula*. No other *Melanconis* having hyaline ascospore without appendage are known on *Betula*. Distribution of the present species in Japan was recently noted by the author (Kobayashi 1966). According to Carter (1936), a disease caused by the present fungus occurred in the nursery and plantation after severe drought in the United States. In Japan it is observed that the fungus usually associates with the bark that has suffered from frost or winter injury.

Ascospore and conidium of the present fungus easily germinated and developed their colony on potato-sucrose agar, while beta conidium did not germinate on the agar medium as stated by Wehmeyer (1926b). Growth of colony was comparatively slow. Colony was white and wavy at first, then became creamy white to pale yellowish brown in colour. Black mucous masses of conidia were scatteredly produced within one to two months after isolation. No differences were observed in all aspects between the isolates from ascospore and from conidium. Size of conidia produced on agar medium, $9\sim15\times5\sim7.5\,\mu$, as well as shape and colour, were not different from those on host plant. Perithecia were not produced.

Cultural characters of the present species were first reported by Leonian (1924) in research concerned with temperature relation and various nutritional condition upon the fructification of the fungus. Wehmeyer (1926b) confirmed the connection between *Melanconis* and *Melanconium* state of the present fungus through cultural studies. At the same time, he found that *Naemospora crocea*, *N. aurea* and *Libertella betulina* recorded in literature were nothing but the beta conidia of the present *Melanconis*.

2) ***Melanconis marginalis*** **(Peck) Wehmeyer**, Pap. Michig. Acad. Sci. 6 : 382, 1926 —— (Figures 3 and 4; Plate I: F～I)

Synonym: *Diaporthe marginalis* Peck, Rept. N. Y. St. Mus. 39 : 52, 1886; Saccardo, Syll. Fung. 9 : 704, 1891; Ellis & Everhart, N. Amer. Pyren. 439, 1892

Melanconis alni var. *marginalis* (Peck) Wehm., Univ. Michig. Stud. Sci. Ser. 14 : 27, 1941

Diaporthe nivosa Ell. et Holm, Proc. Acad. Nat. Sci. Phila. 1890 : 222; Saccardo, Syll. Fung. 9 : 704, 1891; Ellis & Everhart, A. Amer. Pyren. 436, 1892

Conidial state: *Melanconium marginale* Wehm. nom. seminud., Pap. Michig. Acad. Sci. 6 : 382, 1926

Pustules on bark of cankered or dead stems and twigs, 1～2 mm in diam.; ectostroma first immersed within bark periderm, then erumpent and broken through the bark epiderm, elevated as conic and white to creamy disc. Perithecia clustered beneath the ectostroma, globular, to subglobular, slightly flattened at their bottom, 300～650 μ in diam., with long black neck at the top; wall of perithecia constituted from two layers, outer layer composed of dark, thick-walled cells and inner one composed of flattened, hyaline and thin-walled cells. Necks collectively erumpent through ectostroma, 500～800 μ in length, pierced by a pore furnishing many hyaline periphyses, composed of elongated tip furnishing apical ring and evanescent short stalk at the base, 70～93×10～15 μ in size and 79.2×11.6 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores elliptic to cylindric, rounded at the ends, straight or slightly curved, 2-celled, hyaline 15～23×4～6.5 μ in size, mostly 17～20×4.5～5.5 μ and 18.9×5.1 μ in average.

Conidial state separately or simultaneously develops to the perfect state. Acervuli are formed in the marginal zone of ectostroma remaining sterile central part as disc and are composed of conidiophores and their basal cell layers. Conidiophores are hyaline, simple, 20～25 μ in length, and produce conidia acrogenously; annellation is faintly visible. Alpha conidia are fusoid to elliptic, slightly acute at one end, smoky green to pale greenish brown, unicellular, 11.5～15×4～6.5 μ in size and 13.3×4.9 μ in average, often ooze out as black mucous masses of conidia and flow down the bark surface under rainy condition. Beta conidia are produced in one acervuli together with alpha conidia, and are hyaline, cylindric to oblong-fusoid, straight or curved, 7.5～12.5×1.5～2.5 μ in size and 10.6×2.3 μ in average, ingerminable.

Host and Material: *Alnus faurii* LEV. et VAHT. (Miyama-kawara-hannoki)—Narusawa, Yamanashi, VI-7, 1962, by T. K. (FPH-1899, 1903). *Alnus crispa* subsp. *maximowiczii* (CALL.) HULT. (Miyama-hannoki)—Narusawa, Yamanashi, VI-17, 1964, by T. U. (FPH-2549); Shikkeshinai, Hokkaido, IX-1, 1967, by T. OGUCHI (FPH-3290). *Sorbus commixta* HEDL. (Nanakamado)—Narusawa

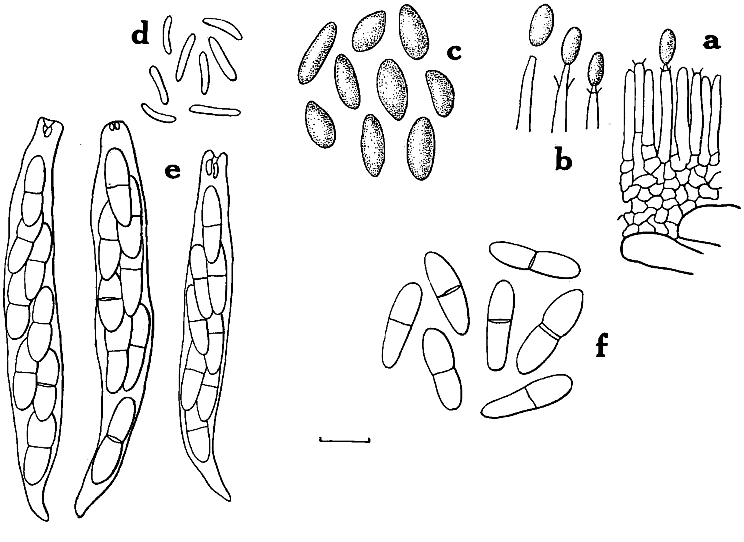

Figure 3. *Melanconis marginalis* (PECK) WEHM. on *Alnus*

a: A part of acervulus b: Tip of conidiophores showing the formation of conidium c: Conidia d: Beta conidia e: Asci and ascospores f: Ascospores (⌴=10 μ)

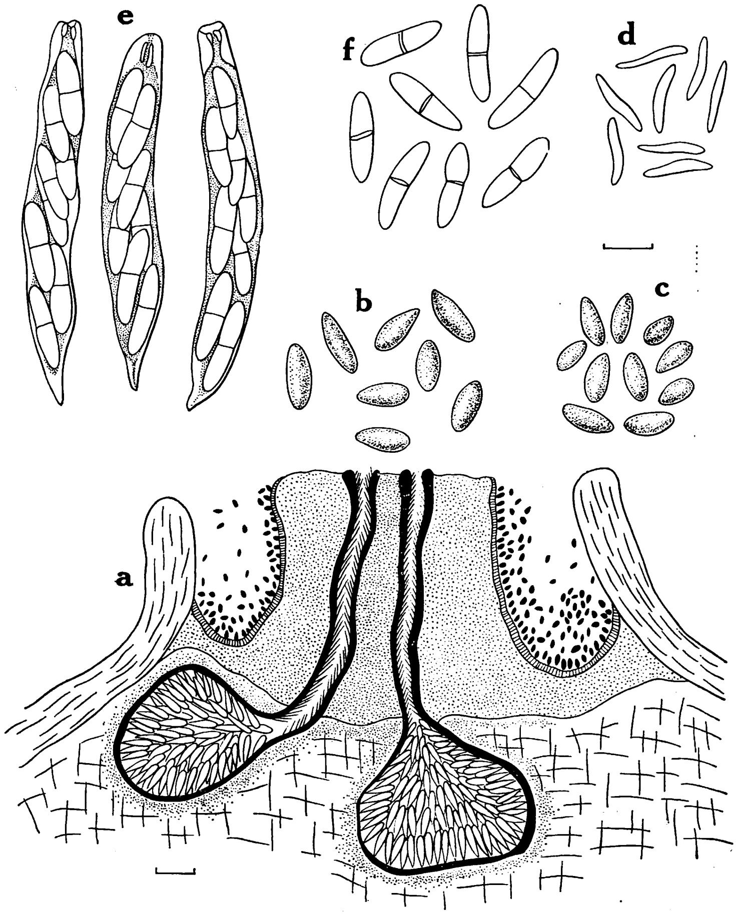

Figure 4. *Melanconis marginalis* (PECK) WEHM. on *Sorbus*
a : Stroma having perithecia and acervulus　b : Conidia　c : Conidia produced on culture　d : Beta conidia　e : Asci and ascospores
f : Ascospores　(⊔ : a=100 μ; b∼f=10 μ)

Yamanashi, VII-6, 1967, by T.U. (FPH-3288)

Distribution: Asia (Japan) and North America.

Note: Macroscopic appearances of the pustules and discs of the present fungus are much alike to those of *Melanconis stilbostoma* (FR.) TUL. on *Betula*. The present species was first considered to be independent by WEHMEYER (1926 c) based on the *Melanconium* type of conidia which was different from that of *Melanconis alni* TUL. reported from Europe. Later (1941 a) he combined it with the latter and treated it as a variety of *Melanconis alni* by the difference of the perfect state between these two species. Perfect and imperfect states of the fungus on Japanese collections are quite identical with those of American species, *Melanconis marginalis* or *M. alni* var. *marginalis*, excepting the lack of appendage on ascospore. In *Melanconis alni* and *M. marginalis*, appendage was recorded on ascospore, but it was pointed but by WEHMEYER (1941 a) that appendage of ascospore in this species is often evanescent and entirely disappears. On the other hand, REHM described a variety of European species, *Melanconis alni* var. *mauca* REHM (SACCARDO 1913), based

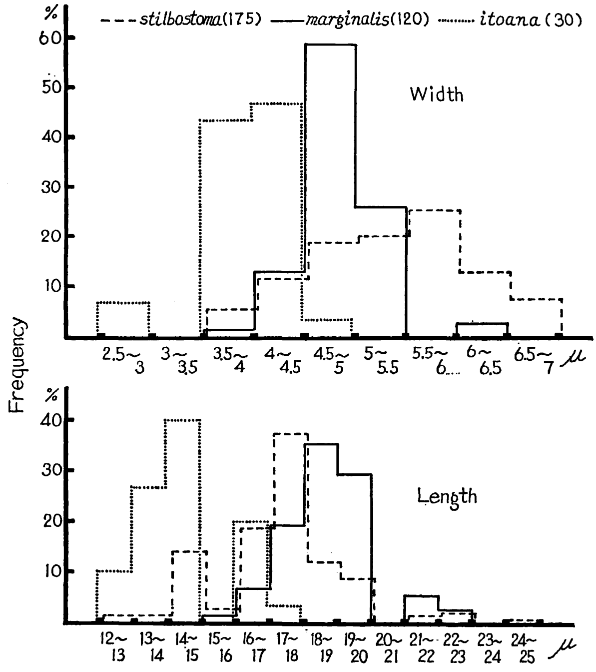

Figure 5. Histogram of width and length of ascospore in three similar species of *Melanconis* (Total account of measured ascospore).

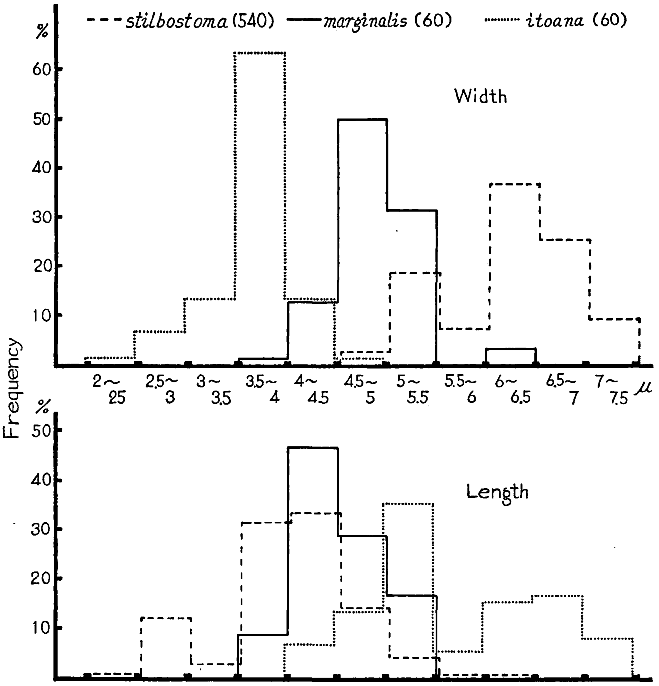

Figure 6. Histogram of width and length of alpha conidium in three similar species of *Melanconis* (Total account of measured conidium).

on the lack of appendage on the ascospores. It seems probable that REHM's variety is *Melanconis alni* minus its appendage. Distinct difference in *Melanconium* type of conidia between *Melanconis alni* and *M. marginalis* is considered to be important to separate them into independent species respectively. Recently, URBAN (1956) described a new *Melanconis, M. glutinosae* URBAN, on *Alnus glutinosa*. However, it distinctly differs from the present fungus by its large ascus and ascospore which measure 97～120×20～32 μ and 23～27×9.5～11 μ, respectively. Therefore, Japanese fungus is identified as *Melanconis marginalis* (PECK) WEHM., which is often observed to have no appendage on its ascospore.

Ascospore and conidium easily germinated and developed their colony on potato sucrose agar. Cultural characters were quite similar to those of *Melanconis stilbostoma* (FR.) TUL. mentioned above, excepting the more creamy colour seen in this species. Black slimy drops of conidia were also produced on the mycelial colony within one to two months after isolation. In addition to the normal alpha conidia which were somewhat shorter and wider, 10～14×5～9 μ in size and 11.7×5.5 μ in average, than those of host plant, intermediate type of conidia as noted in *Phomopsis* (HAHN 1930) was produced together with the alpha conidia. Intermediate conidia, 12.5～19×2.5～4 μ in size and 15.3×3.2 μ in average, are longer and narrower than normal alpha conidia, and hyaline to pale greenish brown in colour. They can germinate on agar medium in contrast with beta conidia. Typical beta conidia found on host plant were not produced on culture.

3) ***Melanconis itoana*** **KOBAYASHI**, sp. nov.—(Figures 7 and 8, Plate II: A～F)

Conidial state: *Melanconium itoanum* KOBAYASHI, sp. nov.

Pustulae corticola, persimilae ad Melanconis stilbostomae in aspectus; ectostroma primo immersa, dein erumpens, conicis, 1～2 mm diam., albo-lutescens; perithecia multi-aggregata in mono- vel irregulariter di-stichis, saepe cresco infra imperfecte strata, 370～400 μ diam., ostiolatis; ostiola cylindrica, 700～900 μ longis, 100 μ latis, donatus hyalino periphysatis; asci cylindricis vel clavatis, unitunicatis, apicis incrassata donatus annulus, 70～88×9～11.5 μ, 8-sporis; ascosporae irregulariter biseriatis, obtuso-ellipticis, inaequilateralis vel leniter curvatis, bicellulae, in septo leniter constrictis ad maturitatis, hyalinis, 12.5～17.5×3～5 μ, raro brevi-appendiculata in terminalis; aparaphysatis.

Status imperfectus: pustulae corticola, 0.5～1.5 mm diam., albo-lutescens; acervuli primo immersis, dein erumpens, maturesco irregulariter defringo ad apicis et protrudo sporae in nigro massae; conidiophorae simplicis, hyalinis, 18～38×2～2.5 μ enim alpha conidia et 25～45×1.5 μ enim beta conidia, manifesto annellophoris; alpha conidia oblongo-fusoideis, utrinque acutis, brunneis vel brunneo-viridis, 13～19×2.5～5 μ, medio 15.8×3.8 μ, laevis, saepe fluere deorsum in conditio pluvius; beta conidia hyalinis, cylindricis vel lunatis, utrinque rotundatis, 7.5～9×2～2.5μ, curvatis.

Hab. on dead bark of *Betula ermanii* CHAM. (Dake-kanba)—Mt. Fuji, Fujinomiya, Shizuoka, VIII-6, 1968, by T.K. (FPH-3375—TYPE, 3387).

Conidial state only: *Betula ermanii*—Mt. Fuji, Narusawa, Yamanashi, VI-17, 1964, by T.U. (FPH-2541).

Distribution: Asia (Japan).

Note: It is quite difficult to distinguish the pustules of the present species and those of *Melanconis stilbostoma* (FR.) TUL. in appearance. However, both species can be distinguished easily under a microscope. Conidial states of both species are quite different from each other as shown in Figures 1, 2 and 5. The present fungus has fusoid conidia, while conidia of *Melanconis stilbostoma* are ovoid. Moreover, ascus and ascospore of the present fungus are apparently smaller

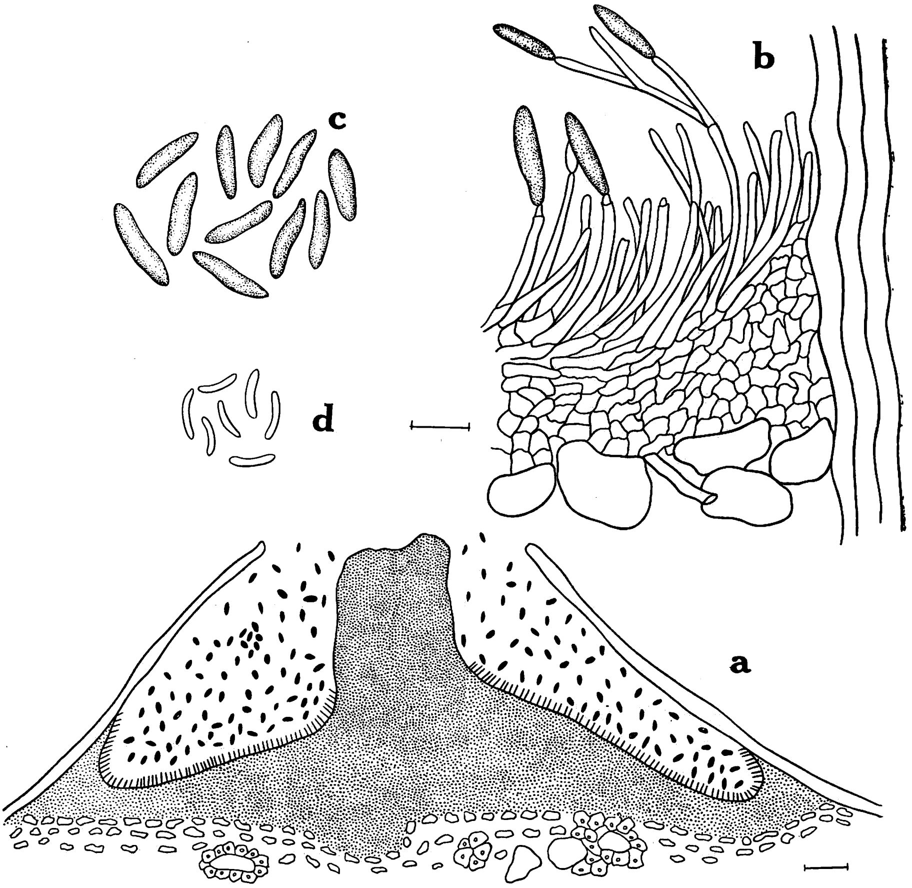

Figure 7. *Melanconis itoana* sp. nov. (=*Melanconium itoanum*)

a : Acervulus and annellation　b : A part of acervulus showing branched conidiophores
c : Alpha conidia　d : Beta conidia
(⊢—⊣: a=100 μ; b～d=10 μ)

than those of *Melanconis stilbostoma*.

On the other hand, this fungs is similar to *Melanconis marginalis* (PECK) WEHM. in its morphology of the perfect and imperfect states. However, both species can be divided clearly in some characters. Alpha conidia of the present fungus are definitely fusoid in shape and 13～19×2.5～5 μ in size, whereas those of *Melanconis marginalis* show medium type from fusoid to elliptic with somewhat rounded end. Ascospores of the former are smaller than those of the latter. Terminal appendages on ascospore of the present fungus are horn-shaped and measure 2～2.5×2 μ, whereas those of *Melanconis marginalis* given by WEHMEYER (1941 a) are cylindric, often curved, and measure 3～7×2～4 μ.

No other *Melanconis* comparable with the present fungus is found among the hitherto known species, so that this *Melanconis* found on *Betula* is treated as a new species and the name *itoana* is dedicated to Dr. K. ITO, an eminent forest pathologist in Japan.

Ascospore and alpha conidium of the fungus easily germinated on 2% sucrose agar, while beta conidium did not germinate on the agar media tested. Colony on potato-sucrose agar was quite

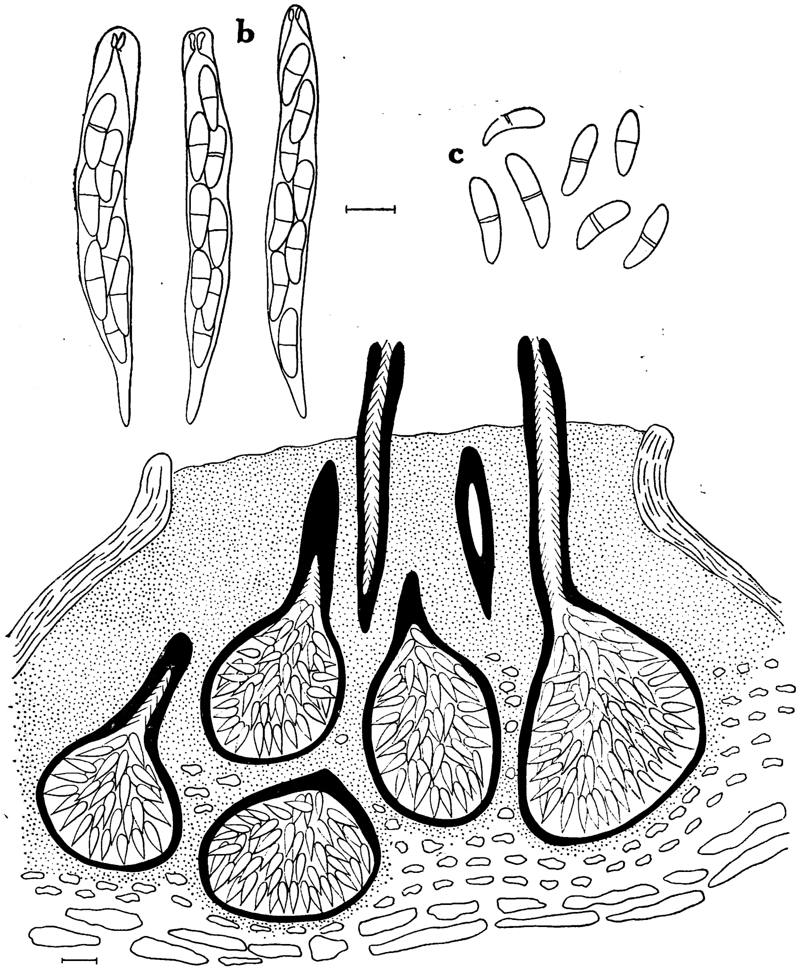

Figure 8. *Melanconis itoana* sp. nov.
a : Perithecial stroma　b : Asci and ascospores　c : Ascospores
(└─┘: a=100 μ; b, c=10 μ)

similar to that of *Melanconis stilbostoma* (Fr.) Tul. in its macroscopic appearances. About one month after isolation, many sphaeric bodies were produced on the surface of the colony, then black mucous masses of conidia oozed out from these bodies. No differences were observed in all aspects between the isolates from ascospore and from conidium. Size of conidia produced on agar, as well as shape and colour, were not different from those on host plant. Perithecium was not produced.

4) ***Melanconis juglandis*** (**Ellis et Everhart**) **Graves**, Phytop. 13:415, 1923—(Figures 9 and 10; Plate III: A～E)—Wehmeyer, Univ. Michig. Stud. Sci. Ser. 14:39, 1941; Gilman et al., Ia. St. Coll. Jour. Sci. 33:339, 1959; Kobayashi, Jour. Jap. For. Soc. 48:28, 1966.

Synonym: *Diaporthe juglandis* Ell. et Ev., Proc. Acad. Nat. Sci. Phila. 1893:448; Saccardo, Syll. Fung. 11:310, 1895

Conidial state: *Melanconium oblongum* Berkeley, Grev. 2:153, 1874; Saccardo, Syll. Fung. 3:752, 1884; GRAVES, Phytop. 13:415, 1923; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 14:40; MATUO & SAKURAI, Res. Rept. Fac. Text. & Seric. Shinshu Univ. 4:10, 1954; KOBAYASHI, Jour. Jap. For. Soc. 48:28, 1966

Pustules on the bark of cankered or dead stems and twigs, first immersed under epidermal layer, then erumpent and broken through the bark, elevated conical and gray to greenish gray disc of ectostroma, 1～3 mm in diameter. Perithecia clustered in one to two layers under the ectostroma, globular to subglobular, 550～800 μ in diam., with long neck at the top. Perithecial wall constituted from two layers; outer layer composed of isodiametric, black, thick-walled cells, inner one composed of flattened, hyaline, thin-walled cells. Necks 0.5～1 mm in length, collectively erumpent through ectostroma, protruding as a fascicle of black club from the surface of disc, constituted from elongated cell tissues lined vertically, pierced by the pore furnishing hyaline periphyses. Asci clavate to cylindric, thin-walled, furnished apical ring at their swollen tip, 108～137×14～19 μ in size and 122.6×17.3 μ in average, 8-spored, loosed irregularly in perithecium at full maturity. Ascospores usually uniseriate, elliptic, two-celled, constricted at the septum, hyaline to pale yellowish brown at full maturity, 17～22×8.5～13 μ in size and 19.8×10 μ in average.

Conidial state develops solely from or simultaneously with the perfect state. Acervuli are flat or elevated at the centre part of the layer, composed of conidiophores and their basal cell layers. Conidiophores are hyaline to pale brown, simple 15～38×3～5 μ in size, and produce conidia acrogenously and successively, resulting in scar as distinct annellation. Conidia are elliptic, dark brown to olive brown, granular, unicellular, 18～28×7.5～12.5 μ in size, mostly 19～25×9～12 μ and 22×10.3 μ in average, often ooze out from acervuli as black conidial masses and flow down the bark surface under rainy condition.

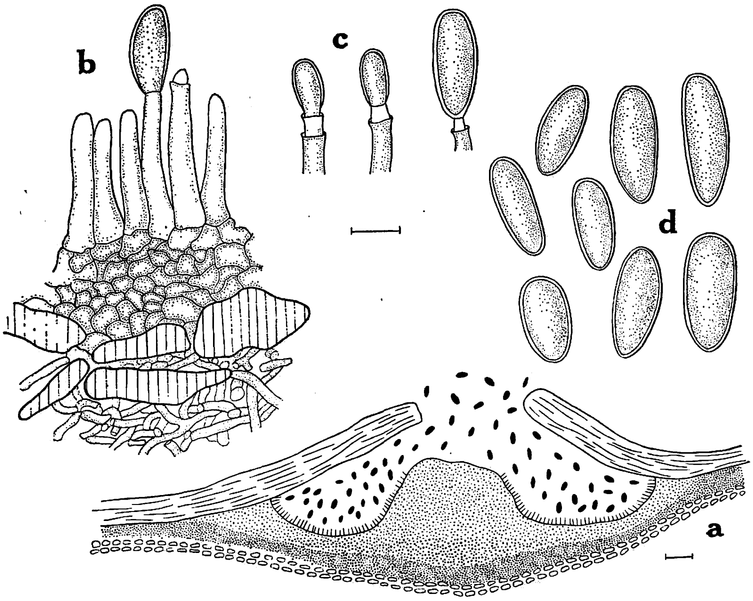

Figure 9. *Melanconis juglandis* (ELL. et EV.) GRAVES

a: Acervulus b: A part of acervulus c: Conidiophores showing annellation
d: Conidia (⊢—⊣: a=100 μ; b～d=10 μ)

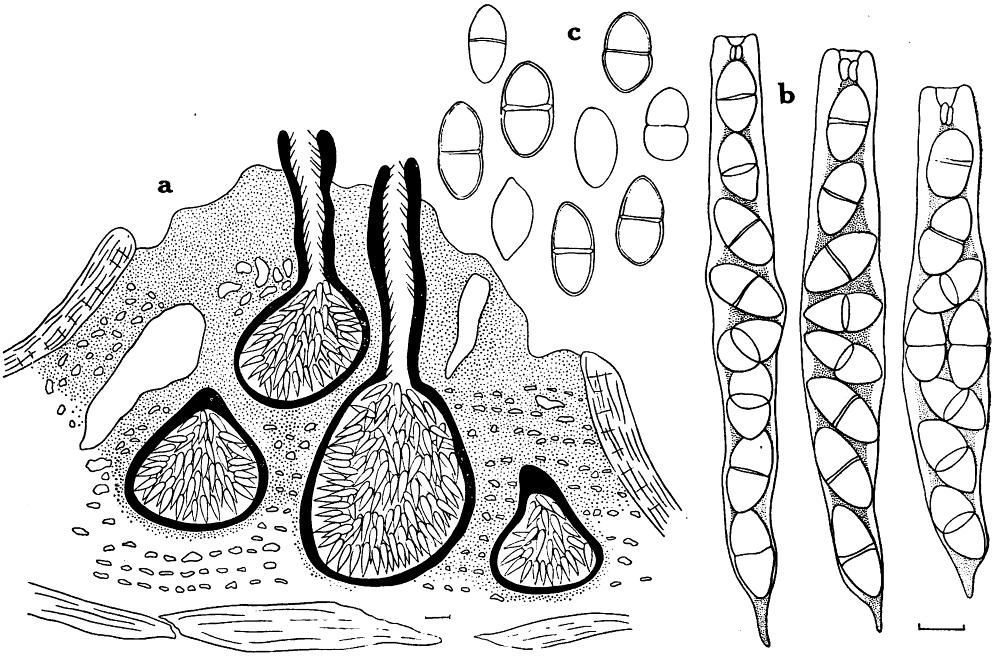

Figure 10. *Melanconis juglandis* (Ell. et Ev.) Graves
a: Perithecial stroma　b: Asci and ascospores　c: Ascospores
(⌴ : a=100 μ; b, c=10 μ)

Host and Material: *Juglans ailanthifolia* Carr. (Oni-gurumi)—Koshunai, Hokkaido, IX-23, 1964, by T.K. (FPH-2623, 2711).

Conidial state only: *Juglans ailanthifolia*—Chichibu, Saitama, V-24, 1959, by T.K. (FPH-1224); Asakawa, Tokyo, III-10, 1960, by T.K. (FPH-1145); VIII-24, 1964, by T.K. (FPH-2939); Wada, Nagano, IX-18, 1963, by T.U. (FPH-2245). *Juglans regia* var. *orientes* (Dode) Kitam. (Teuchi-gurumi)—Shimekakeno, Akita, VI-26, 1951, by K. Ito (FPH-1089); X-5, 1953, by K. Shibukawa (FPH-1197).

Distribution: Asia (Japan) and North America.

Note: The present species distributes widely in North America but not in Europe. In Europe *Melanconis carthusiana* Tul. has been well known on *Juglans*. According to Wehmeyer (1941 a), small differences in morphological aspect of the perfect state were observed between these two species, but their imperfect states were fairly well separable from each other in the shape and size of conidia. For instance, *Melanconis juglandis* had shorter and straight ascospores, and distinct narrower and oblong elliptic conidia than those of *M. carthusiana*. Both perfect and imperfect states of Japanese materials quite agree with those of *Melanconis juglandis*.

In Japan, *Melanconium* state of the fungus has been recorded as a causal agent of dieback disease of walnut trees since 1954 (Matuo & Sakurai 1954, Ito 1955) and its perfect state was recently found by the author (Kobayashi 1966).

Ascospore and conidium of the fungus easily germinated. Colony on potato-sucrose agar developed slowly and flatly, and became yellowish brown to dusty yellow in colour. Several black mucous masses of conidia were produced on the colony within one to two months after isolation.

Conidia produced on culture, 15～23×7.5～10 μ in size and 18.3×8.3 μ in average, were somewhat smaller than those on host plant.

According to GRAVES (1923) who used other sorts of agar media for culturing the fungus, small pycnospores were produced on peptone agar and oat agar besides common type of conidium. Such pycnospores or any other beta type of conidia were not produced on potato-sucrose agar.

5) ***Melanconis pterocaryae*** **KOBAYASHI**, sp. nov.—(Figure 11, Plate III: F～I)

Conidial state: *Melanconium pterocaryae* KUSCHKE, Monit. Jard. Bot. Tiflis, 31:24, 1918; SACCARDO, Syll. Fung. 25:582, 1931

Pustulae corticola; ectostroma primo immersa in peridermica, dein erumpens, conicis, minutis, 0.5～1.5 mm diam., griseus vel griseo-viridis; perithecia pauci aggregata, saepe cresco infra

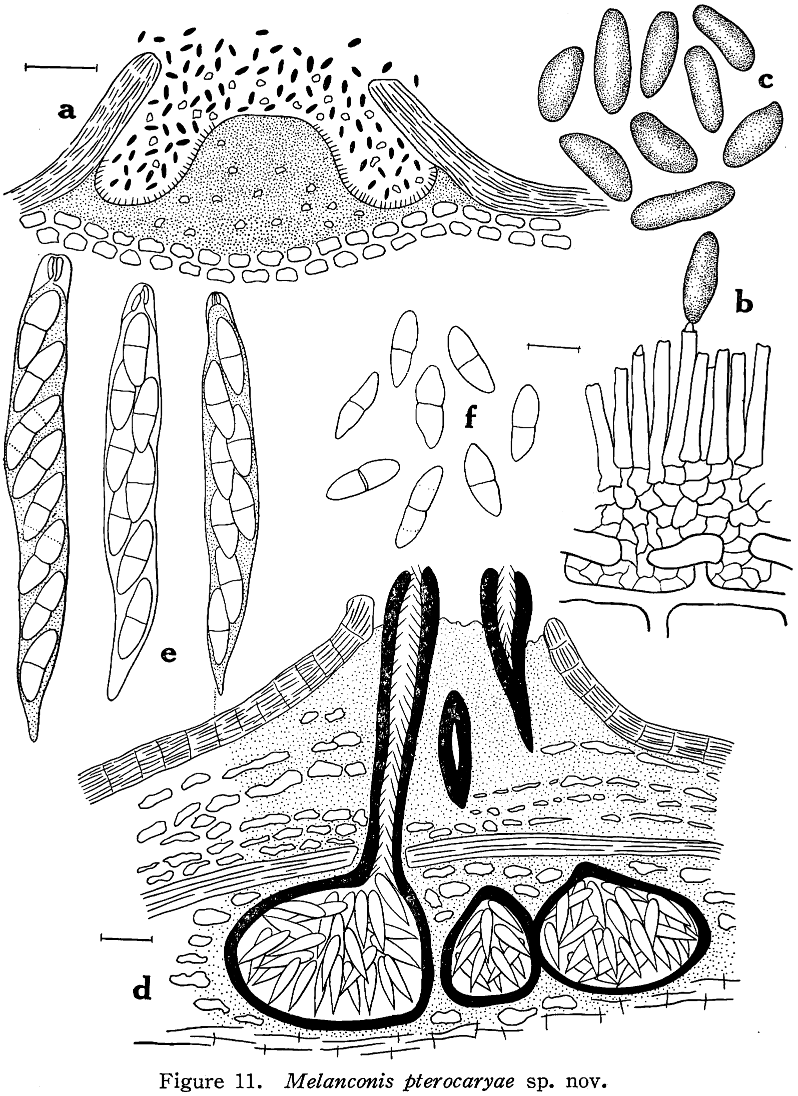

Figure 11. *Melanconis pterocaryae* sp. nov.

a: Conidial stroma　b: A part of acervulus showing annellophores　c: Conidia
d: Perithecial stroma　e: Asci and ascospores　f: Ascospores
(⌞—⌟: a, d=100 μ; b, c, e, f=10 μ)

imperfecte strata, 400 μ diam., ostiolata; ostiola cylindrica, erumpens per discum, 600 μ longa, 100 μ lata, donatus hyalino periphysatis numerosis; asci cylindricis vel clavatis, unitunicatis, apicis incrassata donatus annula, basi attenuata, 85~98~11.5~14 μ, 8-sporis; ascosporae irregulariter biseriatae, obtuso-ellipsoidae, hyalinis, bicellulae, in septo leniter constrictis ad maturitatis, 15~23×4.5~6.5 μ, ex appendiculata; aparaphysatis.

Status imperfectus: pustulae corticola, 0.5~2 mm diam.; acervuli primo immersis, dein erumpens, maturesto irregulariter defringo ad apicis et protrudo sporae in nigro massae, maneo centro-sterile partis; conidiophoris simplicis, hyalinis, 13~30×3~5 μ, manifesto annellophoris; conidia elliptica, utrinque rotundatis, brunneis vel olivaceis, continuis, 14~21×6~10 μ, medio 17.4×7.7 μ, laevis, saepe fluere deorsum in conditio pluvius.

Hab. on dead bark of *Pterocarya rhoifolia* SIEB. et ZUCC. (Sawa-gurumi)—Mt. Fuji, Fujinomiya, Shizuoka, VIII-6, 1968, by T.K. (FPH-3373-TYPE, 3388).

Conidial state only: *Pterocarya rhoifolia*—Towada, Aomori, X-11, 1962, by T.K. (FPH-691).

Distribution: Asia (Japan) and Europe (Caucasia).

Note: As already pointed out (KOBAYASHI 1968), shape and colour of the conidia of the present species are quite similar to those of *Melanconis juglandis* (ELL. et EV.) GRAVES. However, size of conidia is constantly smaller in the former than in the later not only on host plants but also on agar media (Figures 1, 12 and 13). Moreover, differences between both *Melanconis* species are shown in the morphologic characteristics of the perfect state. The present fungus has small asci, narrow ascospores which are usually biseriate in each ascus, and small pustules (Figures 1, 12 and 13). On the other hand, *Melanconis juglandis* has large prominent pustules, large asci and wide constricted ascospores which are contained in an oblique row in each ascus. No other

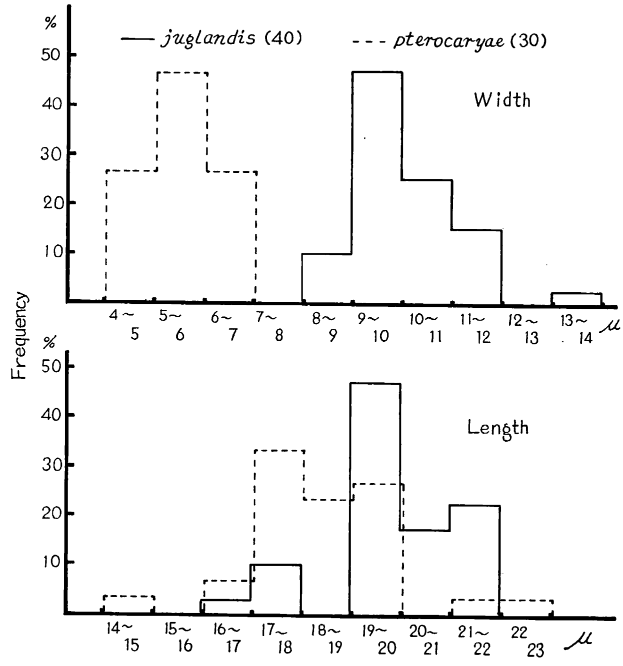

Figure 12. Histogram of width and length of ascospore in two similar species of *Melanconis* (Total account of measured ascospore).

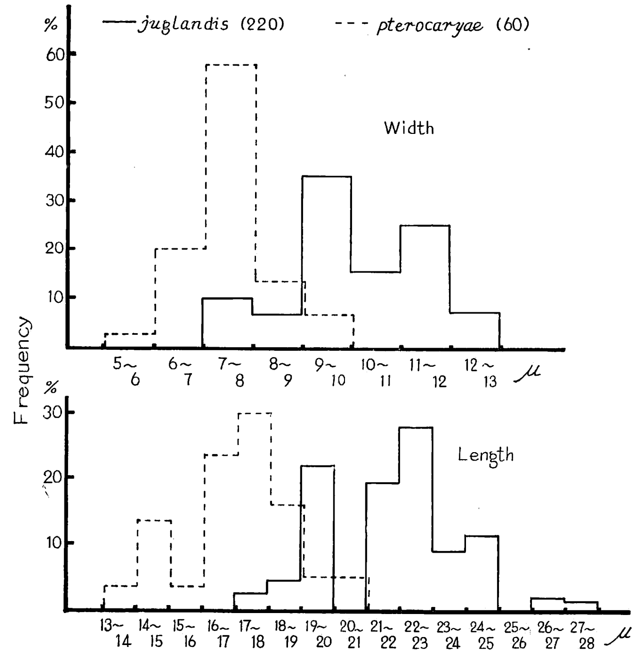

Figure 13. Histogram of width and length of conidium in two species of *Melanconis* (Total account of measured conidium).

Melanconis comparable with the present fungus was found among the hitherto known species. From the foregoing facts, the present *Melanconis* on *Pterocarya* is treated as a new species.

The present fungus was easily isolated from ascospore and conidium. Colony on potato-sucrose agar developed slowly, grayish brown in colour, then became dark brown and was covered with grayish brown and felty aerial mycelia. Many small sphaeric bodies were produced on the surface of the colony about two months after isolation. Black mucous masses of conidia were exuded from these bodies. No differences were observed in all aspects between the isolates from ascospore and from conidium. Conidia produced on culture, 12.5~16.5×5.5~7 μ in size and 14.2×6.5 μ in average, were smaller than those on host plant. Perithecium was not produced. Beta conidium which is observed in some other species of *Melanconis*, was not produced on either host plant or agar medium. Macroscopic appearance of the culture of the present fungus is apparently distinguishable from that of *Melanconis juglandis*.

Although the present fungus inhabits predominantly on many diebacked twigs of *Pterocarya* planted on the southern slope of Mt. Fuji at about 1,500 m altitude, it is uncertain whether this dieback of *Pterocarya* is attributed to the present fungus or not.

6) ***Melanconis microspora*** **KOBAYASHI**, sp. nov.—(Figure 14; Plate IV: A~C)

Conidial state: *Melanconium gourdaeforme* KOBAYASHI, Trans. Myc. Soc. Jap. 9:5, 1968

Pustulae corticola; ectostroma primo immersa in peridermica, dein erumpens, conicus, minutis, 0.5~1.5 mm diam., griseus vel griseo-viridis; perithecia pauci aggregata, subectostromatate, conjungo cum imperfect strata, 350~400 μ diam., ostiolata; ostiola cylindrica, erumpens per discum, 250~300 μ longa, donatus hyalino periphysatis numerosis; asci cylindricis vel clavatis, unitunicatis,

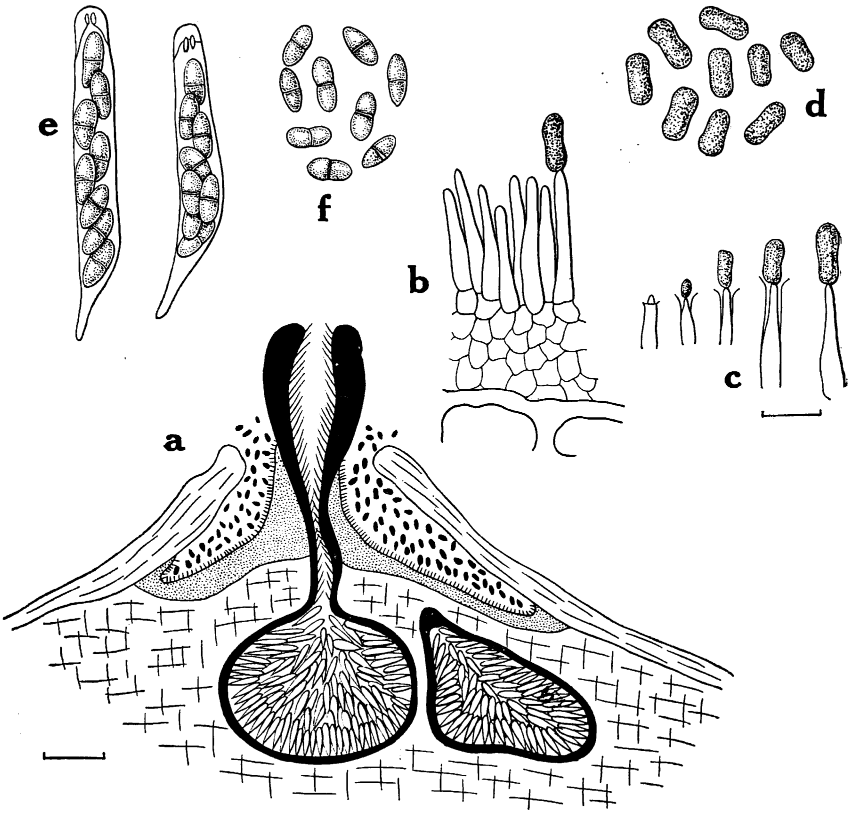

Figure 14. *Melanconis microspora* sp. nov.
a : Stroma having perithecia and acervulus　b : A part of acervulus
c : Tip of conidiophores showing formation of conidium　d : Conidia
e : Asci and ascospores　f : Ascospores　(└─┘: a=100μ; b～f=10μ)

apicis incrassata donatus annulus, basi brevi-stipitatum maturesco evanescens, 53～63×7.5～11.5μ, 8-spora; ascosporae uniseriatae vel irregulariter biseriatae, obtuso-ellipsoidae, bicellulae, in septo leniter constrictis ad maturitatis, brunneo-viridis vel griseo-viridis, 9～12.5×3～5μ, exappendiculata; paraphyses evanescens prae maturum.

Status imperfectus: pustulae corticola, 0.1～1.5 mm diam.; acervuli primo immersis subepidermide vel in ectostromaticus, dein erumpens, maturesco irregulariter defringo ad apicis et protrudo sporae in nigro massae, pluries fluere deorsum in conditio pluvius; conidia gourdaeformae, angustatus ad medium, utrinque rotundatis, olivaceis vel brunneo-viridis, continuis, 7～11.5×3.5～5μ, laevis.

Hab. on dead bark of *Castanea crenata* Sieb. et Zucc. (Kuri)—Tsuchiura, Ibaraki, IX-5, 1967, by T.K. (FPH-3286, TYPE).

Conidial state only: *Castanea crenata*—Seto, Aichi, VI-24, 1960, by T.K. (FPH-1338); Chigasak, Kanagawa, X-9, 1959, by K. Kato (FPH-988); Kakegawa, Shizuoka, VI-, 1964, by T.K.

Distribution: Asia (Japan).

Note: No identical species with the present fungus has been found on *Castanea* or on the other Fagaceae plants. *Melanconium castaneum* var. *subctaneum* Salvi (Saccardo 1915) has similar conidia in shape to the *Melanconium* state of the present fungus, but it differs from the latter by its larger conidia, 18×4～6μ in size.

Among the species described on the host plants other than Fagaceae, *Melanconis nigrospora* (Pk.) Wehm. and *M. stellata* (Petch) Wehm. are fungi somewhat similar to the fungus in question in their ectostromatic character. However, *Melanconis nigrospora* recorded on *Betula* distinctly differs from the present fungus by its spore size, 11.5～17.5×4～7 μ, and no formation of imperfect state on either host plant or agar media (Wehmeyer 1940). *Melanconis stellata* on *Thea* is also different from the present fungus in its *Valsaria*-like hymenial layer, spore size, 13～15×6～7.5 μ, and presence of black ventral zone in bark tissue (Wehmeyer 1941 a).

On the other hand, Wehmeyer (1941 a) listed three small-spored species showing a different developmental type of ectostroma in his monograph. These are *Melanconis spodiaea* Tul. on *Carpinus*, *M. decorahensis* Ell. on *Betula* and *M. corni* Wehm. on *Cornus*. Among them, *Melanconis corni* is distinctly different from the present fungus by its imperfect state forming four-celled hyaline conidia (Wehmeyer 1932). The former two species produce *Melanconium* type of imperfect state. In the case of ascospores and conidia of *Melanconis spodiaea*, described as 13～22×5.5～8 μ and 11～17×5.5～7 μ, respectively, (Wehmeyer 1941 a), these are far larger than those of the present fungus. *Melanconis decorahensis* also differs from the fungus in question by its larger ascospores and conidia which were described as 14～21×7～9 μ and 13～22×5～10 μ, respectively (Wehmeyer 1926 b, Gilman et al. 1959).

No other species comparable with the present fungus was found among the hitherto known species of *Melanconis*. From the foregoing facts, the author proposes to treat the chestnut fungus as a new species.

The present fungus was easily isolated from ascospore and conidium, although germination percentage of ascospore was relatively low. Colony on potato-sucrose agar developed very slowly and was grayish in colour at first with white felty aerial mycelia, then became dark greenish black with grayish and felty aerial mycelia. Colony in two months after isolation was about 2 cm in diameter. Small sphaeric bodies were scatteredly produced on the marginal part of the colony about four months after isolation, and then small slimy black masses of conidia exuded from them. Conidia produced on culture were first hayline, then became greenish brown and measured 7.5～9×3～4.5 μ in size and 8.5×3.8 μ in average. No differences in the size or in the shape were found between the conidia produced on the isolate from ascospore and those from conidium, and between the conidia produced on the host plant and on the culture. Beta conidium was not produced on potato-sucrose agar.

7) ***Melanconis spodiaea*** **Tulasne**, Ann. Sci. Nat. Ser. IV, 5:109, 1856—(Figure 15; Plate II: G～I)—Winter, Rabh. Kryptgfl. I, 2:781, 1887; Wehmeyer, Univ. Michig. Stud. Sci. Ser. 14:43, 1941; Müller & Arx, Beit. Kryptgfl. Schw. 11(2):720, 1962

Synonym: *Melanconiella spodiaea* (Tul.) Sacc., Syll. Fung. 1:740, 1882; Munk, Dsk. Bot. Ark. 17(1):240, 1957; Dennis, Brit. cup fungi, 196, 1960

Conidial state: Unknown.

Pustules on bark of dead twigs, minute, at first immersed, then erumpent and broken through the bark epiderm, appearing as sooty ectostromatic disc, 0.5～1 mm in diameter. Ectostroma parenchymatous to plectenchymatous, scanty around the perithecial necks. Perithecia clustered beneath the ectostroma, surrounded by loose scanty development of entostromatic hyphae containing residual tissue of substratum, 500～550 μ in diam., prolonged brown to black neck from the top, filled with free asci. Perithecial wall constituted from two layers of cells: outer layer composed of dark, thick-walled cells, inner layer composed of hyaline, flattened and thin-walled cells. Necks

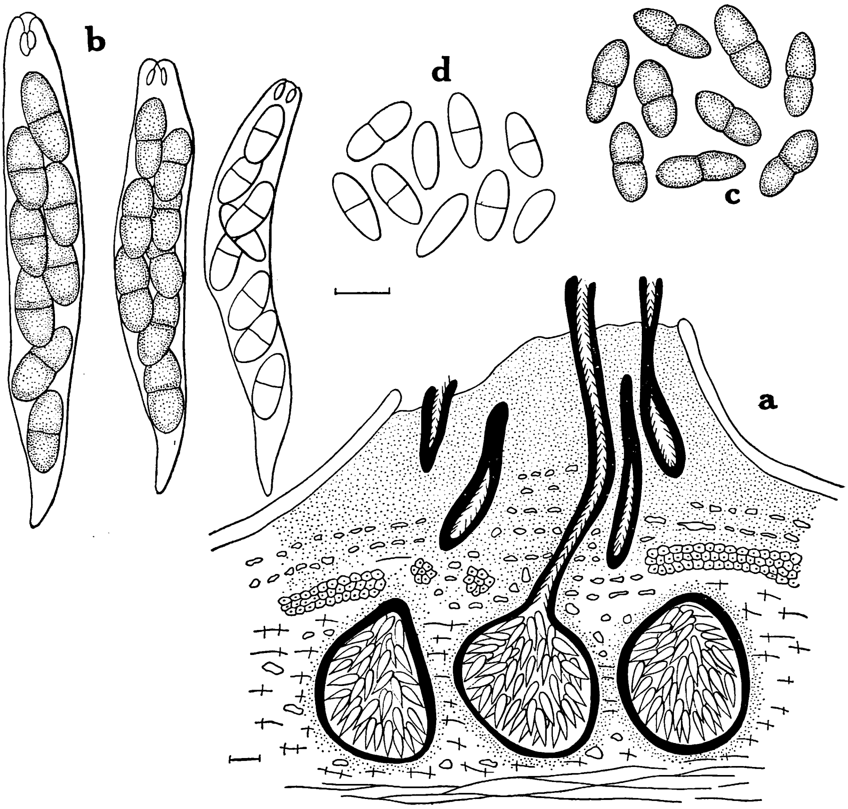

Figure 15. *Melanconis spodiaea* Tul.

a : Perithecial stroma　　b : Asci and ascospores

c : Matured and coloured ascospores　　d : Immature hyaline ascospores

(└─┘: a=100 μ; b∼d=10 μ)

450∼1000 μ in length, converged to the disc, cylindric or curved, penetrated by a pore furnishing many hyaline periphyses. Asci clavate to cylindric-clavate, thin-walled, with swollen tip providing apical ring, 73∼88×11.5∼15 μ in size, 8-spored, with short evanescent stalk, loosed irregularly in perithecium. Ascospores irregularly uniseriate or biseriate, elliptic, 2-celled, constricted at the septum, hyaline at first, then turns brownish, 16.5∼21.5×6.5∼7.5 μ in size and 18.3×7 μ in average.

Host and Material: *Castanea crenata* Sieb. et Zucc. (Kuri)—Akanuma, Saitama, X-19, 1965, by T.K. (FPH-2690).

Distribution: Asia (Japan) and Europe.

Note: The imperfect state of Japanese material could not be confirmed owing to the failure of isolation. On Fagaceae plants no identical species with the present material has been described hitherto. Three species of *Melanconis* known on other host plants, namely *Melanconis spodiaea* Tul., *M. decorahensis* Ell. and *M. corni* Wehm., have similar spore size to the present chestnut fungus. Among them, *Melanconis decorahensis* somewhat differs from the fungus in question by its greenish ectostroma and long-sized ascus. *Melanconis corni* has cylindric and far larger ascus containing uniseriate ascospores, and it is distinguishable from the chestnut fungus by these characters. Excepting the faint cap-like appendage on ascospore, Japanese material is quite identical with *Melanconis spodiaea* known on *Carpinus* in Europe. WEHMEYER (1941 a) noted on *Melanconis spodiaea* that appendage was very faint and often disappeared entirely. However, it is known among many collections of appendaged species of Diaporthaceae that entire lack of appendage is often observed. From these facts, the present material is identified as *Melanconis spodiaea* TUL., though its conidial state should be confirmed through further cultural study.

2. ***Pseudovalsella*** **HÖHNEL**, Ann. Myc. 16:123, 1918, char. emend.

Type species: *Pseudovalsella thelebola* (FRIES) HÖHNEL

Conidial state: *Hendersonula* SPEG., *Stilbospora* PERS. ex FR., and *Coryneum* NEES

Pustules usually large; ectostroma scanty or distinct, forming disc with converged necks, composed of parenchymatous or plectenchymatous tissue, immersed at first, then erumpent and broken through the bark epiderm, gray to yellowish brown, fusely jointed to loose hyphal twines forming entostromatic area with the residual tissue of substratum. Perithecia clustered and embedded within stromatic area, globular to subglobular, brown to dark brown or black, with schizogeneous neck at the top; perithecial wall constituted from two layers of cell, outer layer composed of brown to blackish and thick-walled cells, inner one composed of hyaline, flattened and thin-walled cells. Necks cylindric, stout or bent, collectively erumpent through disc, penetrated by a pore furnishing hyaline periphyses; wall composed of vertically prolonged and thick-walled cells. Blackened zone separating one entostromatic area from the other absent. Asci clavate to oblong-clavate, thin-walled, with thickened tip furnishing apical ring and fine pore, 8- or 4-spored, first lined in a layer along the perithecial wall, then loosed irregularly in perithecium. Ascospores irregularly uniseriate or biseriate, elliptic to fusoid, 2-celled, hyaline or brown to greenish brown, often with hyaline appendage on the ends.

Imperfect state belongs to either the form-genera *Hendersonula* SPEG., *Coryneum* NEES or *Stilbospora* PERS. ex FR. In these genera, the many celled and coloured conidia are produced on or in the ectostroma.

Main characters of this genus excepting the type of imperfect state are similar to those of *Melanconis*. Concept of the genus given by HÖHNEL (1918) is extended to contain WEHMEYER's two sections of *Melanconis*, Thelebolae and Modoniae, by the author. Chief bases segregating *Pseudovalsella* from *Melanconis* is the difference of imperfect state. HÖHNEL (1918) considered the imperfect state of *Sphaeria thelebola* FRIES, having multilocular pycnidia and phaeophragmosporous conidia, as a separable type from the imperfect state of the other *Melanconis* species represented by *Melanconium*. Then, the genus *Pseudovalsella* was erected for it and the form-genus *Hendersoniopsis* was also given to its imperfect state. This opinion was refuted by WEHMEYER (1941 a) and *Pseudovalsella* was treated as a synonym of *Melanconis*. MÜLLER and ARX (1962) followed WEHMEYER. However, the author supports the genus *Pseudovalsella* HÖHNEL with the extended concept, in which species of *Melanconis* having phragmosporous type of conidia in locule or on exposed layer of ectostroma and having two-celled ascospore are included, based on their affinity to the genus *Pseudovalsa* rather than to *Melanconis*.

As to the imperfect state of the genus *Pseudovalsella*, a problem still remains as to whether the genus *Stilbospora* and *Hendersonula* are the same or not. HÖHNEL's *Hendersoniopsis* is apparently synonymous with *Hendersonula* SPEG. *Stilbospora* forms stromatic locules at immature stage and these locules open their upper part widely at a more advanced stage. The decision to place it in

Melanconiales was probably based on the later state of locules. On the other hand, *Hendersonula* belonging to Sphaeropsidales is characterized by the locular pycnidia formed within stroma, and these locules also widely open their ostiole at the mature stage. As it is not the purpose of the present paper to discuss the difference or accordance between the form-genera *Stilbospora* and *Hendersonula*, the author accepts here *Hendersonula* for the species having locular type of imperfect state in keeping with HÖHNEL's deliberations.

HÖHNEL (1918) noticed another type of conidia of *Pseudovalsella thelebola* (FR.) HÖHN. which was produced in the locules similar to *Hendersoniopsis thelebola*. These conidia are hyaline, cylindric, straight or curved and $5\sim12\times1\,\mu$ in size. For such conidial state he gave a new form-genus *Cytosporopsis*. As stated by WEHMEYER (1941 a) this small hyaline conidium of *Pseudovalsella thelebola* is nothing but the ingerminable beta conidium as would be recognized in some *Melanconis* species. It is quite doubtful that the independent genera is required for such beta conidium.

No species of *Pseudovalsella* has been reported in Japan. KITAJIMA's record (1933) on *Melanconis modonia* TUL. (=*Pseudovalsella modonia*) as the causal agent of ink disease of chestnut was a direct translation from old foreign books. Distinguishing points of the three species of *Pseudovalsella* found in Japan, including one new species, are given in the following key and in Figure 16.

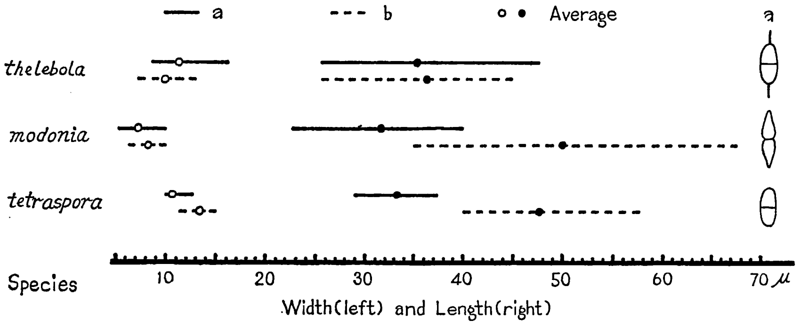

Figure 16. Shape and size of ascospore (a) and conidium (b) of *Pseudovalsella* in Japan.

Key to Japanese species of *Pseudovalsella*

A_1: Conidial state *Hendersonula*, in pycnidial locule, ascospore
  with appendage, on *Alnus*, *Sorbus* ··*P. thelebola* (p. 31)
A_2: Conidial state *Coryneum*, on exposed layer, ascospore
  without appendage
  B_1: Ascus 8-spored, ascospore hyaline, on *Castanea* ······························*P. modonia* (p. 35)
  B_2: Ascus 4-spored, ascospore brown, on *Betula* ······························*P. tetraspora* (p. 37)

1) ***Pseudovalsella thelebola*** (**FRIES**) **HÖHNEL**, Ann. Myc. 16:123, 1918—(Figures 17 and 18; Plate IV: D∼H)

Synonym: *Sphaeria thelebola* FRIES, Syst. Myc. 2:408, 1823
Valsa thelebola FRIES, Sum. Veg. Scand. 412, 1846
Aglaospora thelebola (FR.) TULASNE, Sel. Fung. Carp. 2:166, 1863
Diaporthe thelebora (FR.) SACC., Myc. Ven. 224, 1874
Melanconis thelebola (FR.) SACC., Syll. Fung. 1:605, 1882; WINTER, Rabh. Kryptgfl. I, 2:780, 1887; ELLIS & EVERHART, N. Amer. Pyren. 523, 1892; WEHMEYER, Univ. Michig.

Stud. Sci. Ser. 14:52, 1941; MUNK, Dsk. Bot. Ark. 17(1):236, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33:336, 1959; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2):723, 1962

Valsaria thelebola (FR.) SCHROET., Kryptgfl. Schles. 3(2):440, 1897
Taleola thelebola (TUL.) NIT. ap. REHM, Ann. Myc. 4:479, 1906
Sphaeria ditissima TUL., Ann. Sci. Nat. Ser. IV, 3:117, 1856
Valsa tribulosa BERK. et CKE., Grev. 4:102, 1875
Calospora tribulosa (B. et C.) SACC., Syll. Fung. 2:137, 1883
Valsa tubulosa CKE., Proc. Acad. Nat. Sci. Phila. 1877:123
Pseudovalsa tubulosa (B. et C.) SACC., Syll. Fung. 2:232, 1883
Aglaospora tubulosa (B. et C.) KZE., Rev. Gen. Plant. III, 2:441, 1898
Calospora tubulosa (B. et C.) BERL., Icon. Fung. 3:117, 1900
Chorostate sydowiana SACC., Ann. Myc. 6:561,1908
Diaporthe sydowiana SACC., Syll. Fung. 22:377, 1913
Cryptodiaporthe konseiensis KOBAYASHI, Trans. Myc. Soc. Jap. 4:8, 1962

Conidial state: *Hendersonula thelebola* (SACC.) comb. nov. (=*Stilbospora thelebola* SACC., *Hendersoniopsis thelebola* (SACC.) HÖHN., *Hendersonula konseiensis* KOB., *Psecadia umbrina* BON., *Cytospora umbrina* (BON.) SACC., *Cytosporopsis umbrinus* (BON.) HÖHN., *Naemospora alni* ALL.)

Pustules on bark of cankered or dead stems and twigs, large, 1∼3 mm in diam.; ectostroma distinct, first immersed within bark periderm, then erumpent and broken through the bark epiderm, forming a disc with converged necks, fusely jointed entostromatic hyphal twines mixing with residual tissues of host. Perithecia embedded beneath ectostroma, surrounded by entostromatic hyphae, globular or somewhat flattened at the base, 400∼1000 μ in diam., with broad neck at the top; wall of perithecia constituted from two layers; outer layer composed of angular, brown to dark-brown and thick-walled cells, inner one composed of flattened hyaline and thin-walled cells. Necks collectively erumpent, 400∼550 μ in length and 100∼220 μ in width, with hyaline pore furnishing many periphyses. Asci clavate to oblong-clavate, with thickened tip furnishing apical ring, 90∼165×18∼30 μ in size and 140×20 μ in average, 8-spored, loosed irregularly in perithecium at fully matured stage. Ascospores irregularly biseriate, elliptic to fusoid, hyaline or ultimately pale brownish, 1-septate, rarely with one to two pseudosepta, usually not constricted, straight or unequilateral, 28∼48×9∼16.5 μ in size and 35.2×11.4 μ in average, with hyaline hair-like appendage on each end; appendage often evanescent in early stage.

Conidial state develops in ectostroma as uni- to multilocules with or without perfect state. Wall of pycnidial locule is indistinct but distinguishable from the surrounding prosenchymatous or pseudoparenchymatous stroma by a few layers of hyaline flattened cells. Conidiophores arise from innermost cells and produce the conidia acrogenously. Conidia are cylindric, obtuse at the ends, brown to olive brown, 1- to 3-septate, straight or curved, 28∼45×7.5∼12.5 μ in size and 35.4×10.1 μ in average.

Host and **Material**: *Alnus glutinosa* GAERTN. (Ōshu-kurohannoki)—Yamabe, Hokkaido, X-, 1966, by S. YOKOTA (FPH-2916); Noheji, Aomori, VIII-, 1959 (FPH-439, 440); Koma, Iwate, VI-21, 1963, by Y. YOKOSAWA (FPH-698). *Sorbus commixta* HEDL. (Nanakamado)—Konsei Pass, Tochigi, VII-31, 1960, by T.U. (FPH-Type of *Cryptodiaporthe konseiensis*).

Conidial state only: *Alnus inokumai* MUR. et KUS. (Tanigawa-hannoki)—Tarumae, Hokkaido, VI-2, 1965, by H. TOYOOKA (FPH-2505).

Distribution: Asia (Japan), North America and Europe.

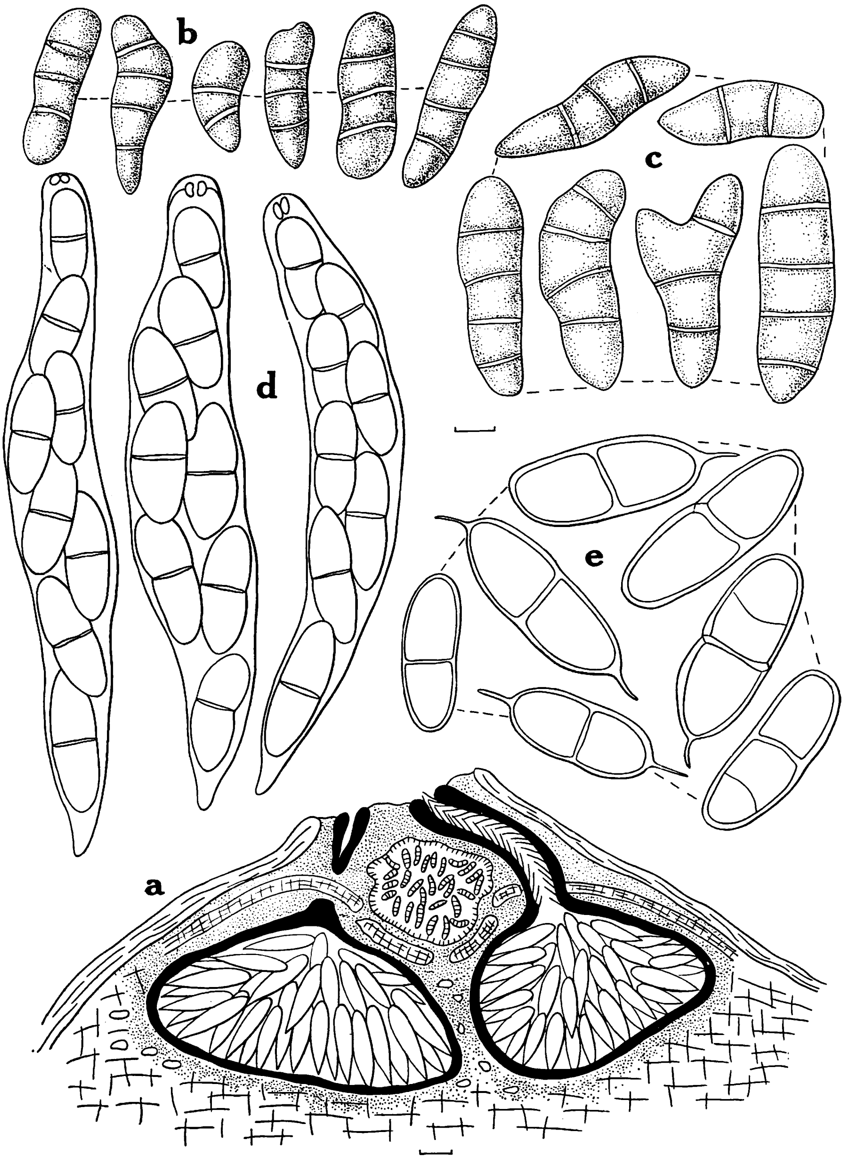

Figure 17. *Pseudovalsella thelebola* (Fr.) Höhnel on *Alnus*

a : Stroma having perithecia and pycnidial locule　b : Conidia produced on host
c : Conidia produced on culture　d : Asci and ascospores　e : Ascospores
(⌴ : a=100 μ; b～e=10 μ)

Note: The present species widely distributes throughout the northern hemisphere with its host *Alnus*. As discussed in the note of *Pseudovalsella*, Höhnel's separation of the genus from *Melanconis* based on the present species seems to be quite reasonable. A fungus on *Sorbus* was previously placed by the author in the genus *Cryptodiaporthe* and was described as a new species *C. konseiensis* (Kobayashi 1962). However, the fungus on *Sorbus* was quite identical with that on *Alnus* in its morphological and cultural characteristics; hence, *Cryptodiaporthe konseiensis* is treated as a synonym of *Pseudovalsella thelebola* (Fr.) Höhn.

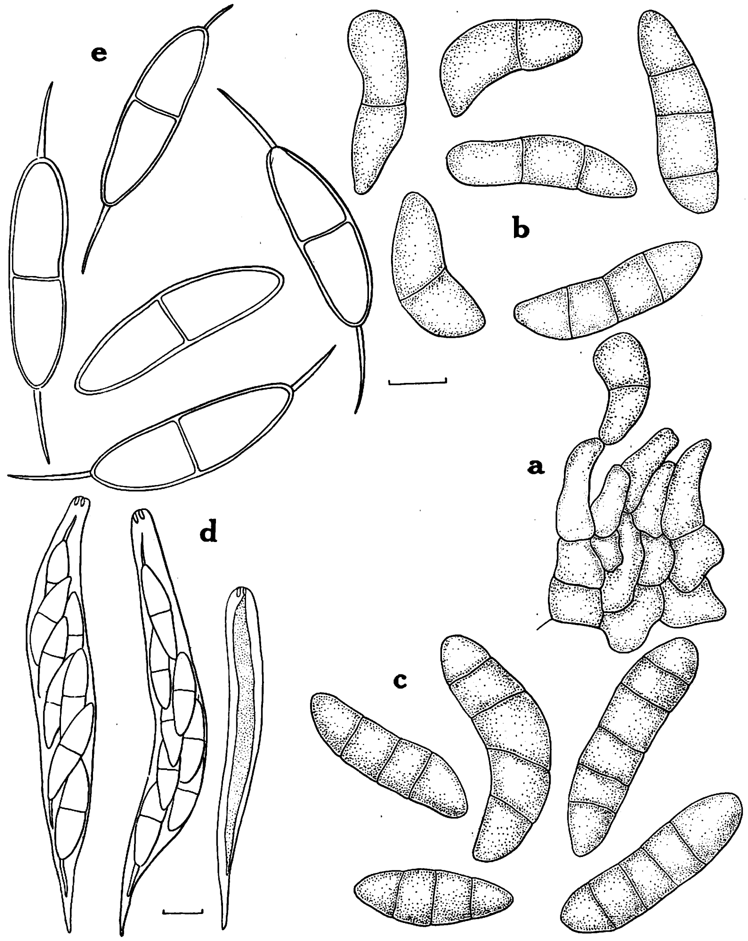

Figure 18. *Pseudovalsella thelebola* (FR.) HÖHN. on *Sorbus*

a : A part of pycnidial locule　　b : Conidia produced on host
c : Conidia produced on culture　　d : Asci and ascospores
e : Ascospores　　(└─┘=10 μ)

The present fungus was observed more often on the exotic species of *Alnus* than on native ones in Japan.

Culture isolated from ascospore or conidium developed slowly and unevenly on potato-sucrose agar. Colony developed, gradually became brownish gray to dark gray in colour with scant cottony aerial mycelia. On one- to two-months-old culture, many small globular fruiting bodies were produced, and then black mucous masses of conidia oozed out from them so that the whole surface of colony was ultimately covered with slimy conidial film. Size of conidia produced on culture, 28～49×8～12 μ in size, were similar to those on host plant, though the number of septum increased in the conidia produced on culture (Figures 17 and 18).

According to WEHMEYER (1938), the fungus produced beta conidia on twig culture besides common *Hendersonula* type of conidia. Such beta conidia failed to appear on potato-sucrose agar.

2) ***Pseudovalsella modonia*** (**Tulasne**) **Kobayashi**, comb. nov.—(Figures 19 and 20; Plate V: A∼E)

Synonym: *Melanconis modonia* Tul., Ann. Sci. Nat. Ser. IV, 5 : 111, 1856; Saccardo, Syll. Fung. 1 : 603, 1882; Winter, Rabh. Kryptgfl. I, 2 : 778, 1887; Ellis & Everhart, N. Amer. Pyren. 523, 1892; Wehmeyer, Univ. Michig. Stud. Sci. Ser. 13 : 63, 1941; Gilman et al., Ia. St. Coll. Jour. Sci. 33 : 340, 1959

Melanconidium modonium (Tul.) Ktze., Rev. Gen. Plant. III, 2 : 493, 1898

Pseudovalsa modonia (Tul.) Höhn., Ann. Myc. 16 : 125, 1918

Sphaeria biconica Curr., Trans. Linn. Soc. Lond. 22 : 279, 1858

Conidial state: *Coryneum castaneae* (Sacc.) comb. nov. (=*Coryneum kunzei* var. *castaneae* Sacc., *Steganosporium castaneae* Lib.)

Pustules on bark of cankered or dead stems and twigs, usually large, at first immersed, then erumpent and broken through the epiderm angularly, elevated truncate conical disc, 1∼3 mm in

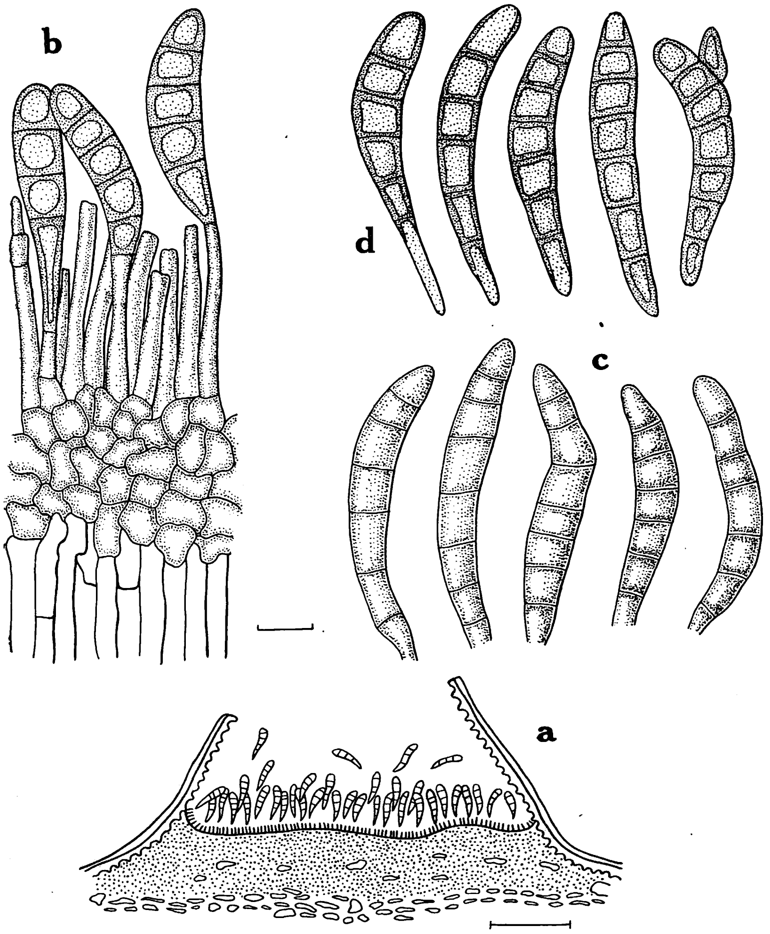

Figure 19. *Pseudovalsella modonia* (Tul.) comb. nov. (=*Coryneum castaneae*)
a : Acervulus　b : A part of acervulus　c : Conidia produced on culture
d : Conidia produced on host　(└─┘: a=100 μ; b∼d=10 μ)

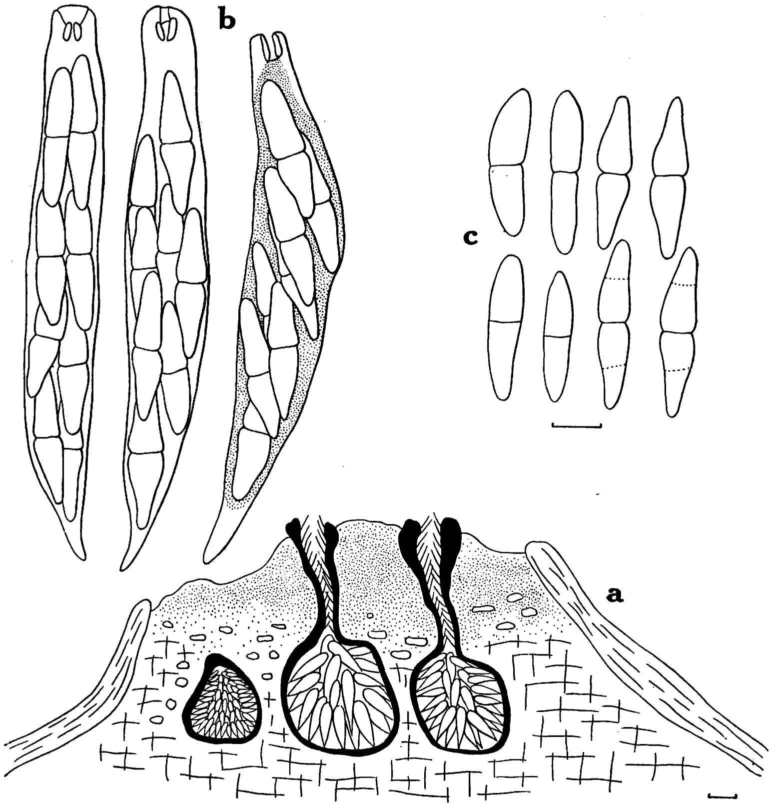

Figure 20. *Pseudovalsella modonia* (Tul.) comb. nov.

a : Perithecial stroma b : Asci and ascospores c : Ascospores

(⎵ : a=100 μ; b, c=10 μ)

diam., brown to grayish-brown. Ectostroma plectenchymatous around perithecial necks, fusely jointed to entostromatic tissue composed of hyphal element and residues of substratum. Perithecia clustered within these stromatic area, 250-500 μ in diam., globular, somewhat flattened at the base with black neck at the top; wall constituted from two layers; outer layer composed of slightly flattened dark-brown and thick-walled cells, inner one composed of strongly flattened, hyaline and thin-walled cells. Necks 300~600 μ in length, penetrated by a broad pore furnishing hyaline periphyses; wall composed of dark brown and thick-walled cells, plectenchymatous. Asci large, clavate to cylindric-clavate with apical ring at the swollen tip, 88~145×12.5~20 μ in size, 8-spored, fine granular, loosed irregularly in perithecium in later stage. Ascospores usually biseriate, sometimes irregularly 1- to 3-seriate, fusoid, straight or slightly curved, 2-celled, constricted at the septum, hyaline, becoming pale brown and adding pseudoseptum in each cell at fully matured stage, 23~40×5.5~10 μ in size, mostly 28~35×6.5~8 μ and 31.7×7.5 μ in average.

Imperfect state develops separately from or simultaneously with the perfect state. Acervuli are flat or elevated by ectostromatic plectenchyma becoming alike to sporodochia. Conidiophores arise from the uppermost layer of acervuli and are cylindric, pale brown, 10~38 μ in length, simple, and produce the conidia acrogenously. Conidia are cylindric to oblong-clavate, the upper end obtuse, tapered to the lower end, straight or curved, sometimes bifurcate, brown to olive-brown, 3- to 7-septate, 35~68×6.5~10 μ in size, mostly 40~60×7.5~9 μ and 50×8.2 μ in average.

Host and Material: *Castanea crenata* SIEB. et ZUCC. (Kuri)—Hiratsuka, Kanagawa, IX-27, 1959, by N. SUZUKI (FPH-1266); Yokohama, Kanagawa, XII-21, 1959, by K. KATO (FPH-1339); Seto, Aichi, VI-24, 1960, by Y. MORIMOTO (FPH-1338); Chiyoda, Ibaraki, IX-6, 1960, by H. KONDO (FPH-949); Kamakura, Kanagawa, V-29, 1965, by T.K. (FPH-2418, 2419); Akanuma, Saitama, X-19, 1965, by T.K. (FPH-2685).

Conidial state only: *Castanea crenata*—Chichibu, Saitama, V-28, 1959, by T.U. (FPH-1176); Asakawa, Tokyo, VII-15, 1959, by T.K. (FPH-453); Dejima, Ibaraki, XI-29, 1960, by H. KONDO (FPH-961).

Distribution: Asia (Japan), North America and Europe.

Note: Among the hitherto known species of the genus *Melanconis*, *M. modonia* TUL. and *M. perniciosa* BRIOSI et FARNETI on *Castanea*, have been known as the species having imperfect state of *Coryneum*. Morphological characteristics of Japanese materials are quite identical with *Melanconis modonia*. *Melanconis perniciosa* has far wider ascospores, 15～18 μ, although *Coryneum* state of both *Melanconis* are quite similar to each other. On the *Coryneum* state of *Melanconis modonia*, *C. kunzei* var. *castaneae* SACC. has been used. *Coryneum kunzei* var. *castaneae*, however, is a different species from *C. kunzei* CDA. *Coryneum kunzei* was proved to be the imperfect state of *Pseudovalsa longipes* (TUL.) SACC. by WEHMEYER (1926 b).

HÖHNEL (1918) transferred the present species to the genus *Pseudovalsa* based on the following reasons, namely, occurrence of brownish and 3-4-celled ascospores in fully matured stage and *Coryneum* type of conidia. However, as pointed out by WEHMEYER (1941 a), occurrence of HÖHNEL's condition in ascospores of the present fungus is a very rare case. It is commonly observed that the true septum is only one, and the other two appearing in each cell are pseudosepta. On the other hand, HÖHNEL erected the genus *Pseudovalsella* for the *Melanconis* species having many-celled and coloured conidia in locules. As discussed above, concept of the genus is extended and it includes the species having many-celled conidia in or on ectostroma. For this reason, the present fungus is treated under a new combination *Pseudovalsella modonia*.

The fungus was easily isolated from either ascospore or conidium. Dark brown to blackish brown colony developed on potato-sucrose agar with felty, paler coloured aerial mycelia. Its growth was relatively fast, and black slimy conidial masses were produced on the surface of the colony within one to two months after isolation. Conidia produced on agar medium, 50～68×7～9μ in size, were quite similar to those on host plant, though non-septated conidia were mixed with common septated conidia.

3) ***Pseudovalsella tetraspora*** KOBAYASHI, sp. nov.—(Figures 21 and 22; Plate V: F～H, VI: A, B)

Conidial state: *Coryneum pedunculatum* sp. nov.

Pustulae corticola; ectostroma primo immersis peridermica, dein erumpens, conicus vel disciformis, 1～3 mm diam., albus vel griseus; perithecia pauci-aggregata, subectostromate conjungo cum imperfect strata, 500～600 μ diam., ostiolatus; ostiola cylindrica erumpens per discum, 550～850μ longis, donatus hyalino periphysatus numerosis; asci clavatis vel clavato-cylindricis, unitunicatus, 145～175×15～17.5 μ, apicis incrassatus donatus annulus, basi brevi-stipitatus maturesco evanescens, 4-sporis; ascosporae uniseriatae, obtuso-ellipsoidae, bicellulae, in septo constrictae, rectis vel leniter inaequilateralis, brunneis vel olivaceus, 29～38×10～12.5 μ, exappendicularis.

Status imperfectus: pustulae corticola, 1～3 mm diam., primo immersis subepidermide, dein erumpens appareo discus; discus prosenchymaticus, hemisphaericis vel truncato-conicis; conidiophoris ordino ad superficies, longis, filiformibus; conidia oblongo-fusoideis vel acuto-cylindricis, 40～58×

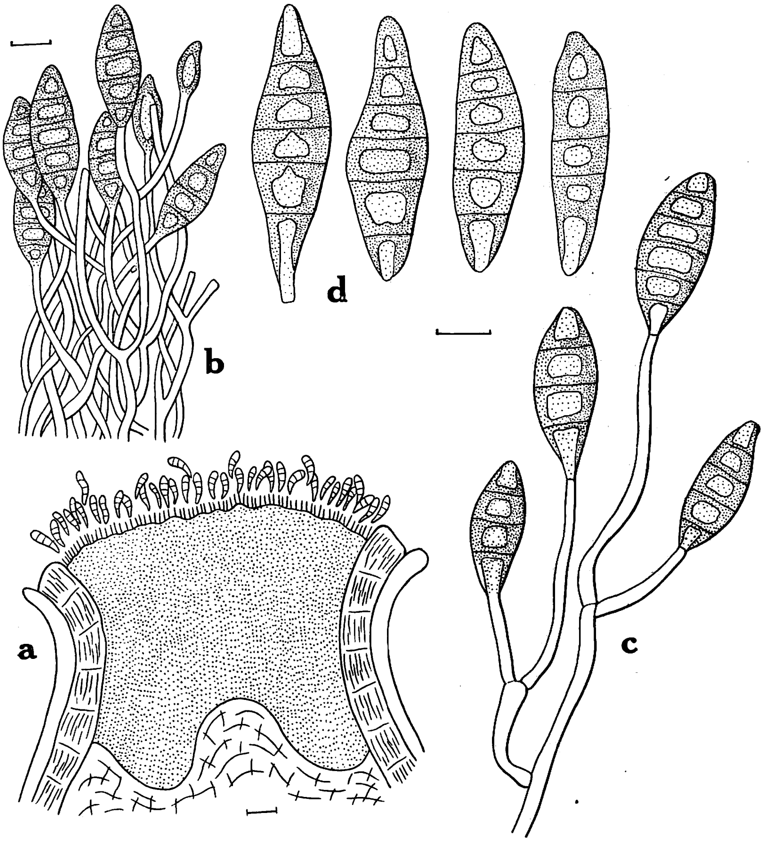

Figure 21. *Pseudovalsella tetraspora* sp. nov. (=*Coryneum pedunculatum* sp. nov.)

a : Conidial stroma b : A part of acervulus

c : A branched conidiophore forming conidia d : Conidia

(⌴ : a=100 μ; b∼d=10 μ)

11.5∼15 μ, 4-6-septatis, crassitunicata.

Hab. on dead bark of *Betula maximowicziana* REGEL (Udai-kanba)—Nopporo, Hokkaido, VI-3, 1966, by T. OGUCHI (FPH-3047, Type).

Distribution: Asia (Japan).

Note: No species having four-spored asci has been described in the genus *Melanconis* and related genera. Life history of the present fungus was not proved culturally because of the ascospores and conidia of the fungus on the over-summered material not germinating. Relationship between perithecial and conidial state was presumed by the fact that the perithecia were produced beneath the conidial ectostroma and their necks collectively erumpent through the conidial layer.

3. *Ophiovalsa* PETRAK, Sydowia 19:221, 1966

Type species: *Ophiovalsa suffusa* (FRIES) PETRAK

Synonym: *Cryptospora* TULASNE (non KIRLIN et KIRILOW 1842), Sel. Fung. Carp. 2 : 144, 1863; SACCARDO, Syll. Fung. 2:361, 1883; WINTER, Rabh. Kryptgfl. I, 2:768, 1887; ELLIS & EVERHART, N. Amer. Pyren. 529, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1:468, 1897;

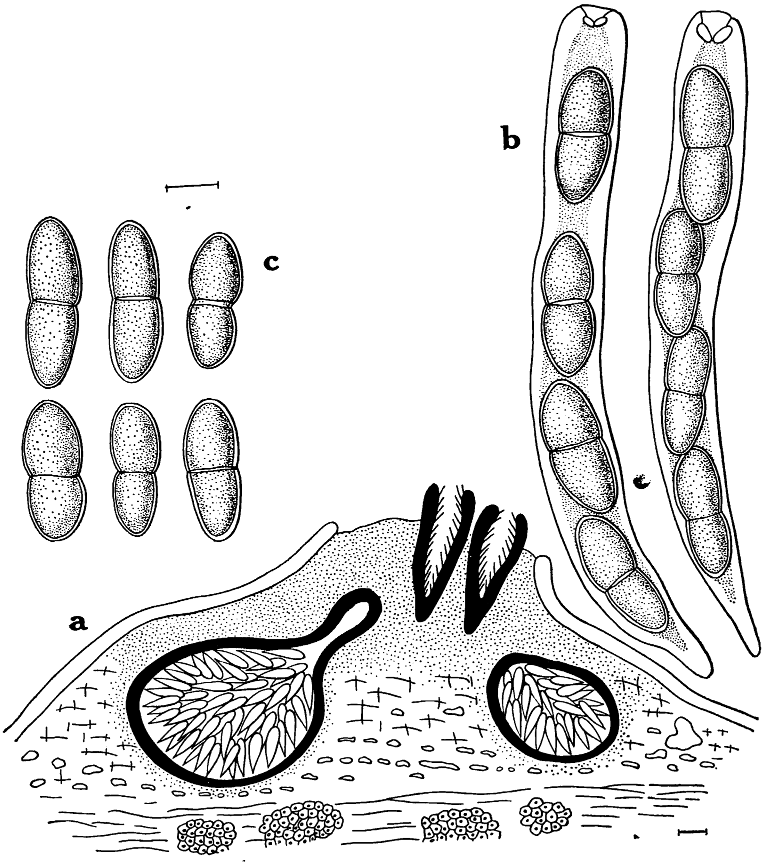

Figure 22. *Pseudovalsella tetraspora* sp. nov.
a : Perithecial pustule　b : Asci and ascospores　c : Ascospores
(└─┘: a=100 μ; b, c=10 μ)

WEHMEYER, Amer. Jour. Bot. 13:639, 1926; MUNK, Dsk. Bot. Ark. 15(2):83, 1953;17(1): 241, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33:327, 1959; DENNIS, Brit. cup fungi, 197, 1960

Conidial state: *Disculina* HÖHNEL

Pustules on bark; ectostroma usually poor, forming gray to black and small disc with converged necks, 0.5 mm in diam., immersed at first, then erumpent and broken through the bark epiderm. Blackened zone absent and development of entostroma indistinct, only scanty hyphae visible among the tissue of substratum. Perithecia embedded circinately in small group and obliquely or horizontally within bark tissue, globular to elliptic, black, with long neck; wall composed of flattened, dark, thick-walled cells, innermost cells being hyaline, strongly flattened and thin-walled. Necks born laterally, strongly bent toward the disc, collectively erumpent through disc or confluent into a few stout ostioles, penetrated by the pore furnishing periphyses. Asci clavate to cylindric-clavate, first lined in a layer along perithecial wall, then loosed from wall by evanescence of their stalk, thin-walled excepting their thickened tip, apical ring being hardly visible or apical plate only. Ascospores long-cylindric, obtuse or acute at the ends, straight or curved, sometimes thickened at both ends, multiseriate or fascicular, granular, hyaline, unicellular or sometimes uniseptate.

Imperfect state belongs to the form-genus *Disculina* Höhn. which produces hyaline, 1-celled, allantoid conidia in exposed layer of ectostroma.

The present genus has long been known under the name of *Cryptospora* Tul. from 1863 until 1966, when Petrak changed the genus name to *Ophiovalsa* based on his finding of *Cryptospora* Kirlin et Kirilow established in 1842, a plant genus of Curciferae. First, the genus *Cryptospora* Tul. was established for the valsoid fungi having large, hyaline and unicellular ascospores. Later Saccardo (1877) segregated the genus *Cryptosporella* from it based on the spore character. Species having hyalosporous type of ascospore were transferred to *Cryptosporella*, while that with scolecosporous type of ascospore was retained in *Cryptospora* Tul. This separation was accepted by later workers other than Winter (1887). *Cryptospora* Tul. was first placed in Melanconidaceae (e.g. Winter 1887, Ellis & Everhart 1892, Lindau 1897), then transferred to Diaporthaceae by Höhnel (1917 a). Relationship between *Cryptospora* Tul. and imperfect fungi belonging to *Cryptosporium* was presumably mentioned in literature. Höhnel (1916) established a new genus *Disculina* instead of *Cryptosporium* auct. which was different from *Cryptosporium* Kze. ex Fr. Later (1918) he reported the result of critical examination on many species belonging to *Cryptospora* Tul. and of *Disculina*. A comment on this presumption was given partly by Wehmeyer's cultural experiment (1926 a). Through morphological and cultural studies he deduced that *Cryptospora* Tul. and *Cryptosporella* as well as *Sillia* would be placed in Diaporthaceae by their structure of perithecial centrum, and that they constituted one group in this family in their type of imperfect state.

Recently, Arx and Müller (1954) established a new family Cryptosporellaceae in Sphaeriales based on the genus *Cryptosporella* naturally accompanying related genera. Reason for segregating them from Diaporthaceae was the presence of the apical plate in ascus tip resembling that of Sphaeriaceae instead of apical ring which is considered to be one of the conspicuous characters in Diaporthaceae. They noted at the same time that this family seemed to be quite simillar to Diaporthales in its characters other than apical structure of ascus. The present author does not agree with their opinion. The genus *Ophiovalsa* and related genera would be included in Diaporthaceae by the structure of the perithecial centrum and the type of imperfect state, even if their apical ring is hardly visible.

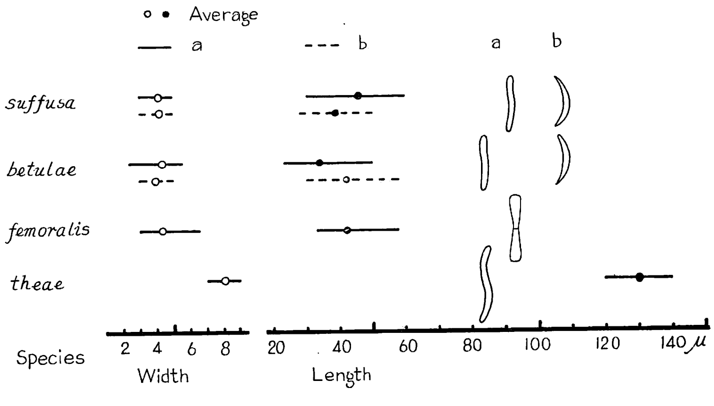

Figure 23. Shape and size of ascospore (a) and conidium (b) of *Ophiovalsa* n Japan.

Four species of *Ophiovalsa* are recorded here. Among them, *Ophiovalsa theae* was described by HARA (1919) from Japan. These four species of *Ophiovalsa* may be distinguished from each other by the following key and figure 23.

Key to Japanese species of *Ophiovalsa*

A_1: Ascospore unicellular, cylindric to oblong-fusoid
  B_1: Ascospore less than 50 μ in length, on *Betula*··························*O. betulae* (p. 43)
  B_2: Ascospore more than 50 μ in length, on *Alnus*························*O. suffusa* (p. 41)
  B_3: Ascospore more than 100 μ in length, on *Thea*···························*O. theae* (p. 47)
A_2: Ascospore often septated at median part, narrowest at median part,
  widest at both ends, bone-like, on *Alnus*, *Sorbus* ······················*O. femoralis* (p. 45)

1) ***Ophiovalsa suffusa*** (**FRIES**) **PETRAK**, Sydowia 19:271, 1965—(Figure 24; Plate VI: C∼H)
Synonym: *Sphaeria suffusa* FRIES, Syst. Myc. 2:399, 1823
  Valsa suffusa FRIES, Sum. Veg. Scand. 412, 1846

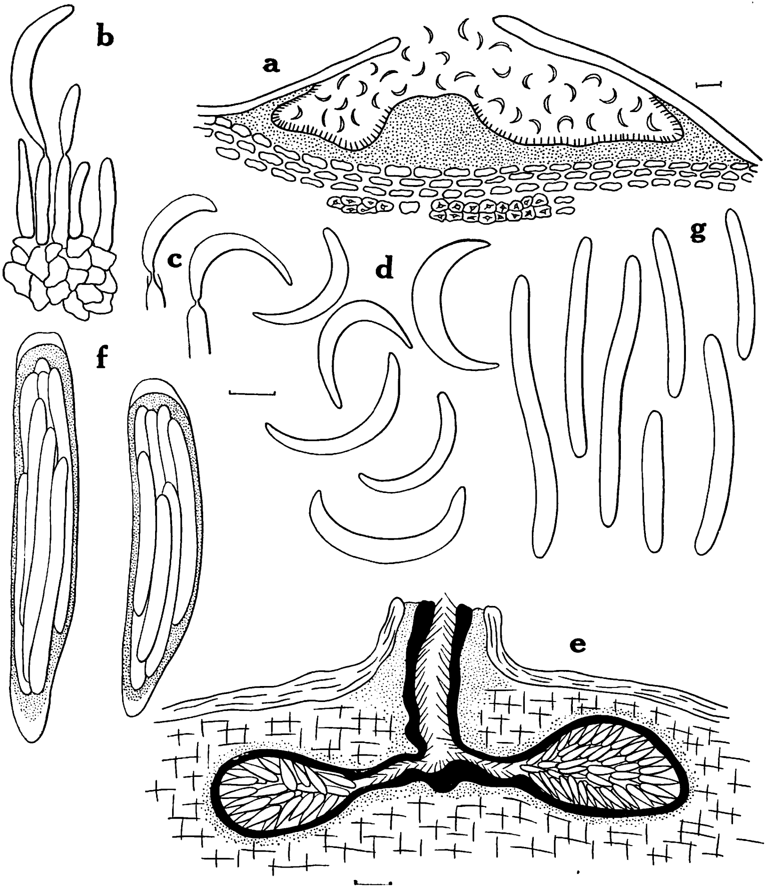

Figure 24. *Ophiovalsa suffusa* (FR.) PETR.
a: Conidial stroma b: A part of acervulus c: Tip of conidiophores d: Conidia e: A perithecial pustule with confluent neck f: Asci and ascospores g: Ascospores (└─┘: a, e=100 μ; b, d, f, g=10 μ)

Cryptospora suffusa (Fries) Tulasne, Sel. Fung. Carp. 2:145, 1863; Saccardo, Syll. Fung. 2:361, 1883; Winter, Rabh. Kryptgfl. I, 2:772, 1887; Ellis & Everhart, N. Amer. Pyren. 533, 1892; Munk, Dsk. Bot. Ark. 15(2):83, 1953; 17(1):242, 1957; Gilman et al., Ia. St. Coll. Jour. Sci. 33:328, 1959; Dennis, Brit. cup fungi, 197, 1960

Sphaeria cryptosporii Curr., Microscop. Jour. 3:271

Conidial state: *Disculina neesii* (Cda.) Hčhn., Sitzb. Kais. Akad. Wiss. Wien, Math. naturw. Kl. 125:104, 1916; Grove, Coelom. 2:298, 1937; Petrak, Sydowia 19:269, 1965 (=*Cryptosporium neesii* Cda.)

Pustules on bark; development of ectostroma quite scanty, forming small black disc with converged necks. Perithecia circinately embedded within bark tissue, globular to elliptic, 200～350 μ in diam., black, obliquely or horizontally laid, bearing lateral neck; wall composed of dark, flattened, thick-walled cells, innermost cells being hyaline and strongly flattened. Necks long, cylindric, bent toward the centre part of the disc, often confluent beneath the disc, 550～700 μ in length, plectenchymatous, penetrated by a pore furnishing hyaline periphyses. Asci cylindric to clavate, sharply tapered at the base, with thin membrane furnishing apical plate at the thickened tip, sometimes faint apical ring being visible, 65～80×12.5～15 μ in size and 71.1×13.8 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores fascicular, cylindric, narrowly obtuse at both ends, straight or curved, granular, unicellular, hyaline, 30～60×3～5 μ in size and 46.2×4.3 μ in average.

Conidial pustules are formed on the bark mixed with perithecial pustules; conidial layer is formed in ectostroma consisting of plectenchymatous tissue, somewhat like that of *Melanconium* in appearance but ruptured white to creamy masses of conidia. Conidiophores are short, simple, produce the conidia acrogenously; annellation is invisible. Conidia are large, obtusely crescent, unicellular, hyaline, 28～50×3～5 μ in size and 39×4.1 μ in average.

Host and Material: *Alnus hirsuta* Turcz. (Ke-yama-hannoki)—Koshunai, Hokkaido, V-18, 1966, by T. Oguchi (FPH-3043). *Alnus hirsuta* var. *tinctoria* (Sarg.) Kudo (Yama-hannoki)—Nopporo, Hokkaido, VI-3, 1966, by T. Oguchi (FPH-3038). *Alnus inokumai* Murai et Kusaka (Tanigawa-hannoki)—Tomobe, Ibaraki, I-, 1964, by Y. Kato (FPH-2208).

Conidial state only: *Alnus japonica* var. *arguta* (Reg.) Cau. (Ezo-hannoki)—Koshunai, Hokkaido, V-18, 1965, by T. Oguchi (FPH-3041). *Alnus inokumai*—Mt. Tarumae, Hokkaido, VI-2, 1965, by H. Toyooka (FPH-2514). *Alnus incana* Willd.—Koshunai, Hokkaido, V-18, 1965, by T. Oguchi (FPH-3284).

Distribution: Asia (Japan), Europe and North America.

Note: Asci and ascospores of Japanese materials are somewhat smaller than those of *Ophiovalsa suffusa* reported by foreign mycologists. However, there are wide variations in the dimensions taken by many workers; namely, size of ascus ranges from 60 to 100 μ in length and 16 to 30 μ in width, and that of ascospore from 40 to 65 μ in length and 3 to 5 μ in width. Dimensions of ascus and ascospore in Japanese materials mostly overlapped those mentioned above. From this fact and complete agreement in the other characters, Japanese materials on *Alnus* are identified as *Ophiovalsa suffusa* (Fr.) Petr. No other species identical with the present fungus was found among the hitherto known *Ophiovalsa*.

Relationship between ascigerous state and *Disculina* state was culturally proved by Wehmeyer (1926 a). At the same time, he noted the formation of beta conidia in culture. The author could not confirm this relationship due to the lack of fresh materials.

2) ***Ophiovalsa betulae*** **(TULASNE) PETRAK**, Sydowia 19:273, 1966—(Figure 25; Plate VII: A∼F)

Synonym: *Cryptospora betulae* Tulasne, Sel. Fung. Carp. 2:149, 1863; Saccardo, Syll. Fung. 2:364, 1883; Winter, Rabh. Kryptgfl. I, 2:772, 1887; Ellis & Everhart, N. Amer. Pyren. 533, 1892; Munk, Dsk. Bot. Ark. 17(1):243, 1957; Gilman et al., Ia. St. Coll. Jour. Sci. 33:329, 1959.

Conidial state: *Disculina betulina* (Saccardo) Höhnel, Sitzb. Kais. Akad. Wiss. Wien, Math. naturw. Kl. I, 125:108, 1916 (=*Cryprosporium neesii β betulinum* Sacc., *C. betulinum* (Sacc.) Jaap)

Pustules on bark of dead branches, black, small; ectostroma scanty, forming disc with converged necks. Perithecia circinately embedded within bark tissue, globular to subglobular, flattened at the base, 420∼540 μ in diam., with long neck at the top; wall constituted from two layers, outer layer composed of black, angular to somewhat flattened, thick-walled cells, inner layer composed of

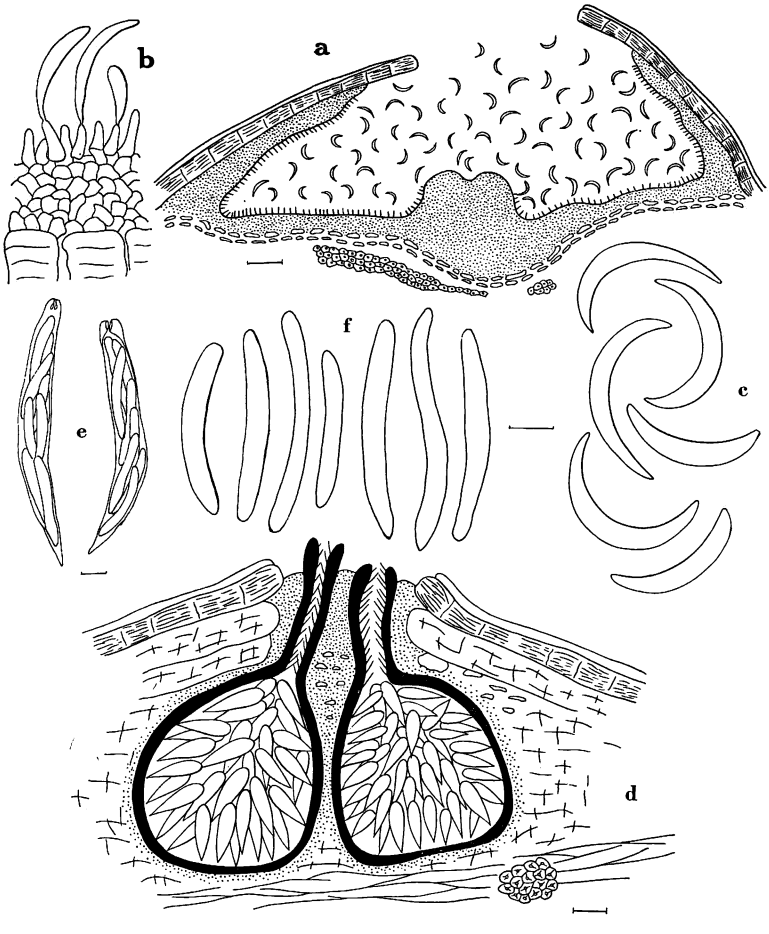

Figure 25. *Ophiovalsa betulae* (Tul.) Petr.

a: Conidial stroma　b: A part of acervulus　c: Conidia
d: Perithecial pustule　e: Asci and ascospores　f: Ascospores

(⊔: a, d=100 μ; b, c, e, f=10 μ)

strongly flattened and hyaline cells. Necks long, cylindric, 500~650 μ in length, collectively erumpent through disc, often confluent, furnished hyaline periphyses at the inner layer of plectenchymatous wall. Asci cylindric to cylindric-clavate, sharply tapered at the base, 60~124×10~15 μ in size and 87.3×11.8 μ in average, 8-spored, first lined in a layer along perithecial wall, then loosed irregularly in perithecium. Ascospores irregularly multi-seriate, cylindric to obtuse-crescent or wavy, unicellular, hyaline, 23~50×2.5~5.5 μ in size and 33.7×4.5 μ in average, fine granular.

Conidial pustules are formed on the bark together with perithecial pustules; conidial layer formed in ectostroma consisting of plectenchymatous tissue, somewhat like that of *Melanconium* in appearance but ruptured white to creamy masses of conidia. Conidiophores simple, hyaline, 10~18×2.5~3 μ in size, produce the conidia acrogenously; annellation is invisible. Conidia large, obtusely crescent, unicellular, hyaline, 30~58×3~5 μ, mostly 38~50×4~4.5 μ in size and 42.2×4 μ in average.

Host and **Material**: *Betula platyphylla* var. *japonica* (MIQ.) HARA (Shira-kanba)—Daimon, Nagano, IV-15, 1961, by T.K. (FPH-851, 967). *Betula maximowicziana* REGEL (Udai-kanba)—Nopporo, Hokkaido, VI-3, 1966, by T. OGUCHI (FPH-3047).

Conidial state only: *Betula ermanii* CHAM. (Dake-kanba)—Koshunai, Hokkaido, IV-20, 1962, by T. OGUCHI (FPH-3049). *Betula populifolia* MARSH.—Koshunai, Hokkaido, VIII-2, 1963, by T. OGUCHI (FPH-3036). *Betula maximowicziana*—Koshunai, Hokkaido, IV-14, 1964, by T. OGUCHI (FPH-3037). *Betula pubescens* EHRH.—Koshunai, Hokkaido, VII-15, 1964, by T. OGUCHI (FPH-3033). *Betula verrucosa* EHRH.—Koshunai, Hokkaido, VIII-15, 1964, by T. OGUCHI (FPH-3046). *Betula platyphylla* var. *japonica*—Koshunai, Hokkaido, IV-12, 1963, by T. OGUCHI (FPH-3048); IV-15, 1965, by T. OGUCHI (FPH-3045)

Distribution: Asia (Japan), Europe and North America.

Note: The present species may distribute widely in the northern hemisphere with its host plant *Betula*. Japanese material is identified as *Ophiovalsa betulae* (TUL.) PETR. by the agreement in all aspects of its morphology.

Ascospore easily germinated and developed its colony on potato-sucrose agar. Colony grew relatively fast and flatly with thick aerial mycelia. It was first white to creamy then became dusty cream to grayish. No conidial and perithecial fruiting bodies were produced after all.

Disculina betulina (SACC.) HÖHN. (= *Cryptosporium betulinum* (SACC.) JAAP) has been well known in literature as the imperfect state of the present *Ophiovalsa*. The author also obtained this imperfect fungus on several collections of *Betula*. No experimental proof of the genetic rela-

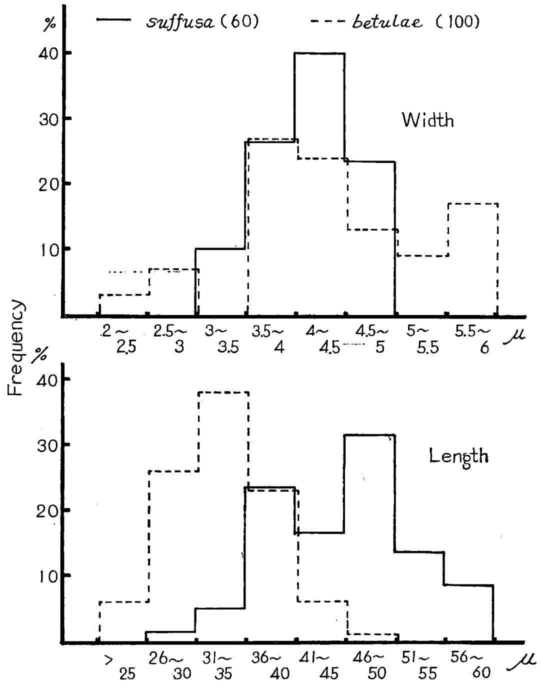

Figure 26. Histogram of width and length of ascospore in two similar species of *Ophiovalsa* (Total account of measured ascospore)

tionship between the *Ophiovalsa* and *Disculina* on *Betula* was carried out. Culture from *Disculina* could not be compared with that of *Ophiovalsa* owing to the lack of fresh material of the former. Confirmation of the life cycle between *Ophiovalsa* and *Disculina* on *Betula* is needed in further study.

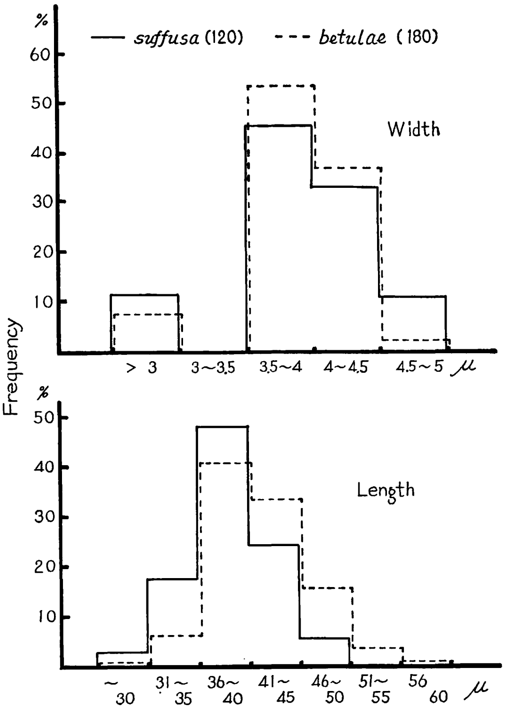

Figure 27. Histogram of width and length of conidium in two similar species of *Ophiovalsa* (Total account of measured conidium)

3) ***Ophiovalsa femoralis*** (PECK) PETRAK, Sydowia 19:271, 1966—(Figure 28; Plate VII: G~L)

Synonym: *Valsa femoralis* PECK, Rept. N.T. St. Mus. 28:74, 1876
Cryptospora femoralis (PECK) SACCARDO, Syll. Fung. 2 : 362, 1883; ELLIS & EVERHART, N. Amer. Pyren. 534, 1892; GILMAN et al., Ia. St. Coll. Jour. Sci. 33:328, 1959.

Conidial state: Unknown

Pustules on bark of cankered or dead stems and twigs; ectostroma quite scanty, forming small black disc with convergent necks. Perithecia circinately or aggregately embedded within the bark tissue, globular or flattened at the base, 300~550 μ in diam., with long neck at the top; wall of perithecia constituted from two layers, outer layer composed of dark, thick-walled and slightly flattened cells, inner one composed of strongly flattened, hyaline and thin-walled cells. Necks cylindric, collectively erumpent through disc, 300~640 μ in length, with many hyaline periphyses at the inner layer of plectenchymatous wall. Asci clavate to cylindric-clavate, sharply tapered at the base, thin-walled with thickened tip as apical plate furnishing fine pore, 65~105×11.5~20 μ in size and 81.7×15.3 μ in average, 8-spored, rarely 4-spored, loosed irregularly in perithecium. Ascospores fascicular, cylindric, straight, bone-like, nrrower at mid-part and broader at both ends, unicellular or often uni-septated at the middle, hyaline, 33~58 in length (42.3 μ in average), 3~6.5 μ in width at the ends (4.4 μ in average) or 2~4 μ at the narrowest part.

Host and Material: *Alnus inokumai* MUR. et KUS. (Tanigawa-hannoki)—Asakawa, Tokyo, VIII-16, by T.K. (FPH-2348); Koma, Iwate, VI-21, 1963, by Y. YOKOSAWA (FPH-703); Mt. Tarumae, Hokkaido, VI-2, 1965, by H. TOYOOKA (FPH-2514); Atsuga, Hokkaido, IX-6, 1967, by S. YOKOTA (FPH-3301). *Alnus hirsuta* var. *sibirica* SCHN. (Yama-hannoki)—Asakawa, Tokyo, VIII-16, 1960, by T.K. (FPH-1160). *Alnus glutinosa* GAERTN. (Ōshu-kuro-hannoki)—Noheji, Aomori, VI-, 1962 (FPH-1908); Koma, Iwate, VI-21, 1963, by Y. YOKOSAWA (FPH-700, 702). *Sorbus commixta* HEDL. (Nanakamado)—Konsei Pass, Tochigi, VII-31, 1960, by T.U. (FPH-2350)

Distribution: Asia (Japan) and North America.

Note: On *Alnus* two species of *Ophiovalsa*, namely *O. suffusa* (FR.) PETR. and *O. femoralis*

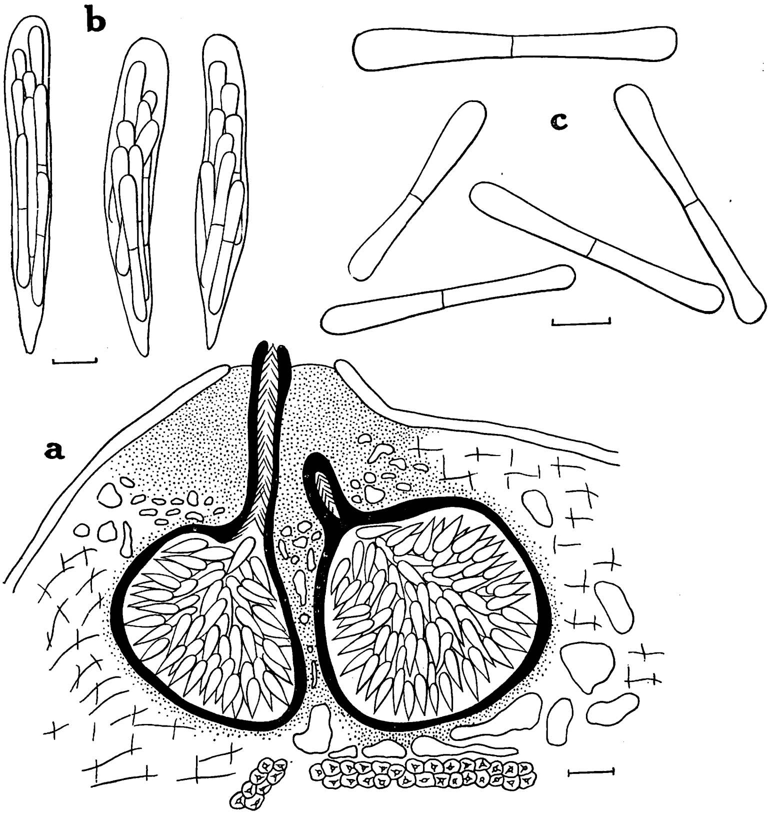

Figure 28. *Ophiovalsa femoralis* (Peck) Petr.
a: Perithecial pustule　b: Asci and ascospore
c: Ascospore　(─── : a=100μ ; b, c=10μ)

(Peck) Petr., and two species of *Cryptospora* Tul., namely *C. alnicola* Höhn. and *C. aurantiaca* Wehm. on which Petrak (1966) submitted no criticism, have been described hitherto. Among them, *Cryptospora aurantiaca* (Wehmeyer 1942) differs from the present fungus by its shape of ascospore and orange-coloured ectostroma. *Cryptospora alnicola* (Höhnel 1914), which was recognized to be a separate species by Wehmeyer (1942), and *C. suffusa* also differ from the fungus in question by their shape of ascospore. Ascospore of *Ophiovalsa femoralis* was characterized by its "bone-like" shape as figured by Gilman et al. (1959). Shape of ascospore of Japanese materials is quite identical with *Ophiovalsa femoralis* reported from Europe and North America, though ascospore of the latter is usually recorded to be unicellular (Höhnel 1918, etc.). Among Japanese materials, one on *Alnus hirsuta* var. *sibirica* has ascospores showing no septation. From the facts that characters other than septation in ascospore quite agree with those of *Ophiovalsa femoralis*, and that septation in ascospore seems to be unstable, Japanese fungus is identified as *O. femoralis* (Peck) Petr.

Germination percentage of ascospore of the fungus was usually low, probably due to the difficulty in obtaining unbroken spores. Most ascospores are broken down in the process of isolation. Germ-tube develops from the side-wall of broadest parts. Growth of the fungus on agar medium was quite slow. Germinated ascospore develops faintly visible colony after two or three weeks from the transplantation. Colony was white or creamy white and flat with scanty white aerial mycelia. After three or four months, a few small black nodules were produced on the margin of the colony, but they did not bear any spore after all.

No record on the culture or the imperfect state of the present species was found in literature.

4) ***Ophiovalsa theae*** **(Hara) Kobayashi**, comb. nov.

Synonym: *Cryptospora theae* Hara, Chagyokai 14(6), 1916; Diseases of tea plant, p. 117, 1932
Conidial state: Unknown

The author was unable to examine this species for lack of fresh and herbarial materials. No specimen was found in Hara's collection preserved in the National Science Museum, Tokyo. If we are to judge from the description and figure made by Hara (1932), the present fungus can be considered a valid species of *Ophiovalsa* which is apparently distinguishable from the hitherto known species by its far larger asci and ascospores. Description by Hara is as follows:

" Perithecia solely or circinately embedded in the bark tissue, subglobular, 400～1000 μ in diam., with long neck. Necks cylindric, surrounded by the ectostromatic hyphae, collectively erumpent, forming black small disc, 0.3～1 mm in length. Asci clavate or cylindric, tapered toward the base, 200～250×18～25 μ in size, 8-spored; membrane thin but with thickened tip furnishing fine pore. Ascospores fascicular, oblong-cylindric or wavy, obtusely tapered at the ends, multi-guttulate, unicellular, hyaline, 120～140×7～9 μ in size. On *Thea sinensis* L. (Cha)."

According to Hara, this species was regarded as the causal agent of the stem canker of the tea plant, but no detailed experiment has been carried out. Conidial state has been unknown.

4. ***Ditopellopsis*** **Reid et Booth**, Can. Jour. Bot. 45: 1479, 1967

Type species: *Ditopellopsis clethrae* Reid et Booth
Conidial state: Unknown

Pustules on bark; stroma develops quite well, pseudoparenchymatous, enveloping perithecia entirely, immersed in bark tissue, then erumpent through bark epiderm forming gray to blackish disc. Perithecia embedded singly or a few in one stroma, globular to subglobular, with stout cylindric neck at the top. Perithecial wall distinct, composed of flattened, dark, thick-walled cells, innermost cells being hyaline and thin-walled. Neck furnished periphyses on the inner surface of the pore. Asci clavate to cylindric, with thickened tip and evansecent short stalk, 8-spored, loosed irregularly in perithecium. Ascospores elliptic to fusoid, hyaline, 2-celled.

The present genus was recently erected as a member of Diaporthaceae by Reid and Booth (1967). The chief basis distinguishing it from the hitherto known genera is the well developed parenchymatous stroma enveloping perithecium entirely. At the same time they established another new genus *Ditopellina*, being distinguishable from *Ditopellopsis* only by its phragmosporous type of ascospore. Such development of stroma enveloping perithecium is found in some other genera, for instance *Leucostoma*, *Endothia*, *Lambro*, etc. However, these genera are distinguished fairly well from *Ditopellopsis* and *Ditopellina* by the structure of the stroma and nature of the asci and ascospores.

Second species of *Ditopellopsis* was found in Japan and is described as follows:

1) ***Ditopellopsis sophorae*** **KOBAYASHI**, sp. nov.—(Figure 29; Plate VIII: A～C)
Conidial state: Unknown

Pustulae corticola; stroma primo immersa, dein erumpens, pseudoparenchymatica, 2 mm alto et 2～3 mm diam., involvo 1～3 perithecia et residua substrata; perithecia in stromate immersa in totum, globosa vel basi applanata, 400～500 μ diam., ostiolata; ostiola cylindrica, nigris, erumpens per discum, 750 μ longa, donatus hyalino periphysatus numerosis; asci cylindricis vel clavatis, 123～145×14～17.5 μ, apice incrassata donatus annula vel patellata, 8-spora, aparaphysatis; ascosporae monostichae, ellipsoidea vel fusoidea, utrinque rotundata, 2-cellulata, in septo constrictae, rectis, hyalinae, 17.5～20×9～11.5 μ exappendiculata.

Hab. on dead bark of *Sophora japonica* L. (Enjyu)—Karuisawa, Nagano, IX-, 1960, by T.U. (FPH-1272, Type).

Distribution: Asia (Japan).

Note: According to REID and BOOTH (1967), *Ditopellopsis clethrae* REID et BOOTH produces single perithecium in one stroma and the ascus of the fungus furnishes thickened tip instead of apical ring. In the present species, a stroma contains one to three perithecia and the apical ring

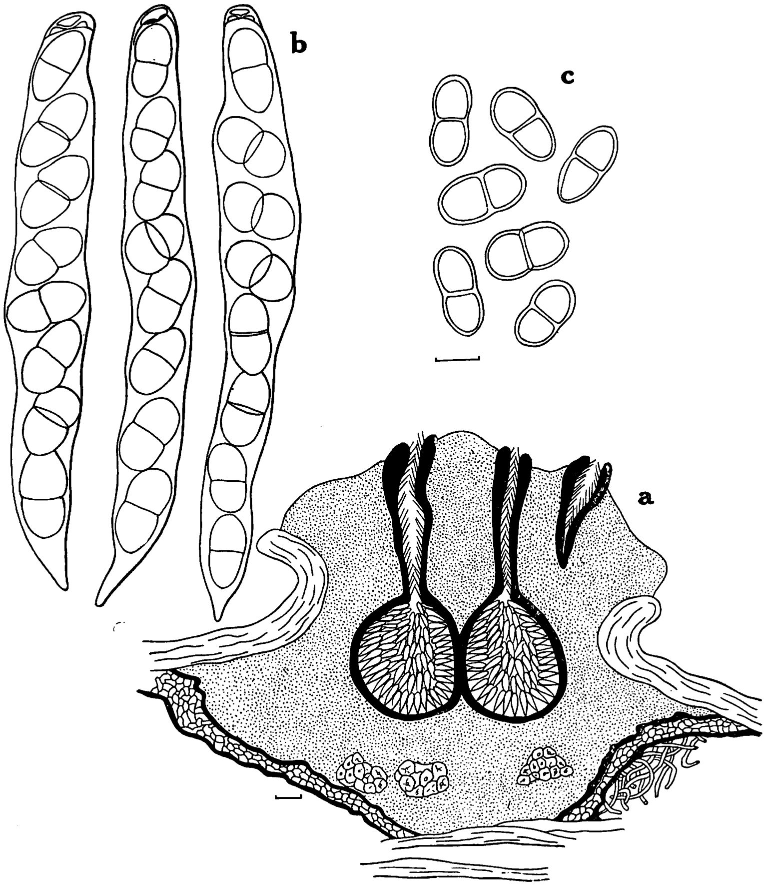

Figure 29. *Ditopellopsis sophorae* sp. nov.
a : Perithecial stroma b : Asci and ascospores c : Ascospores
(⌴ : a=100 μ; b, c=10 μ)

of ascus tip is faintly visible. Size of asci and ascospores of the present fungus also differs that of *Ditopellopsis clethrae*. No identical species with the fungus in question was found among the Diaporthaceous fungi described hitherto. For these reasons, it is suggested that the fungus on *Sophora* is to be regarded as a new species of the genus *Ditopellopsis*.

As cultural study of the present species was not conducted, it is unknown whether the fungus produces conidial state on agar media or not.

5. ***Cryptodiaporthe*** **PETRAK**, Ann. Myc. 19: 118, 1921; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9: 189, 1933; MUNK, Dsk. Bot. Ark. 15 (2): 86, 1953; 17 (1): 248, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33: 356, 1959; DENNIS, Brit. cup fungi, 192, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11 (2): 754, 1962

Type species: *Cryptodiaporthe aesculi* (FUCK.) PETR.

Conidial state: *Septomyxa* SACC., *Discella* BERK., *Chondroplea* KLEB., *Fusicoccum* CDA. ap. STURM., *Pseudodiplodia* KARST. or *Didymosorium* NEES

Pustules on bark; development of ectostroma variable from scanty to rich; disc composed of converged necks and ectostromatic hyphae around them, elevated conic to truncate conic rupture breaking through the bark epiderm. Entostroma also variable from none to rich, composed of hyphal twines and residual tissue of substratum. Blackened zone absent. Asci clavate to cylindric clavate, with apical ring at the thickened tip, tapered to the base, loosed irregularly from perithecial wall, 8-spored. Ascospores hyaline, 2-celled, elliptic to fusoid, often slightly narrower at the lower end, straight or slightly curved, often appendaged.

Conidial state various, but usually formed on exposed layer or in locular cavity of ectostroma without distinct wall.

The present genus was first established by PETRAK (1921 a) for the species of *Diaporthe* having atypical obsolete ectostroma and *Septomyxa* type of conidia. Thereafter, WEHMEYER (1933) extended PETRAK's concept on the genus to various species having no blackened zone and different conidial

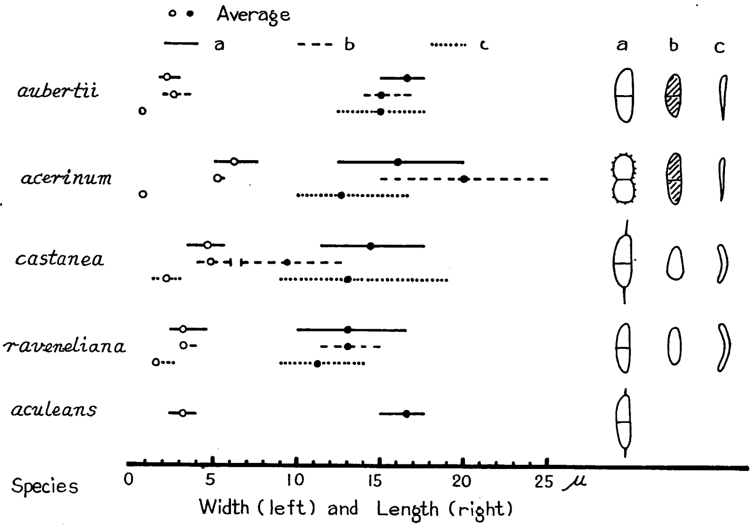

Figure 30. Shape and size of ascospore (a), alpha conidium (b) and beta conidium (c) of *Cryptodiaporthe* in Japan.

state from *Phomopsis*, the imperfect state of the genus *Diaporthe*. At the same time, he mentioned that the genus was constituted from rather heterogeneous species which could not be placed in any other genera, also that such species respectively showed affinity to various genera of Diaporthaceae. However, these various types of imperfect state of *Cryptodiaporthe* sensu WEHMEYER listed above may not be different fundamentally from each other in their mode of conidial production. Hyaline and uni- to bi-cellular conidia are commonly produced on exposed layer or in locular type layer without distinct pycnidial wall. Therefore, it is the author's opinion that the genus *Cryptodiaporthe* would be maintained as a valid genus of Diaporthaceae.

Five species of the present genus will be described in the following part. Besides *Cryptodiaporthe castanea* (TUL.) WEHM. recorded by ITO (1955, 1960) as a causal agent of the canker disease of chestnut tree; the other four are newly recorded from Japan. These five species of *Cryptodiaporthe* are distinguished from each other by the following key and Figure 30.

Key to Japanese species of *Cryptodiaporthe*

A$_1$: Ascospore with appendage
  B$_1$: On *Castanea*, conidial state *Fusicoccum*, ascospore
    12～18×3.5～5.5 μ ……………………………… *C. castanea* (p. 50)
  B$_2$: On *Rhus*, ascospore 11～16×2.5～4 μ ……………………………… *C. aculeans* (p. 61)
A$_2$: Ascospore without appendage
  B$_1$: Ascospore more than 5 μ in width, echinulate, conidial
    state *Discella*, on *Acer* ……………………………… *C. acerinum* (p. 57)
  B$_2$: Ascospore less than 5 μ in width, smooth
    C$_1$: Alpha conidium hyaline, unicellular (*Fusicoccum*), on
      Quercus ……………………………… *C. raveneliana* (p. 54)
    C$_2$: Alpha conidium 2-celled, brown in full maturity
      (*Pseudodiplodia* or *Didymosporium*), on *Sorbus* ……………………………… *C. aubertii* (p. 59)

1) ***Cryptodiaporthe castanea*** **(TULASNE) WEHMEYER**, Univ. Michig. Stud. Sci. Ser. 9:205, 1933—(Figures 31 and 32; Plate VIII: D～I)—DÉFAGO, Phytop. Zeit. 10:168, 1937; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2):758, 1962

Synonym: *Sphaeria castanea* TUL., Ann. Sci. Nat. Ser. III, 15:379, 1851
Valsa castanea TUL., Ann. Sci. Nat. Ser. IV, 5:117, 1856
Diaporthe castanea (TUL.) SACC., Syll. Fung. 1:624, 1882
Chorostate castanea (TUL.) TRAV., Fl. Ital. Crypt. 2:207, 1906
Chorostella castanea (TUL.) CLEM. et SHEAR, Genera of fungi, 264, 1931
Cryptospora leiphaemoides FUCK., Symb. Myc. Nachtr. 2:34, 1873
Diaporthe leiphaemoides (FUCK.) SACC., Syll. Fung. 1:624, 1882; WINTER, Rabh. Kryptgfl. I, 2:662, 1887

Conidial state: *Fusicoccum castaneum* SACCARDO, Syll. Fung. 3:249, 1884; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9:206, 1933; DÉFAGO, Phytop. Zeit. 10:168, 1937; GROVE, Coel. 1:247, 1935 (=*Cytispora castaneae* SACC., *Diplodina castaneae* FRILL. et DELAC., *Cytodiplospora castaneae* OUD., *Malacostroma castaneum* (SACC.) HÖHN.)

Pustules on bark on cankered or dead stems and twigs; ectostroma first distinct, immersed, then erumpent through epiderm exposing white to creamy or brownish and conic to truncate conic disc with converged necks, 0.5～1 mm in diam., later collapsed gradually leaving only blackened necks. Perithecia clustered beneath the ectostroma, globular or depressed at the bottom, 350～600 μ in diam., surrounded by loose hyphal elements twisting the tissue of substratum, with long neck at the top; wall of perithecia membranaceous, brown to dark brown, constituted from two layers; outer layer composed of slightly flattened, thick-walled and dark-coloured cells, inner one composed of strongly flattened, hyaline and thin-walled cells. Necks cylindric, brown to dark brown, 250～700 μ in length, penetrated by a pore furnishing hyaline periphyses. Asci clavate to cylindric-clavate, with distinct apical ring at the thickened tip, 50～73×7.5～12.5 μ in size, mostly 55～60×9～10 μ and 59.1×10 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to fusoid, straight or inaequilateral, 2-celled, slightly constricted at the septum in full maturity, hyaline, 11.5～17.5×3.5～5.5 μ in size, mostly 12.5～16.5×4～5 μ and 14.4×4.6 μ in average, with hyaline appendage at the ends which is often evanescent and disappears.

Conidial state develops solely or simultaneously with perithecial state, usually its formation

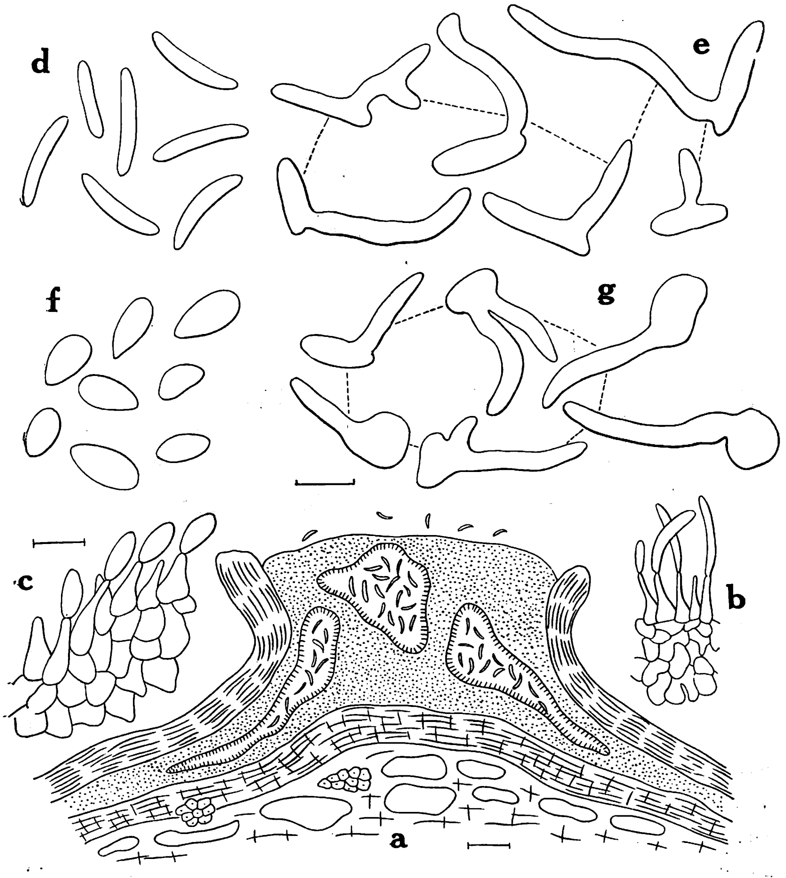

Figure 31. *Cryptodiaporthe castanea* (Tul.) Wehm.

a : Conidial stroma　b : A part of pycnidial locule producing crescent type of conida　c : A part of pycnidial locule producing ovoid type of conida
d : Crescent type of conidia　e : Germination of crescent type of conidia
f : Ovoid type of conidia　g : Germination of ovoid type of conidia

(⊢⊣: a=100 μ; b～g=10 μ)

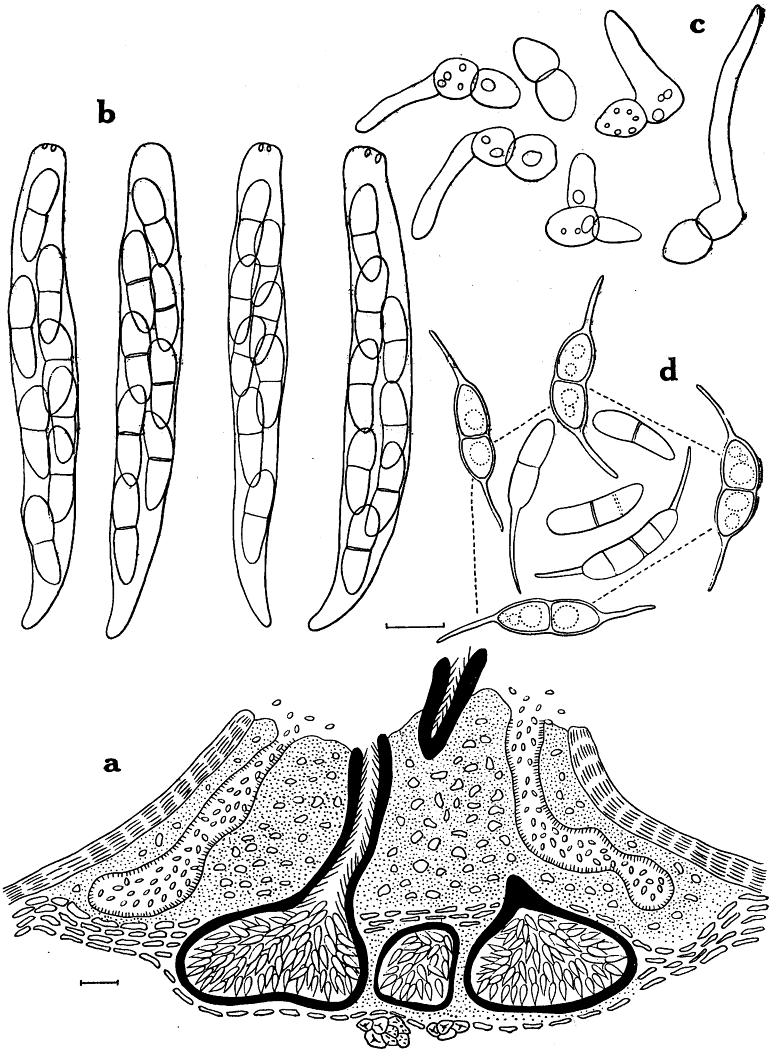

Figure 32. *Cryptodiaporthe castanea* (Tul.) Wehm.
a : Perithecial pustule having pycnidial locule　b : Asci and ascospores
c : Ascospores　d : Germinating ascospores　(⊢—⊣ : a=100 μ; b∼d=10 μ)

precedes the perithecial formation. Conidial stroma is immersed within peridermal layer, then erumpent, prosenchymatous, white to creamy white, 0.5∼1 mm in diam.; conidial locule is formed lysigenously within the stroma; wall of locules is indistinct. Conidiophores arise from innermost cell layer of locule, and are simple, hyaline. Two types of germinable conidia are produced; one of which is elliptic to ovoid, acute at one end and obtuse at the opposite end, hyaline, unicellular, 6.5∼12.5×4∼6 μ in size and 9.3×4.7 μ in average; the other is fusoid to cylindric or allantoid, straight or curved, rounded at the ends, unicellular, hyaline, 9∼19×1.5∼3 μ in size and 13.1×2.3 μ in average.

Host and Material: *Castenea crenata* Sieb. et Zucc. (Kuri)—Koma, Iwate, VII-23, 1951, by K. Ito (FPH-1165); Seto, Aichi, X-21, 1953, by T.K. (FPH-1164, 1324); Yokohama, Kanagawa, XII-21, 1959, by K. KATO (FPH-1177); VIII-, 1960, by K. KATO (FPH-1169); X-, 1966, by T.K. (FPH-3118, 3122); Chiyoda, Ibaraki, VII-6, 1960, by H. KONDO (FPH-1170, 1241, 1242, 1243); Yasato, Ibaraki, XI-27, 1960, by H. KONDO (FPH-1246); Hyuga, Miyazaki, IX-15, 1963 (FPH-2974). *Castanea mollissima* BL. (Shina-guri)—Aisari, Iwate, VII-10, 1953, by T. TAKANO (FPH-1285); Kamabuchi, Yamagata, X-2, 1959, by T.K. (FPH-449).

Conidial state only: *Castanea crenata*—Chichibu, Saitama, V-23, 1959, by T.K. (FPH-990, 1175); Meguro, Tokyo, VI-23, 1959, by T.U. (FPH-1481); Chiyoda, Ibaraki, IX-6, 1960, by H. KONDO (FPH-1245, 1246, 1469); Kakegawa Shizuoka, VI-, 1964, by T.K.

Distribution: Asia (Japan) and Europe.

Note: The present species was transferred to *Cryptodiaporthe* from *Diaporthe* by WEHMEYER (1933) without particular accounts in detail, but he noted that *Cryptodiaporthe castanea* showed a similarity to the genus *Apioporthe* in its morphological characters, such as the development of entostromatic hyphae, the shape of ascospore tapered at lower cell, and the conidial state. In the present species, development of ectostroma is rather distinct, though it collapses in a later stage. However, the author agrees with WEHMEYER's treatment that the present species be included in *Cryptodiaporthe*, chiefly based on its morphology of the imperfect state, and no formation of the blackened zone within bark tissue.

Dimensions of ascospores from Japanese materials are wider than those of WEHMEYER, but these are mostly overlapped by those of DÉFAGO (1937). According to WEHMEYER (1933), confusion has been noted among the records on the imperfect state of *Cryptodiaporthe castanea* in literature. There are two types of conidia distinguishable by their size and shape, namely, shorter and wider conidia and slender ones. The name of *Fusicoccum castaneum* has been used for both types of conidia in literature. This may be attributed to the lack of cultural and comparative studies on many materials. DÉFAGO, who first conducted some cultural and etiological studies on the present fungus, observed only one type of conidia. Judged from the dimention and figure, conidia observed by him as well as by FUCKEL are probably considered to be the same as the ovoid type of conidia of Japanese materials. More slender conidia described by SACCARDO may correspond to the crescent or allantoid type of conidia of Japanese materials.

Ascospore and both types of conidium easily germinated. Colony was first white and flat with felty short aerial mycelia, then yellowish brown patches appeared on the colony and gradually became uneven. Pycnidial sphaeric bodies were produced on the marginal area of the colony within two months after isolation. Mucous masses of conidia oozed out from them. Conidia produced on culture are cylindric to crescent, straight or curved, slightly acute at the ends, $6\sim15\times1.5\sim2.5\,\mu$ in size. These conidia are quite accordant with those on host plant. Ovoid type of conidia was not produced after all on agar media, even in the isolates from the ovoid conidium. Cultural characters of Japanese isolates were accordant with those observed by DÉFAGO excepting the production of the ovoid type of conidia in his culture.

According to DÉFAGO (1937), the present species was a weak parasite on chestnut trees. In Japan, the fungus has been well known as the causal agent of a dieback or canker disease of chestnut since the first record by ITO (1955). It is observed more often on the cultivated chestnut varieties than on the wild chestnut, and often on the cankered bark of young trees affected by frost injury or drought. According to the unpublished data of ITO and KOBAYASHI, inoculation experiments showed weak pathogenicity of the fungus on the healthy chestnut trees or seedlings, in accordance with DÉFAGO's result.

2) ***Cryptodiaporthe raveneliana*** (**THÜMEN** et **REHM**) **KOBAYASHI**, comb. nov.—(Figure 33; Plate IX: A∼E)

Synonym: *Diaporthe raveneliana* THÜM. et REHM, Flora 61:178, 1878; SACCARDO, Syll. Fung. 1:671, 1882

Diaporthe leiphaemia var. *raveneliana* (THÜM. et REHM) WEHM., Pap. Michig. Acad. Sci. 9:487, 1929; Univ. Michig. Stud. Sci. Ser. 9:178, 1933

Diaporthe denissima ELL., Amer. Nat. 17:316, 1883; SACCARDO, Syll. Fung. 2:L, 1883; ELLIS & EVERHART, N. Amer. Pyren. 454, 1892

Cryptodiaporthe denissima (ELL.) WEHM., Univ. Michig. Stud. Sci. Ser. 9:198, 1933

Conidial state: Undetermined species of *Fusicoccum*.

Pustules on bark of cankered or dead stems and twigs; ectostroma fairly distinct, first immersed within epidermal layer of the bark, then erumpent and rupturing the bark epiderm, yellowish brown to pale brown, 0.5∼2 mm in diam., prosenchymatous or pseudoparenchymatous, forming disc with convergent necks, blackened and collapsed in later stage. Perithecia clustered beneath ectostroma in one to two layers or circinately, globular or depressed, 250∼700 μ in diam., with long neck at the top; wall of perithecia composed of several layers of flattened, brown to dark brown, thick-walled cells, innermost cells being hyaline, thin-walled and strongly depressed.

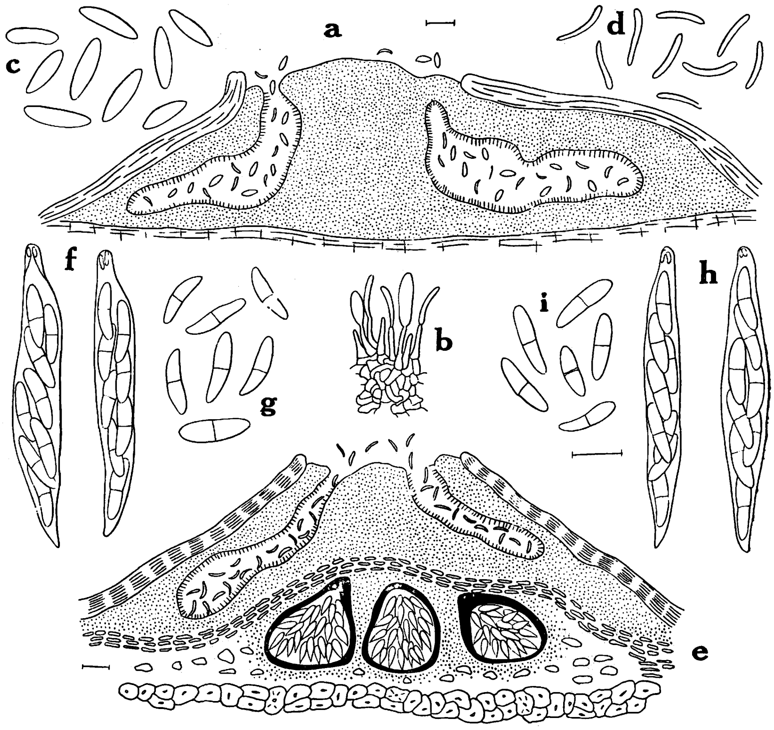

Figure 33. *Cryptodiaporthe raveneliana* (THÜM. et REHM) comb. nov.

a : Pycnidial stroma　b : A part of pycnidial locule producing elliptic and crescent types of conidia　c : Elliptic type of conidia　d : Crescent type of conidia　e : Perithecial stroma having pycnidial locule　f, h: Asci and ascospores　g, i: Ascospores　b, e, f, g: On *Quercus serrata*　a, c, d, h, i: On *Quercus mongolica* var. *grosseserrata*　(⊢⊣ : a, e=100 μ; b∼d, f∼i=10 μ)

Necks cylindric, dark brown, 150～1300 μ in length, penetrated by a pore furnishing periphyses; wall composed of prolonged prosenchymatous cells. Asci clavate or cylindric-clavate, thin-walled, with thickened tip furnishing apical ring, 35～70×6～10 μ in size and 48×7.7 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores fusoid somewhat acute at the lower end, usually inaequilateral or curved, 2-celled, often somewhat unequally but not apiosporous, usually not constricted, 10～16.5×2.5～5 μ in size, mostly 11.5～15×3～4 μ and 13×3.3 μ in average, without appendage.

Conidial state develops separately or sometimes simultaneously with the perfect state. Conidial stroma is yellowish brown, prosenchymatous or pseudoparenchymatous, irregularly ruptures the bark epiderm by the elevation of the stromatic tissue. Pycnidial locule is uni- to multi-locular, remaining central sterile part; wall of locule is indistinct, only distinguishable from the surrounding stromatic tissue by the several layers of flattened and hyaline cells. Conidiophores are simple, erect, hyaline, 7.5～10 μ in length. Two types of conidia are produced, one of which is elliptic to fusoid, unicellular, hyaline, 11.5～15×3～4 μ in size and 13×3.2 μ in average; the other is cylindric to allantoid or crescent, unicellular, hyaline, 9～14×1.5～2 μ in size and 11.3×1.6 in average.

Host and Material: *Quercus mongolica* var. *grosseserrata* (BL.) REHD. et WILS. (Mizunara)—Tsumagoi, Gunma, IX-23, 1960, by T.U. (FPH-885); Kamabuchi, Yamagata, X-2, 1960, by T.K. (FPH-880); Mt. Nishidake, Nagano, VIII-30, 1963, by T.K. (FPH-2310); Mt. Keicho, Tochigi, VII-14, 1964, by T.K. (FPH-2446, 2461); Komoro, Nagano, IX-, 1965, by Y. ZINNO (FPH-2892); Inawashiro, Fukushima, IX-28, 1965, by Y. ZINNO (FPH-2652). *Quercus serrata* THUNB. (Konara)—Komayama, Kanagawa, V-31, 1959, by T.K. (FPH-2880); Kamikano, Shizuoka, VII-8, 1959, by

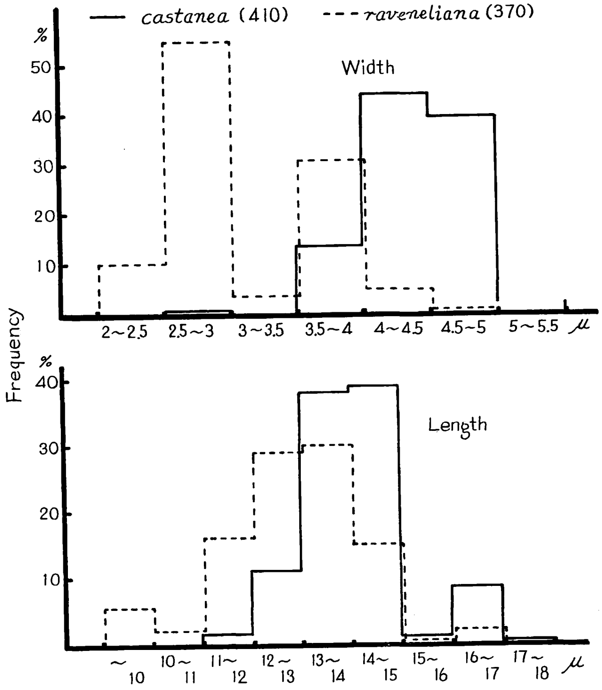

Figure 34. Histogram of width and length of ascospore in two similar species of *Cryptodiaporthe*. (Total account of measured ascospore)

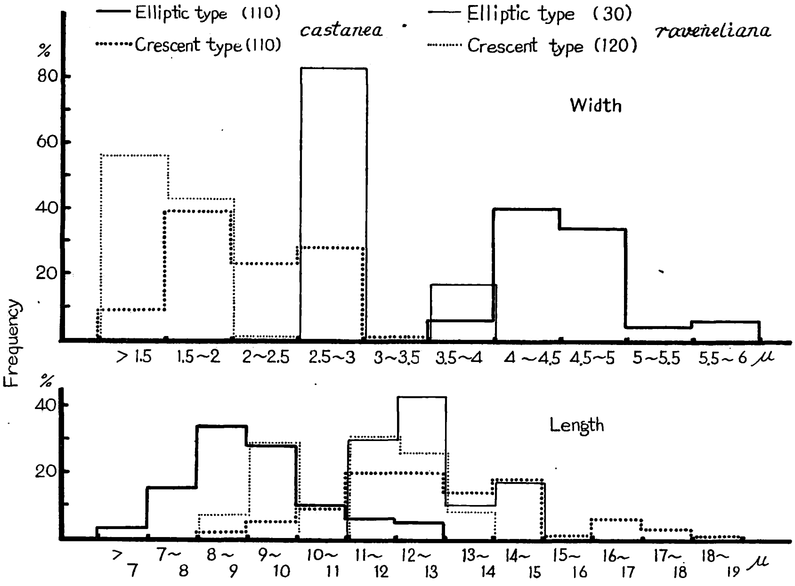

Figure 35. Histogram of width and length of both elliptic and crescent type of conidia in two similar species of *Cryptodiaporthe*. (Total account of measured conidia)

T.K. (FPH-2961); Chichibu, Saitama, V-2, 1930, by T.K. (FPH-861); Misugi, Mie, IX-6, 1965, by T.K. (FPH-2699). *Quercus dentata* THUNB. (Kashiwa)—Kamabuchi, Yamagata, X-2, 1960, by T.K. (FPH-1141). *Quercus myrsinaefolia* BL. (Shirakashi)—Kameyama, Chiba, V-10, 1954, by T.K. (FPH-360).

Conidial state only: *Quercus mongolica* var. *grosseserrata*—Oneyama, Gumma, V-27, 1962, by H. HAYASHI (FPH-401); Tomakomai, Hokkaido, VII-9, 1965, by O. CHIBA (FPH-3262). *Quercus serrata*—Kamikano, Shizuoka, VI-, 1960, by T.U. (FPH-1150). *Quercus dentata*—Wada, Nagano, IX-, 1960, by T.K. (FPH-1284).

Distribution: Asia (Japan) and North America.

Note: Fungus on Japanese oak is much like *Cryptodiaporthe castanea* (TUL.) WEHM., but it is distinguishable from the latter by the somewhat unequal and curved ascospore having no appendage and the yellowish brown ectostroma (Figures 30, 34 and 35). On *Quercus*, two similar Diaporthaceous fungi to Japanese fungus are found, that is *Cryptodiaporthe denissima* (ELL.) WEHM. and *Diaporthe leiphaemia* (FR.) SACC. In *Cryptodiaporthe denissima*, general features and size of ascus and ascospore are identical with the present fungus, though no conidial state was reported on it (WEHMEYER 1933). *Diaporthe leiphaemia* which widely distributes throughout Europe is also similar to the present fungus in its general features, especially the type of conidial state and structure and colour of ectostroma (WEHMEYER 1933, MUNK 1957). According to WEHMEYER (1933), *Diaporthe leiphaemia* has two kinds of conidia but there is no experimental proof on the relationship between the perfect and imperfect fungi. These conidia are quite similar to those of the present fungus. However, ascospore of *Diaporthe leiphaemia*, 15~22 μ in length, is larger than that of Japanese fungus. On the other hand, *Diaporthe leiphaemia* var. *raveneliana* (THÜM. et REHM) WEHM. was differentiated in America from *D. leiphaemia* by its shorter, 12~16 μ, and less curved ascospore (WEHMEYER 1929, 1933). According to WEHMEYER (1929), this variety produced two types of conidia not only on host plant but also on agar media. Conidia described by him are quite identical with those of Japanese fungus. His alpha conidium corresponds to the elliptic type of conidium of Japanese fungus and beta conidium to the allantoid one. Judged from the morphological characters of the perfect and imperfect states, the present fungus is identified as *Diaporthe leiphaemia* var. *raveneliana*. However, it seems to be more realistic to conclude, from the nature of its imperfect state and lack of the blackened zone within the bark tissue, that the fungus belongs to the genus *Cryptodiaporthe*. As noted by WEHMEYER (1933), *Diaporthe leiphaemia* and its variant *raveneliana* lack the blackened zone within the bark tissue surrounding perithecial group and producing atypical type of conidia, being different from the common *Phomopsis* type of conidia of *Diaporthe*. Both elliptic and allantoid type of conidia in the present fungus can germinate quite well, though WEHMEYER did not mention germinability of alpha and beta conidia in *Diaporthe leiphaemia* var. *raveneliana*. Therefore, the callings of alpha and beta conidium to such imperfect state seems to be inadequate. Elliptic and allantoid conidium do not correspond to alpha and beta conidium of *Phomopsis* in which beta conidium has been reported to be ingerminable. Difference in the size of ascospore between *Diaporthe leiphaemia* and its variety *raveneliana* is considered to be sufficient to justify separating them into two independent species respectively, though no material corresponding to *D. leiphaemia* has been collected in Japan. In view of the foregoing, the present author treats *Diaporthe leiphaemia* var. *raveneliana* as an independent species of the genus *Cryptodiaporthe*, namely *C. raveneliana* (THÜM. et REHM) comb. nov. *Cryptodiaporthe denissima* (ELL.) WEHM. is also treated as a synonym of *C. raveneliana*.

Imperfect fungi recorded presumably as the conidial state of *Diaporthe leiphaemia* are quite similar to those of *Cryptodiaporthe raveneliana*. The question of whether conidial state of *Diaporthe* is really accordant with these imperfect fungi or not would be answered by further cultural studies. Therefore, the species name of the imperfect state of *Cryptodiaporthe raveneliana* must remain undetermined until this problem is cleared up.

Ascospore and conidium, both elliptic and allantoid type, easily germinated and the cultures developed from them showed no difference in their characters. Growth of the colony was relatively slow. White and flat colony was first formed, then it became uneven and gray to dusty brown. Small sphaeric bodies were produced on the marginal area of the colony within two months after isolation. From these bodies, slimy masses of conidia oozed out and ultimately almost the entire surface of the colony was covered with the slimy film of conidia. Only the allantoid type of conidia was produced on culture. Their size, 10～19×1.5～3 μ and 13.6×2.2 μ in average, as well as shape were quite variable, and many intermediate types of conidia between elliptic and allantoid conidia found on host plant were observed. Typical elliptic type of conidia was not produced after all on potato-sucrose agar, though WEHMEYER (1929) obtained them on oat agar and on sterilized twigs.

3) ***Cryptodiaporthe acerinum*** **REID et CAIN**, Can. Jour. Bot. 40:839, 1962—(Figure 36; Plate IX: F～I)

Synonym: *Cryptodiaporthe myinda* sensu WEHM., Univ. Michig. Stud. Sci. Ser. 9:199, 1933

Conidial state: *Discella* sp.

Pustules on bark of dead branches, small, 0.5 mm in diam., erumpent through epidermal layer as angular to irregular rupture exposed black disc with necks. Ectostroma visible only around the neck. Perithecia single or in small group, globular, somewhat depressed at the bottom, 350～1100 μ in diam., with black neck at the top; wall constituted from two layers of cell, outer layer composed

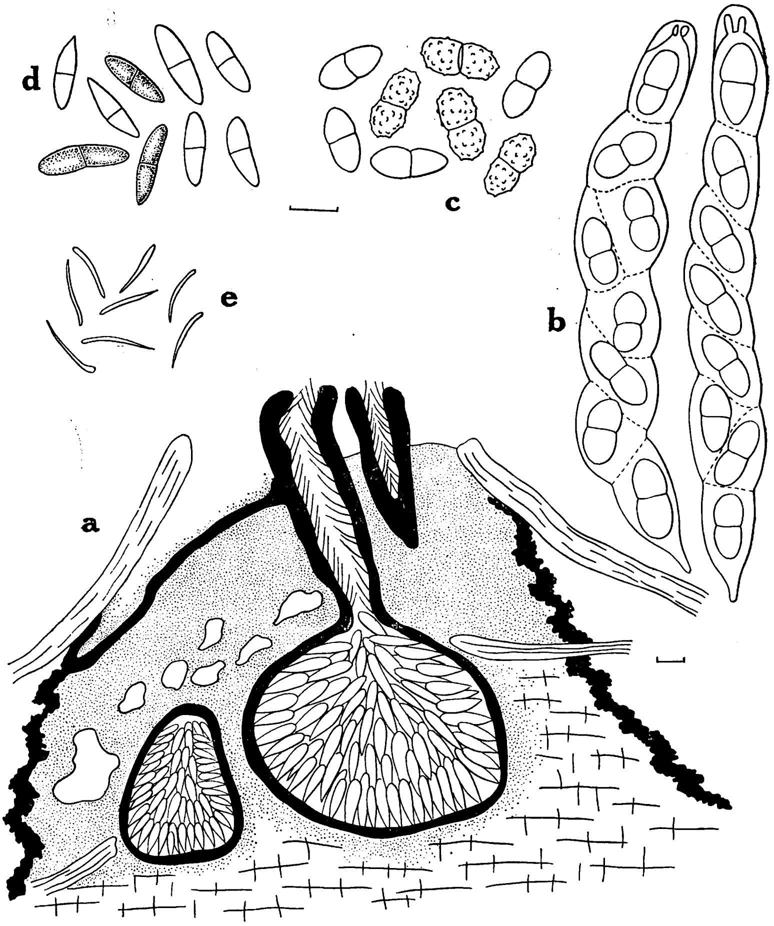

Figure 36. *Cryptodiaporthe acerinum* Reid et Cain

a : Perithecial stroma showing decomposed conidial layer　b : Asci and ascospores
c : Ascospores showing echinulation　d : Conidia produced on culture showing hyaline and coloured state　e : Beta conidia produced on culture

(└─┘: a=100 μ; b～e=10 μ)

of slightly flattened, dark, thick-walled cells; inner one composed of strongly flattened, hyaline, thin-walled cells. Necks cylindric, 500～1,200 μ in length, composed of dark, vertically elongate, thick-walled cells, penetrated by a pore furnishing hyaline periphyses. Asci cylindric to oblong-clavate, thin-walled with thickened tip furnishing apical ring, 83～134×11.5～17.5 μ in size and 107×15 μ in average, 8-spored, loosed irregularly in perithecium. In early stage ascus divided into eight parts by the thick envelope surrounding each ascospore, but these divisions and hyaline envelope disappear at later stage. Ascospores irregularly uniseriate or biseriate, elliptic to fusoid, rounded at the ends, straight or somewhat inaequilateral, 2-celled, hyaline, smooth and not constricted when young, fine echinulate and constricted at the septum in full maturity, 12.5～20×5～7.5 μ in size and 16×6.1 μ in average.

Conidial state was not collected on the host plant. On culture, two types of conidia are produced in the small sphaeric bodies which later widely open their upper part. One of them is alpha conidia and is fusoid to long fusoid, straight or curved, hayline to pale greenish brown, 2-celled, 15～25×5～5.5 μ in size and 20×5.1 μ in average. The other is beta conidium and is filiform, straight or curved, hyaline, unicellular, 10～16.5×0.8 μ in size and 12.6×0.8 μ in average.

Host and Material: *Acer palmatum* var. *matsumurae* (KOIDZ.) MAKINO (Yama-momiji)—Karuisawa, Nagano, IX-, 1965, by T.K. (FPH-2628); Hakone, Kanagawa, X-, 1965, by T.K. (FPH-2695)

Distribution: Asia (Japan) and North America.

Note: On *Acer*, six species of *Cryptodiaporthe* and five epecies of *Diaporthe* have been known (WEHMEYER 1933). Among them, all species of *Diaporthe* distinctly differ from the present fungus by their *Phomopsis* type of conidia and smaller ascospores. *Cryptodiaporthe denissima* var. *spicata* (ELL. et EV.) WEHM. and *C. lebiseyi* (DESM.) WEHM. are different from the present fungus by their smaller ascospores and conidia. *Cryptodiaporthe magnispora* (ELL. et EV.) WEHM. and *C. niesslii* (KZE.) WEHM. also differ from the fungus in question by their far larger ascospores. *Cryptodiaporthe hystrix* (TODE) PETR. is somewhat similar to this fungus, but it differs from the latter by its narrower and smooth ascospores, *Septomyxa* type of conidia, and necks protruding from the bark surface.

The present fungus is quite identical with *Cryptodiaporthe acerinum* REID et CAIN in its morphology of the perfect state. According to REID and CAIN (1962), *Cryptodiaporthe acerinum* produces conidial state on the host plant and the relationship between the conidial and ascigerous states was confirmed through the cultural experiment. Conidia reported by them are hyaline, fusoid, two-celled, 10～26×3～4.5 μ in size. Junged from their description and photograph, the conidial state may belong to the form-genus *Discella*. Japanese fungus produced similar shape of conidia on the isolate from ascospore, though these conidia were somewhat wider and of pale greenish colour in a later stage than those reported by REID and CAIN. This conidial state may also belong to *Discella*, judging from the type of pycnidia produced on culture. Therefore, the present fungus is identified as *Cryptodiaporthe acerinum* REID et CAIN. No other species having echinulate ascospore has been known among the species of *Cryptodiaporthe*.

4) ***Cryptodiaporthe aubertii*** **(WESTENDORP) WEHMEYER**, Univ. Michig. Stud. Sci. Ser. 9:202, 1933—(Figure 37; Plate X: A, B)

Synonym: *Sphaeria aubertii* WEST., Bull. Acad. Roy. Belg. Ser. II, 7:15, 1864
Diaporthe aubertii (WEST.) LAMB., Fl. Myc. Belg. 2:283, 1880; SACCARDO, Syll. Fung. 1:666, 1882
Diaporthe wibbei NIT., Pyren. Germ. 305, 1867; SACCARDO, Syll. Fung. 1:666, 1882; WINTER, Rabh. Kryptgfl. I, 2:633, 1887; ELLIS & EVERHARTT, N. Amer. Pyren. 457, 1892
Diaporthe prominula BOMM. et al., Contr. Myc. Belg. 2:197, 1885; SACCARDO, Syll. Fung. 9:721, 1891

Conidial state: Undetermined species of *Pseudodiplodia* KARST. or *Didymosporium* NEES

Pustules on bark of dead branches and twigs; 0.5 mm in diam.; ectostroma scanty, only visible at basal portion of the conidial layer, through which necks erupt. Perithecia embedded singly or in small group within upper bark tissue, globular, about 600 μ in diam., with neck at the top; wall composed of several layers of dark, flattened, thick-walled cells, innermost cells being hyaline. Asci clavate, with apical ring at thickened tip, 53～63×7.5～11.5 μ in size and 59.3×9.6 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to fusoid, straight or inaequilateral, hyaline, 2-celled, constricted at the septum in full maturity, 15～17.5×3～4 μ in size and 16.5×3.2 μ in average.

Conidial state was not collected on the host plant. On culture, two types of conidia are

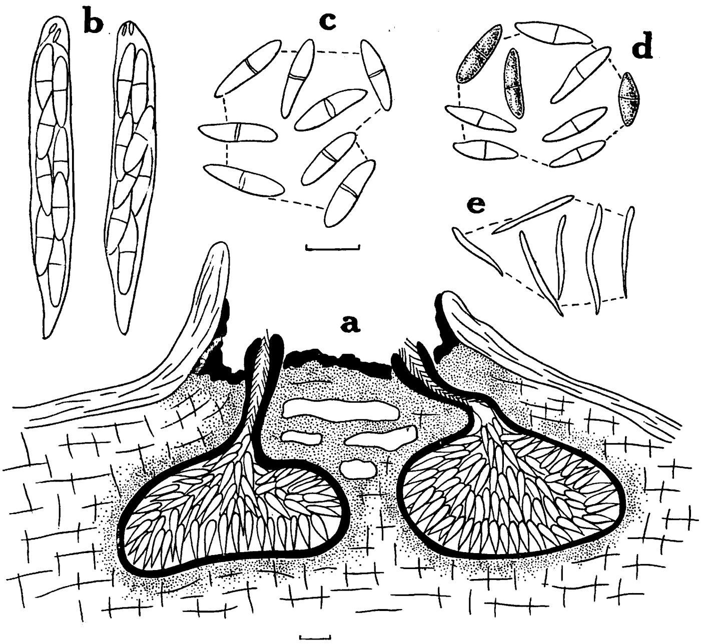

Figure 37. *Cryptodiaporthe aubertii* (West.) Wehm.
a : A perithecial pustule having two perithecia formed beneath empty conidial layer
b : Asci and ascospores　c : Ascospores　d : Conidia produced on culture showing hyaline and coloured stage　e : Beta conidia produced on culture
(⌴ : a=100 μ; b～e=10 μ)

produced; one is germinable, first hyaline and later turn brownish, elliptic to fusoid, straight or inaequilateral, 2-celled, 11.5～15×2～3 μ in younger hyaline stage and 14～16.5×3～4.5 μ in size and 14.9×3.6 μ in average in later coloured stage; the other beta ingerminable conidia is slender, filiform to acicular, unicellular, hyaline, 13～18×0.8 μ in average.

Host and Material: *Sorbus alnifolia* (Sieb. et Zucc.) Koch (Azuki-nashi)—Mt. Fuji, Narusawa, Yamanashi, VI-8, 1962, by T.K. (FPH-1904, 1906).

Distribution: Asia (Japan), Europe and North America.

Note: Only empty conidial layers were observed on the present material. On culture isolated from ascospore two types of conidia were produced. This conidial state may belong to the form-genus *Pseudodiplodia* Karst. or *Didymosporium* Nees, judging from the two-celled and coloured conidia produced on culture, and the empty layers of excipulaceous or melanconiaceous cavities found on the host plant.

Among the hitherto known *Cryptodiaporthe*, *C. aubertii* var. *comptoniae* (Schw.) Wehm. has the conidial state alike to such conidia as the present fungus. According to Wehmeyer (1927), conidia of *Cryptodiaporthe aubertii* var. *comptoniae* were produced in locular cavities on agar media and on sterilized twigs, and they were two-celled, hyaline but blackish in mass, and had appendage at the tip. This conidial state was identified as the species of *Neobarclaya* Sacc. of Melanconiaceae by him. Morphological characters of the perfect state of the present fungus is quite identical with *Cryptodiaporthe aubertii* (West.) Wehm. of which no record of the imperfect state has been found. Difference between *Cryptodiaporthe aubertii* and its variety *comptoniae* is the size of ascospore.

Ascospore of the former are reported to be 13.5～17.5×2.5～5 μ, while those of the latter 9.5～13.5×3.5～5 μ. The present fungus is identified as *Cryptodiaporthe aubertii* based on the agreement of the morphological characters of the perfect state and the similarity in the type of conidial state to that of *C. aubertii* var. *comptoniae.* No identical species with the present conidial state was found among the genera *Pseudodiplodia* and *Didymosporium.* However, it seems to be appropriate that determination of the genus or the species of the present conidial state be retained until good material is obtained on the host plant.

Ascospore of the fungus easily germinated and developed its colony on potato-sucrose agar. Growth of the colony was relatively fast. Colony was first white and flat with white felty aerial mycelia, then became gray to fuscous and uneven, and covered with woody brown-coloured aerial mycelia. On the surface of the colony, irregular, small and sphaeric bodies were numerously produced within one to two months after isolation. Conidia were produced in these bodies which opened widely later in their upper part exposing mucous conidial masses. Ultimately, large mucous drops of conidia were scattered on the surface of the colony.

5) ***Cryptodiaporthe aculeans*** (SCHWEINITZ) WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9:212, 1933—(Figure 38; Plate X: C, D)

Synonym: *Sphaeria aculeans* SCHW., Syn. Amer. Bor. 1399, 1832
Calospora aculeans (SCHW.) SACC., Syll. Fung. 2:233, 1883
Valsa (*Calospora*) *aculeans* (SCHW.) CKE., Grev. 14:54, 1885
Cryptospora aculeans (SCHW.) ELL. et EV., N. Amer. Pyren. 535, 1892
Diaporthe aculeans (SCHW.) HÖHN., Ann. Myc. 16:108, 1918
Sphaeria rufescens SCHW., Syn. Amer. Bor. 1395, 1832
Valsa albovelata BERK. et CURT., Grev. 4:102, 1876
Diaporthe albovelata (BERK. et CURT.) SACC., Syll. Fung. 1:615, 1882

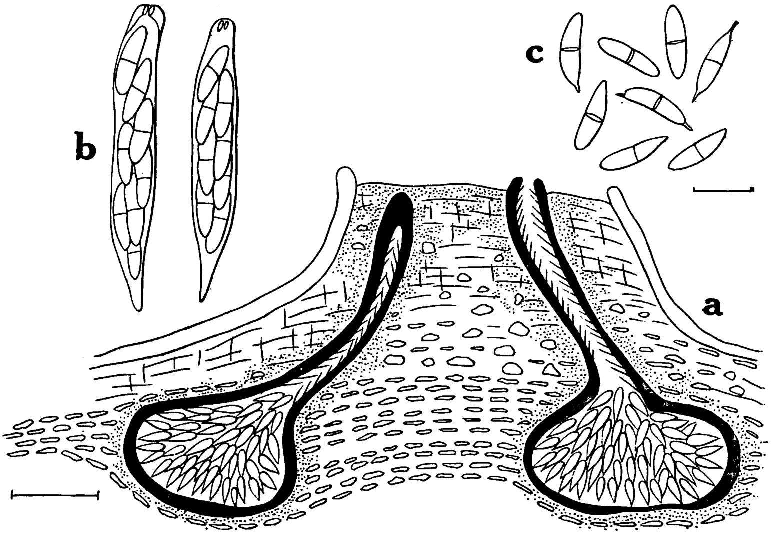

Figure 38. *Cryptodiaporthe aculeans* (SCHW.) WEHM.
a : Perithecial pustule b : Asci and ascospores c : Ascospores
(⊢—⊣ : a=100 μ; b, c=10 μ)

Valsa stilbostoma CKE. (non FRIES), Handb. Brit. Fung. 2498, 1871

Diaporthe stilbostoma (CKE.) SACC., Syll. Fung. 1:615, 1882

Diaporthe rauina WINT., Hedwigia 22:130, 1883

Diaporthe inornata PECK, Rept. N.Y. St. Mus. 65:47, 1911

Chorostate inornata (PECK) SACC., Syll. Fung. 24:748, 1928

Conidial state: Undetermined.

Pustules on bark of dead twigs, blackish, covered with white powdery substance; ectostroma scanty around necks, elevated conic to angular, with converged necks. Perithecia embedded within bark tissue, surrounded by loose entostromatic hyphae effusing residual tissue of substratum, globular to flattened at the base, 250～500 μ in diam., with neck at the top. Necks cylindric, black, 300～900 μ in length, penetrated by a pore furnishing hyaline periphyses. Asci clavate, with apical ring at thickened tip, 43～52×7～9 μ in size and 46.5×7.5 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, fusoid, 2-celled, constricted at the septum in full maturity, hyaline, 11～15.5×2.5～4 μ in size and 12.6×3.3 μ in average, with short appendage at the ends; appendages hyaline, 2.5～5 μ in length, often evanescent in later matured stage.

Host and Material: *Rhus javanica* L. (Nurude)—Masutomi, Yamanashi, VIII-25, 1961, by T.U. (FPH-1248).

Distribution: Asia (Japan) and North America.

Note: According to WEHMEYER (1933), *Cryptodiaporthe aculeans* produced variable types of conidial state on sterilized twig and on agar media. On the sterilized twigs, sporodochia type and locular type of conidial fruiting bodies were produced, while quite variant fruiting bodies from sporodochial type to locular type were observed on oatmeal agar. On the other hand, culture isolated from ascospore of Japanese material did not produce such conidial state on potato-sucrose agar. Growth of its colony was relatively slow. Surface of the colony was quite uneven and dark greenish brown to dark gray. Many small sphaeric bodies were produced on the colony, but they did not mature after all. So, the conidial state of Japanese fungus was not confirmed. However, there is no species identical with the present fungus among the species of *Cryptodiaporthe* or *Diaporthe* other than *C. aculeans*. *Diaporthe spiculosa* (ALB. et SCHW.) NIT. is somewhat similar to the present fungus, but it differs from the latter by the presence of the blackened zone within substratum and lack of appendage of ascospore. From these facts, the Japanese fungus is identified as *Cryptodiaporthe aculeans*.

6. ***Diaporthe*** NITSCHKE, Pyren. Germ. 240, 1870; SACCARDO, Syll. Fung. 1:606, 1882; WINTER, Rabh. Kryptgfl. I, 2:599, 1887; ELLIS & EVERHBRT, N. Amer. Pyren. 423, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1:462, 1897; WEHMEYER, Amer. Jour. Bot. 13:638, 1926; Univ. Michig. Stud. Sci. Ser. 9:14, 1933; MUNK, Dsk. Bot. Ark. 15(2):87, 1953; 17(1):252, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33:343, 1959; DENNIS, Brit. cup fungi, 191, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2):760, 1962

Type species: *Diaporthe eres* NIT.

Synonym: *Chorostate* (SACC.) TRAV., SACCARDO, Syll. Fung. 1:607, 1882 (subgenus); TRAVERSO, Fl. Ital. Crypt 2:190, 1906

Stigmatopsis TRAV., Fl. Ital. Crypt. 2:213, 1906; SACCARDO, Syll. Fung. 22:389, 1913

Septomazzantia THEISS. et SYD., Ann. Myc. 13:113, 1915

Clypeoporthe HÖHNEL, Sitz. Kais. Akad. Wiss. Wien, Math. naturw. Kl. I, 128:584, 1919
Allantoporthe PETRAK, Hedwigia 62:289, 1921
Skottsbergiella PETR. ap. KEISSLER, Nat. Hist. J. Fern. & Easter Is. 2:481, 1927
Clypeorhynchus KIRSCHST., Ann. Myc. 34:190, 1936
Melanoporthe WEHM., Rev. Mus. de La Plata 2:84, 1938

Conidial state: *Phomopsis* SACCARDO

Pustules on bark, often on cankered bark, immersed at first, then erumpent through bark epiderm; ectostroma variable, none to rich, sometimes forming gray to black disc with convergent necks, usually prosenchymatous, limited to peridermal layer, sometimes continuously fused to entostromatic hyphal twines surrounding perithecia. Blackened zone usually present above the perithecia and within the bark or wood, often enveloping entirely one to several groups of perithecia, scattered or clustered in group, embedded within bark tissue or partly in wood, globular or depressed at the bottom, with neck at the top; wall membranaceous, dark brown to black, usually constituted from two layers of cell, outer layer composed of thick-walled, isodiametric or slightly flattened, dark-coloured cells, inner one composed of flattened, hyaline, thin-walled cells. Necks converged densely or loosely, erumpent through periderm or pycnidial stroma, composed of elongated and plectenchymatous cells, pierced by a pore furnishing hyaline periphyses. Asci clavate to cylindric-clavate, with thin membrane excepting swollen tip furnishing distinct apical ring, usually 8-spored, loosed irregularly in perithecium. Ascospores usually biseriate, elliptic to fusoid, obtuse or acute at the ends, straight or inaequilateral to slightly curved, 2-celled, constricted at the septum or not, often tapered toward the end of lower cell, but not apiosporous, hyaline, with or without appendage.

Conidial state of almost all species of the genus belongs to the form-genus *Phomopsis* and the formation of pycnidial bodies usually precedes to the perithecial formation. Pycnidial stroma is prosenchymatous, hyaline to pale brown, first immersed within peridermal layer, then erumpent through epiderm forming hemisphaeric or angular pustules, lysigeneously form conidial locule without distinct wall; locule is linear to mouth-like with the central pore. Conidiophores arise from the innermost cells of locule, and are simple, hyaline. Two types of conidia are usually produced, one of which is the so-called alpha conidium or A-spore, and is elliptic to fusoid, straight, unicellular, hyaline; the other is beta conidium or B-spore and usually filiform or acicular, sometimes band-like, straight or hooked, unicellular, hyaline, ingerminable.

The genus *Diaporthe*, the type genus of Diaporthaceae, constitutes the largest fungous group in this family, though many species have been segregated from this genus to establish a related new genera. Some of these genera once segregated were united again with *Diaporthe* following critical restudy on their characters by later investigators.

SACCARDO (1882) divided *Diaporthe* into three subgenera, namely Euporthe, Tetrastega and Chorostate, based on the mode of arrangement of perithecia within substrata as well as the presence or absence of blackened zone. WINTER (1887) accepted SACCARDO's subgenera with certain amendation about their differentiating points. In 1906, TRAVERSO segregated Chorostate from *Diaporthe* and allocated the species of subgenus Chorostate into three genera, i.e. *Chorostate* (SACC.) TRAV., *Stigmatopsis* TRAV and *Diaporthe* NIT. Many species of Chorostate accepted by SACCARDO and TRAVERSO, however, were excluded from *Diaporthe* by the later mycologists (e.g. WEHMEYER, HÖHNEL, PETRAK) and remaining species were reunited with the genus *Diaporthe* (WEHMEYER 1933, MÜLLER & ARX 1962).

The genus *Stigmatopsis* TRAV. was differentiated from *Diaporthe* only by its well developed stroma. MÜLLER and ARX considered the developmental type of stroma in *Stigmatopsis* to be an invalid characteristic to separate it from *Diaporthe*, and treated *Stigmatopsis* as a synonym of *Diaporthe*.

The genus *Clypeoporthe* was established by HÖHNEL (1919) based on a *Diaporthe*-like fungus on "Sussgras" (Zea ?), to which he gave the name *C. monocarpa*. It was distinguishable from *Diaporthe* by the formation of clypeus in epiderm around neck. *Diaporthe bambusae* PAT. was also placed in *Clypeoporthe* by him. This fungus was restudied by WEHMEYER (1933) and retained in *Clypeoporthe* by reason of its brownish ascospore in later stage, though he did not mention clypeus formation of the fungus. On the other hand, WEHMEYER (1938 b) erected a new genus *Melanoporthe* based on *Diaporthe talae* SPEG. Basis of the genus *Melanoporthe* was the pigmentation of ascospore in fully matured stage. As mentioned in the note of the genus *Melanconis*, pigmentation of ascospore is considered to be invalid criterion for segregation of the genus in Diaporthaceae. It is also observed that clypeus-like structure is generally formed in the species developing definite ectostroma. Therefore, the author agrees with MÜLLER and ARX's treatment, who united again *Melanoporthe* WEHM. and *Clypeoporthe* HÖHN. with the genus *Diaporthe*.

MÜLLER and ARX also considered monotypic genus *Skottsbergiella* PETR. ap. KEISSL. to be synonymous with *Diaporthe*. *Skottsbergiella diaporthoides* PETR. ap. KEISSL. was restudied by them, and transferred to *Diaporthe* with the note that well developed stroma having dark border seemed to be atypical in *Diaporthe* but this stroma was not separable definitely from those of the other species of *Diaporthe*. They considered dark border of the stroma to be a form of blackened zone usually found within bark and wood.

Septomazzantia THEIS. et SYD. based on *Dothidea epitypha* CKE. (THEISSEN & SYDOW 1915) was treated as a synonym of *Diaporthe* for a similar reason that the structure of stroma in *Septomazzantia* was not particularly different from that of *Diaporthe* (HÖHNEL 1918, PETRAK 1954).

PETRAK (1921 b) established a genus *Allantoporthe* based on *Diaporthe tessella* (PERS.) REHM. Chief basis for segregating it from *Diaporthe* is the more or less curved ascospore and the imperfect state considered to be *Discella carbonacea* (FR.) BERK. et BR. This species, however, was replaced in the genus *Diaporthe* by WEHMEYER (1927, 1933) based on the reasons that the curved ascospore was usually observed among the large-spored species of *Diaporthe*, and that relationship between *Diaporthe tessella* and *Discella carbonacea* was proved to be incorrect by the cultural study as already denied by PETRAK (1921 c).

The genus *Clypeorhynchus* was established by KIRSCHSTEIN (1936) and placed in the family Clypeosphaeriaceae. Family Clypeosphaeriaceae had lost its independence (SYDOW 1936) and each member of the family was respectively allocated to its proper position. *Clypeorhynchus* was noted by KIRSCHSTEIN to be similar to the genus *Mamiania* in its general characters. It is characterized by the presence of clypeus and one-celled ascospore. However, PETRAK (1940) pointed out from the examination of the type material of *Clypeorhynchus ater* KIRSCHST. that it may belong to either genera *Diaporthe* or *Diaporthopsis*. ARX and MÜLLER (1954) also examined the authentic material of the fungus and found that ascospore was uni-septate in matured stage. They considered *Clypeorhynchus ater* KIRSCHST. to be synonymous with *Diaporthe arctii* (LASCH) NIT. and included the genus *Clypeorhynchus* in *Diaporthe*.

Great difficulties have been experienced by the mycologists who attempted to identify the fungus belonging to the genus *Diaporthe*, because a large number of species have been described on many host plants. By the effort of WEHMEYER (1926～1933) who critically restudied the genus

Diaporthe and related genera, many species were proved to be synonymous with other species, and as a result the number of the species of genus *Diaporthe* decreased to about seventy species. In WEHMEYER's monograph (1933), small-spored species, such as *Diaporthe eres* NIT. and *D. arctii* (LASCH) NIT., have a large number of synonyms and a wide host range, whereas concept of the large-spored species was relatively definitive and a limited host habitat. GILMAN et al. (1959), DENNIS (1960), MÜLLER and ARX (1962) supported WEHMEYER's treatment, while MUNK (1957) did not accept it. As pointed out by WEHMEYER and MUNK, number of species of this genus may decrease, if detailed comparative studies between the perfect and imperfect states among the large-spored species of *Diaporthe* are conducted through cultural experiments.

In Japan, fourteen species of *Diaporthe* have been listed by HARA (1954) and seven species in "Common names of economic plant diseases in Japan" (Anonymous 1965). Some of them are treated in the following as the synonym of the older species and some others are excluded from the present genus. Differentiating points of the nineteen species of *Diaporthe* found in Japan are presented in the following key and in Figure 39.

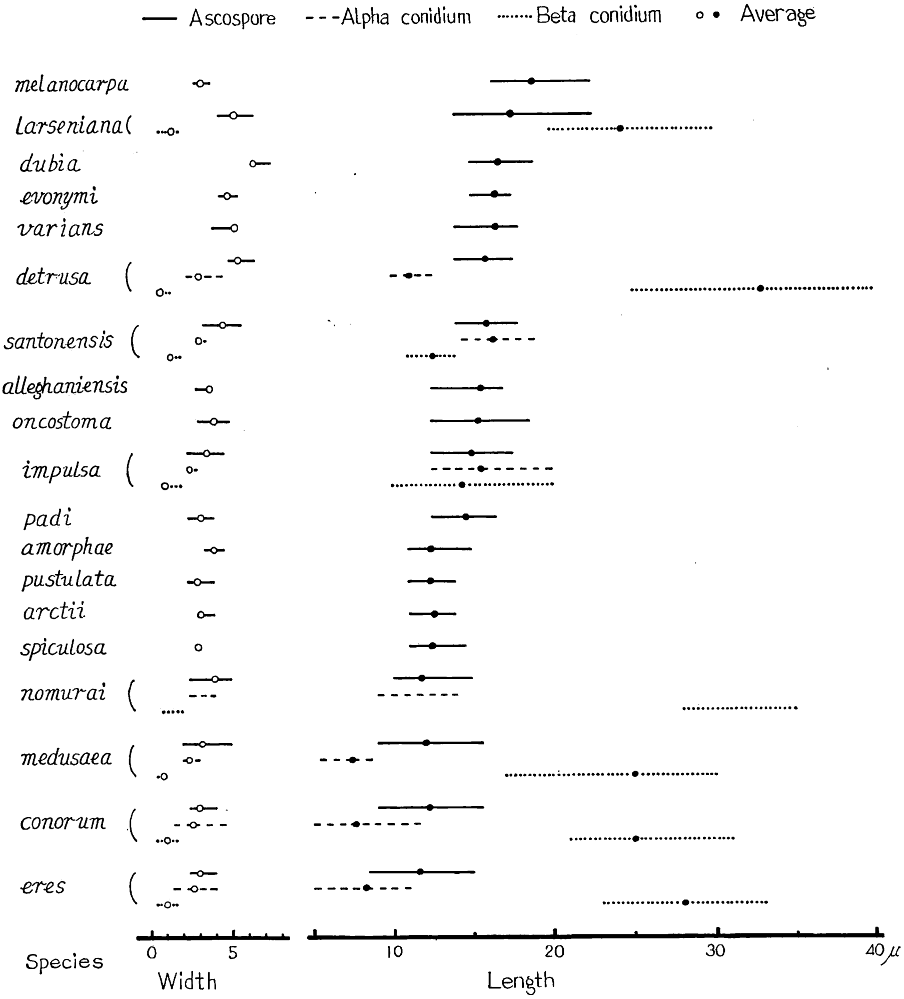

Figure 39. Size of ascospore, alpha conidium, and beta conidium of *Diaporthe* in Japan.

Key to Japanese species of *Diaporthe*

A_1: Ascospore with appendage, 14～18×3.5～4.4μ, beta conidium shorter and wider than usual type, on *Populus* ··················· ***D. santonensis*** (p. 79)
A_2: Ascospore without appendage
  B_1: Ascospore less than 15μ in length
    C_1: Perithecium solitarily embedded or in small group, scattered; neck does not protrude from bark surface
      D_1: On herbaceous stem ··················· ***D. arctii*** (p. 78)
      D_2: On woody bark
        E_1: On broad-leaved tree
          F_1: Alpha conidium 5～11×1.5～4μ ··················· ***D. eres*** (p. 67)
          F_2: Alpha conidium 9～14×2.5～4μ, on *Morus* ··················· ***D. nomurai*** (p. 98)
        E_2: On coniferous tree ··················· ***D. conorum*** (p. 71)
    C_2: Perithecium thickly gregarious
      D_1: Neck long protruded from bark surface, on *Populus*, *Morus* ··················· ***D. medusaea*** (p. 75)
      D_2: Neck not protruded from bark surface
        E_1: On *Acer*, pustulate form apparent, ascospore 11～14×2.5～4μ ··················· ***D. pustulata*** (p. 89)
        E_2: On *Maackia*, pustulate form indistinct, ascospore 11～15×3.5～4.5μ ··················· ***D. amorphae*** (p. 96)
        E_3: On *Rhus*, no pustulate form developed, ascospore 11～14.5×3μ ··················· ***D. spiculosa*** (p. 82)
  B_2: Ascospore 12～18μ in length with about 15μ in average
    C_1: Ascospore less than 4μ in width
      D_1: On *Malus*, ascospore 12.5～16.5×2.5～4μ ··················· ***D. padi*** (p. 94)
      D_2: On *Betula*, ascospore 12.5～17×3～4μ ··················· ***D. alleghaniensis*** (p. 92)
    C_2: Ascospore more than 4μ in width
      D_1: On *Sorbus*, ascospore 12.5～17.5×2.5～4.5μ, alpha conidium 13～20×2.5～3μ ··················· ***D. impulsa*** (p. 95)
      D_2: On *Elaeagnus*, ascospore 12.5～18.5×3～5μ ··················· ***D. oncostoma*** (p. 83)
  B_3: Ascospore more than 15μ in length
    C_1: Ascospore less than 5μ in width
      D_1: On *Betula*, ascospore 16.5～22.5×3～4μ ··················· ***D. melanocarpa*** (p. 93)
      D_2: On *Acer*, ascospore 14～18×4～5.5μ, ascus 84～99×9.5μ··· ***D. varians*** (p. 88)
      D_3: On *Euonymus*, ascospore 15～17.5×4.5～5.5μ, ascus 58～68×9～10μ ··················· ***D. evonymi*** (p. 86)
    C_2: Ascospore more than 5μ in width
      D_1: On conifers, ascospore 14～23×4.5～6.5μ, beta conidium 20～30×1～2μ ··················· ***D. larseniana*** (p. 84)
      D_2: On broad-leaved trees
        E_1: On *Acer*, ascospore 15～19×6.5～7.5μ ··················· ***D. dubia*** (p. 87)
        E_2: On *Hydrangea*, ascospore 14～18×5～6.5μ, beta conidium 25～40×0.5～1.5μ ··················· ***D. detrusa*** (p. 90)

1) ***Diaporthe eres*** NITSCHKE, Pyren. Germ. 245, 1867—(Figures 40 and 41; Plate X: E∼I)—Saccardo, Syll. Fung. 1:631, 1882; Winter, Rabh. Kryptgfl. I, 2:620, 1887; Wehmeyer, Univ. Michig. Stud. Sci. Ser. 9:43, 1933; Munk, Dsk. Bot. Ark. 17(1):268, 1957; Kobayashi & Ito, Bull. Gov. For. Exp. Sta. 103:66, 1957; Gilman et al., Ia. St. Coll. Jour. Sci. 33:346, 1959; Dennis, Brit. cup fungi, 192, 1960; Müller & Arx, Beit. Kryptgfl. Schw. 11(2):761, 1962

Synonym: *Diatrype verrucella* Fries, Sum. Veg. Scand. 385, 1845

Diaporthe verrucella (Fr.) Star., Bih. C.K. Svsk. Vet. Akad. Handl. 19:27, 1894

Diaporthe alnea Fuck. ap. Nit., Pyren. Germ. 312, 1867; Saccardo, Syll. Fung. 1:677, 1882; Winter; Rabh. Kryptgfl. I, 2:629, 1887

Diaporthe exasperans Nit., Pyren. Germ. 289, 1867; Saccardo, Syll. Fung. 1:686, 1882; Winter, Rabh. Kryptgfl. I, 2:644, 1887

Diaporthe insularis Nit., Pyren. Germ. 294, 1867; Saccardo, Syll. Fung. 1:672, 1882; Winter, Rabh. Kryptgfl. I, 2:639, 1887

Diaporthe quercus Fuck., Symb. Myc. Nachtr. 2:36, 1873; Saccardo, Syll. Fung. 1:672, 1882; Winter, Rabh. Kryptgfl. I, 2:643, 1887

Diaporthe magnoliae Ell. et Ev., N. Amer. Pyren. 433, 1892; Saccardo, Syll. Fung. 11:307, 1895

Diaporthe hydrangeae Ell. et Ev., Publ. Field Mus. Bot. Ser. 1:140, 1896; Saccardo, Syll. Fung. 14:548, 1899

Diaporthe theae Hara, Chagyokai 15 (3), 1920; Diseases of tea plant, 199, 1932

Other synonyms vide Wehmeyer (1933)

Conidial state: *Phomopsis oblonga* (Desm.) Höhn., Sitzb. Kais. Akad. Wiss. Wien, Math. naturw. Kl. I, 115:680, 1906; Wehmeyer, Univ. Michig. Stud. Sci. Ser. 9:99, 1933 (=*Phoma oblonga* Desm., *Phoma eres* Sacc., *Phoma alnea* Sacc., *Phoma malbranchei* Sacc., *Phoma imperiales* Sacc. et Roum., *Phomopsis imperiales* (Sacc. et Roum.) Hara.)

Pustules on bark of cankered or dead stems and twigs, small, 0.5∼1 mm in diam., only slightly elevated by the tip of necks, sometimes hardly visible to naked eye. Perithecia singly or in small group, embedded within bark tissue and partly in wood, often beneath the decomposed pycnidial stroma, globular or flattened at the bottom, 200∼550 μ in diam., with neck at the top; wall composed of flattened, dark, thick-walled celles, innermost cells being strongly flattened, hyaline and thin-walled. Necks cylindric, black, 180∼820 μ in length, singly or collectively erumpent through bark periderm or decomposed pycnidial stroma, penetrated by a pore furnishing hyaline periphyses. Blackened zone present within bark and wood, thin, enveloping several perithecial pustules. Asci clavate or cylindric-clavate, with apical ring in the thickened tip, 38∼59×5∼9 μ in size, mostly 40∼45×6∼7.5 μ and 44.5×7 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to fusoid, straight or inaequilateral, narrowly rounded toward the ends, hyaline, 2-celled, slightly constricted at the septum in full maturity, 8.5∼15×2.5∼4 μ in size, mostly 11∼12.5×3∼3.5 μ and 11.5×3.1 μ in average.

Development of conidial state precedes the perithecial formation; pycnidial stroma immerses in peridermal layer of the bark, then breaks through the bark epiderm, elevates hemisphaeric to conic, 1∼2 mm in diam., forms lysigeneously ostiole at the central part of stroma. Conidial cavities first appear as linear crevice, then become mouth-like and open the central pore; wall of cavities is indistinct. Conidiophores arise from innermost layer of locule and are 5∼10 μ in length, hyaline, simple. Two types of conidia are produced acrogeneously on the conidiophores; one is the so-called alpha conidium or A-spore, and is elliptic to fusoid, unicellular, hyaline, 5∼11×1.5∼4 μ in

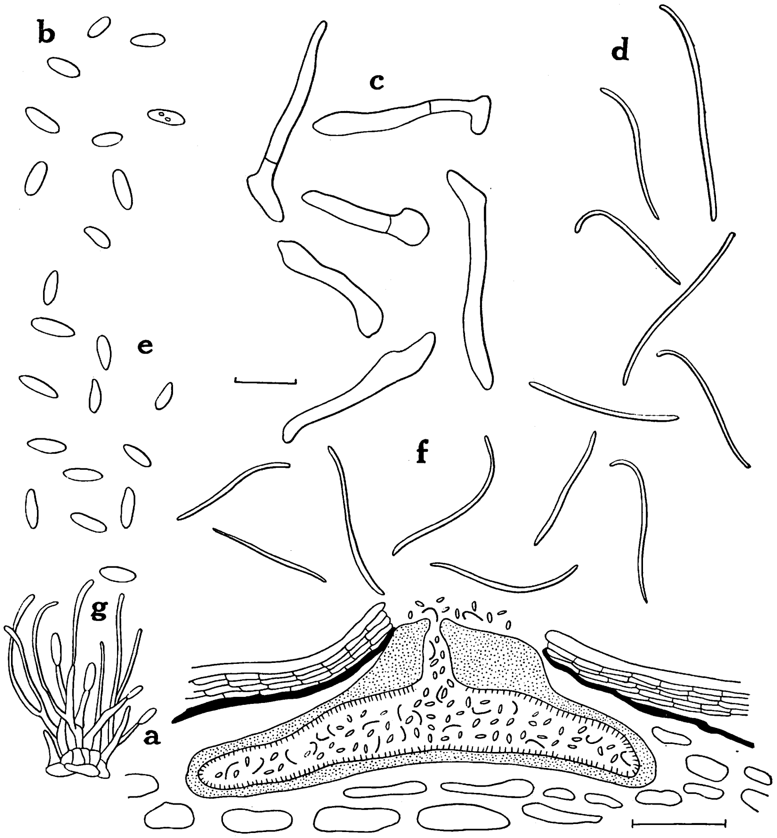

Figure 40. *Diaporthe eres* NIT.

a : Pycnidial stroma on *Juglans* b : Alpha conidia on *Paulownia*
c : Germinating conidia d : Beta conidia on *Paulownia* e : Alpha
conidia produced on culture f : Beta conidia produced on culture
g : A part of pycnidia locule (⊢⊣ : a=100 μ; b～g=10 μ)

size, mostly 7～8.5×2～3 μ and 8.2×2.6 μ in average; the other beta conidium or B-spore is filiform or acicular, straight or hooked, unicellular, hyaline, 23～33×0.5～1.5 μ in size and 27.7×1.1 μ in average.

Host and Material: *Alnus glutinosa* GAERTN. (Ōshu-kuro-hannoki)—Morioka, Iwate, X-6, 1962, by T.K. (FPH-710). *Amorpha fruticosa* L. (Itachi-hagi)—Akanuma, Saitama, X-19, 1965, by T.K. (FPH-2682). *Betula maximowicziana* REG. (Udai-kanba)—Yamabe, Hokkaido, IX-25, 1964, by T.K. (FPH-2064, 2468). *Betula platyphylla* var. *japonica* (MIQ.) HARA (Shira-kanba)—Asakawa, Tokyo, III-23, 1961, by T.K. & T.U. (FPH-965). *Clerodendron trichotomum* THUNB. (Kusagi)—Asakawa, Tokyo, VI-6, 1961, by T.K. (FPH-1271). *Hydrangea paniculata* SIEB. (Nori-utsugi)—Amagi-Pass, Shizuoka, VII-7, 1959, by T.K. *Hypericum galioides* LAM. (Hosoba-kinshibai)—Meguro, Tokyo, V-12, 1959, by T.K. & Y. MAMIYA (FPH-900). *Juglans ailanthifolia* CARR. (Oni-gurumi)—Asakawa, Tokyo, III-13, 1961, by T.K. *Liriodendron tulipifera* L. (Yurinoki)—Meguro, Tokyo, II-2, 1960, by T.K. (FPH-878). *Magnolia kobus* DC. (Kobushi)—Karuisawa, Nagano, IX-21, 1965, by T.K. (FPH-2934). *Melia azadarach* L. (Sendan)—Meguro, Tokyo, V-12, 1960, by T.K. & T.U. (FPH-

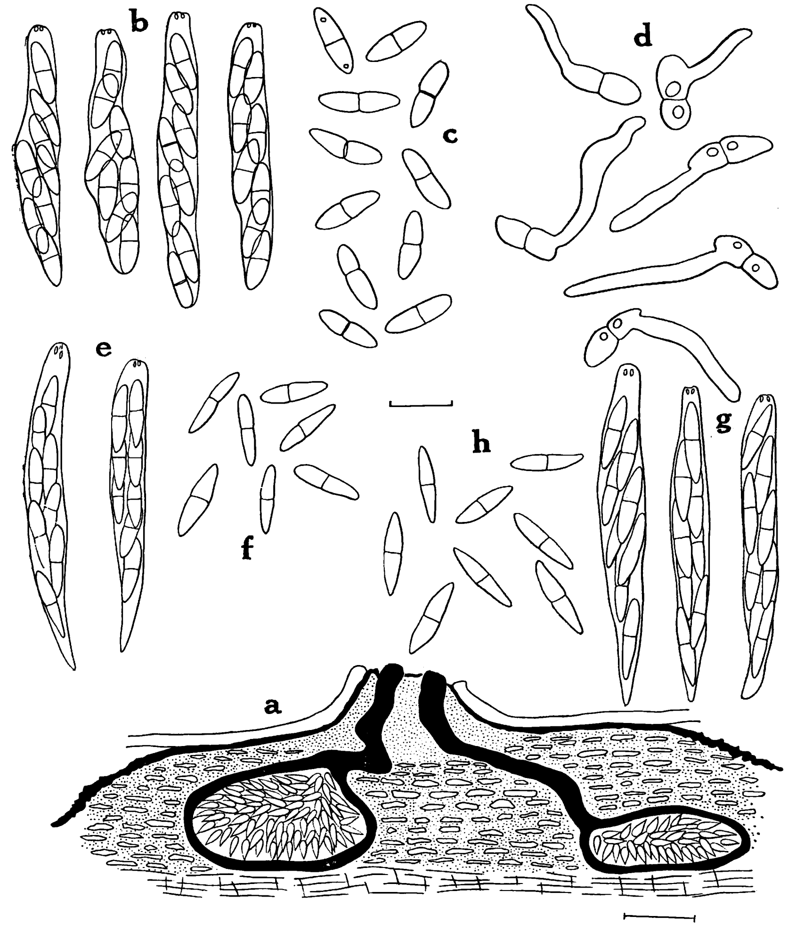

Figure 41. *Diaporthe eres* Nit.

a: Perithecial stroma on *Melia*　　b, e, g: Asci and ascospores
c, f, h: Ascospores　d: Germinating ascospores　b∼d: On *Paulownia*
e, f: On *Betula*　g, h: On *Hydrangea*　(⊢⊣ : a=100 μ; b∼h=10 μ)

920). *Paulownia tomentosa* (Thunb.) Steud. (Kiri)—Meguro, Tokyo, II-22, 1951, by T.K. (FPH-1192). *Quercus acutissima* Carr. (Kunugi)—Meguro, Tokyo, X-, 1959, by T.K. (FPH-3018). *Thea sinensis* L. (Cha)—Shimizu, Shizuoka, XI-22, 1918, by K. Hara (NSM-Hara, Type of *Diaporthe theae* Hara); Rokugo, Shizuoka, II-, 1921, by K. Hara (NSM-Hara, 209514, Paratype of *Diaporthe theae*). *Zelkowa serrata* Max. (Keyaki)—Asakawa, Tokyo, III-22, 1960, by T.K. (FPH-1353).

Conidial state only: *Alnus hirsta* var. *sibirica* Schn. (Yama-hannoki)—Meguro, Tokyo, V-12, 1959, by T.K. (FPH-1037). *Alnus incana* Willd.—Koshunai, Hokkaido, IX-23, 1964, by T.K. (FPH-2439). *Betula ermanii* Cham. (Dake-kanba)—Koshunai, Hokkaido, IV-20, 1962, by T. Oguchi. *Betula lenta* L.—Kuriyama, Hokkaido, IX-22, 1964, by T.K. (FPH-2470); Yamabe, Hokkaido, IX-25, 1964, by T.K. (FPH-2462). *Betula pubescens* Ehrh.—Koshunai Hokkaido, IX-23, 1964, by T. K. (FPH-2612). *Juglans regia* var. *orientes* (Dode) Kitam. (Teuchi-gurumi)—Meguro, Tokyo, V-12, 1959, by T.K. (FPH-914). *Magnolia obovata* Thunb. (Hoonoki)—Karuisawa, Nagano, IX-21, 1965, by T.K. (FPH-2626, 2881). *Melia azadarach*—Asakawa, Tokyo, V-, 1962, by T.K. *Orixa japonica* Thunb. (Ko-kusagi)—Asakawa, Tokyo, V-24, 1960, by T.K. (FPH-909). *Paulownia* *tomentosa*—Meguro, Tokyo, V-31, 1950, by T.K. (FPH-120). *Quercus mongolica* var. *grosseserrata* (BL.) REHD. et WILS. (Mizu-nara)—Meguro, Tokyo, V-12, 1960, by T.K. (FPH-911).

Distribution: Asia (Japan), Europe and North America.

Note: As pointed out by WEHMEYER (1933) and MUNK (1957), identification on the small-spored species of *Diaporthe* is difficult. Large variations are generally observed among these species in the developmental form of the ectostroma and aggregation of the perithecia within the bark, chiefly depending on the condition of the bark and kinds of host plants. In most of these species, the imperfect state has not yet been proved experimentally. If relationship between the perfect and imperfect states are proved clearly in all of the small-spored species, the number of species separated by WEHMEYER may decrease, owing to combining them with a larger species having a wider host range. The present author identified here many materials collected on various tree species in Japan as *Diaporthe eres* NIT. sens. WEHM. based on their common characters; namely, a few perithecia constituting a loose group within the bark, the enclosed black zone enveloping several perithecial groups, the loose hyphal element around the neck and perithecium instead of compact stromatic tissue, and, of course, accordance of the size of ascus and ascospore. In these materials perithecial necks usually do not protrude from the bark surface. Under highly moist condition, necks prolong slightly from the bark surface, but they do not form thick fascicles as found in *Diaporthe medusaea* NIT. Variation in the size of ascospore is rather little, and ascospore is not over 15 μ in length and 4 μ in width.

Type and paratype specimens of *Diaporthe theae* HARA preserved in the National Science Museum show quite accordant characters with the materials on the other host plants examined by the author. Therefore, *Diaporthe theae* is treated as a synonym of *Diaporthe eres* NIT. sens. WEHM.

On *Prunus* spp., a *Phomopsis* causing canker or dieback disease was reported from Japan and northern China. HEMMI (1942) identified it to be *Diaporthe eres* NIT. sens. WEHM., though its *Diaporthe* state had not been found.

Diaporthe ambigua NIT. on *Pyrus* was included in a synonym of *Diaporthe eres* NIT. by WEHMEYER (1933), who reexamined NITSCHKE's type specimen and noted the size of ascospore to be 11～14×2.5～4 μ. In Japan, a causal fungus of the canker disease of exotic pear was identified as *Diaporthe ambigua* NIT. by TANAKA (1934). His dimensions on the canker fungus were much larger than those of *Diaporthe ambigua* given by WEHMEYER. According to TANAKA, size of ascus and ascospores of the canker fungus is 60～96×7.2～14 μ and 14.4～21.6×3.5～8.4 μ, respectively. Moreover, the size and shape of *Phomopsis* state reported by TANAKA are atypical in comparison with those of the species included in *Diaporthe eres* sens. WEHM. Judged from the description and figure by TANAKA, the canker fungus of exotic pear in Japan may not belong to *Diaporthe eres*: it seems to be closely similar to *Diaporthe tuberculosa* (ELL.) SACC. which was recorded from North America on *Amelanchier* and *Prunus* in the morphological characters of the perfect states. As the present author has been unable to examine any material of the canker fungus of exotic pear in Japan, determination on the species name of the exotic pear canker fungus is retained until available materials having perfect and imperfect states are obtained and their morphology and life-history are reexamined.

Many isolates from ascospore and alpha conidium were obtained from the materials listed above. These isolates showed quite similar character to each other on potato-sucrose agar. And no difference was found between the isolates obtained from ascospore and from conidium. Generally, ascospore and conidium germinated within 12 hours and germ-tube grew fast and vigorously. Colony was first compact and flat with white felty aerial mycelia, then developed cottony white aerial mycelia at the marginal area. Colour of colony turned to brownish or purplish brown in one-month-old culture, and several sphaeric bodies were produced on the colony. These pycnidial stroma soon matured and then oozed out creamy mucous masses of conidia consisting of alpha and beta conidia, in some cases only beta conidia. Conidia produced on culture were found to be 4～9×1.5～4 μ in size and 6.7×2.1 μ in average for alpha conidia and 18～48×0.5～1.5 μ in size and 26.4×0.9 μ in average for beta conidia. Alpha conidia produced on agar are smaller than those on host plants, and beta conidia show a wider range in size than those on host.

In an isolate from paulownia tree, optimum temperature for the mycelial growth was 25°C with both extremes of 9°C and 30°C (KOBAYASHI & ITO 1957).

Pathogenicity of *Diaporthe eres* is rather weak. According to HEMMI (1942) and KOBAYASHI and ITO (1957), the fungus causes dieback of peach and paulownia trees affected by unfavourable environmental conditions, and it needs dead tissues to invade the healthy bark.

2) ***Diaporthe conorum*** (**DESMAZIÈRES**) **NIESSL**, Hedwigia 15:2, 1867—(Figures 42 and 43; Plate XI: A～E)—SACCARDO, Syll. Fung. 1:647, 1882; KOBAYASHI, Bull. Gov. For. Exp. Sta. 107:22, 1958

Synonym: *Sphaeria conorum* DESM., Ann. Sci. Nat. Ser. III, 5:76, 1846
Diaporthe occulta NIT., Pyren. Germ. 266, 1867; SACCARDO, Syll. Fung. 1:647, 1882; WINTER, Rabh. Kryptgfl. I, 2:609, 1887
Diaporthe pithya SACC., Fung. Ven. Ser. 4:7, 1875; Syll. Fung. 1:689, 1882
Diaporthe pinophylla PLOWR. et PHIL., Grev. 4:124, 1876; SACCARDO, Syll. Fung. 1:646, 1882
Diaporthe pinicola HAZSL., Math. esterm. Köslem. 25, 2:200, 1892; SACCARDO, Syll. Fung. 17:674, 1905
Diaporthe conigena FELTG., Vorst. Pilz. Lux. Nachtr. 3:136, 1903; SACCARDO, Syll. Fung. 17:674, 1905
Diaporthe thujina PETRAK, Ann. Myc. 19:50, 1921

Conidial state: *Phomopsis occulta* (SACC.) TRAV., Fl. Ital. Crypt. 2:221, 1906; HAHN, Trans. Brit. Myc. Soc. 15:47～52, 1930; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9:72, 1933; GROVE, Coelom. I:179, 1935; KAMEI, Plant. Prot. 5:425～428, 1951; KOBAYASHI, Bull. Gov. For. Exp. Sta. 107:18, 1958 (=*Phoma occulta* SACC., *Phoma conorum* SACC., *Phomopsis conorum* (SACC.) DIED., *Phomopsis conorum* var. *naviculospora* TRAV., *Phoma pithya* SACC., *Sclerophoma pithya* (THÜM.) HÖHN., *Phomopsis thujae* DIED., *Phomopsis cryptomeriae* KITAJ. et KAMEI, *Phomopsis cephalotaxi* SAWADA).

Pustules on bark of cankered or dead stems and twigs, small, 0.5～1 mm in diam., only slightly elevated by the tip of necks, sometimes hardly visible to the naked eye. Perithecia single or in small group, embedded within bark tissue and sometimes partly in wood, often beneath decomposed pycnidial stroma, globular or depressed at the bottom, 300～600 μ in diam., with neck at the top; wall of perithecia composed of slightly flattened, dark, thick-walled cells, innermost cells being hyaline, thin-walled and strongly flattened. Necks cylindric, slender, collectively erumpent through bark epiderm or pycnidial stroma, 250～750 μ in length, penetrated by a pore; periphyses present but hardly visible. Blackened zone usually present within bark and wood. Asci clavate or cylindric-clavate, furnished apical ring at thickened tip, 38～53×5.5～10 μ in size and 46.4×6.8 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to fusoid, narrowly rounded at the ends, hyaline, 2-celled, straight or inaequilateral, usually not constricted but slightly constricted at the septum when fully matured, 9～15.5×2.5～4 μ in size, mostly 11～14×3～3.5 μ and 12.3×3.1 μ in average.

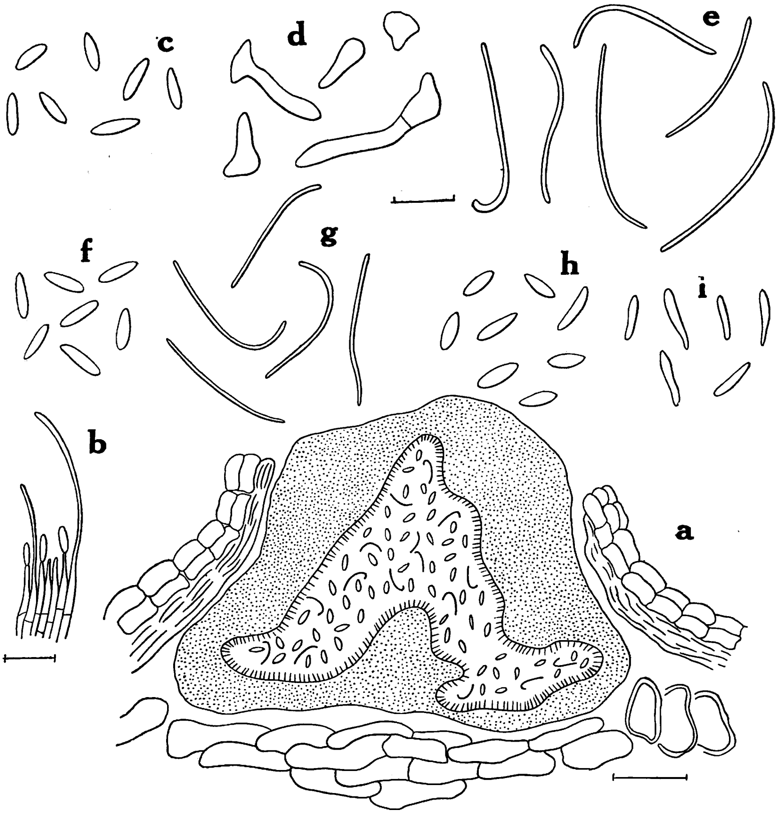

Figure 42. *Diaporthe conorum* (DESM.) NIESSL
a : Pycnidial stroma　b : A part of pycnidial locule　c, f, h: Alpha conidia　d : Germinating alpha conidia　e, g: Beta conidia　i : Intermediate type of conidia　a, b: On *Picea*　c～e: On *Cryptomeria*　f, g: On *Metasequoia*　h, i: On *Larix*　(⊢—⊣: a=100 μ; b～i=10 μ)

Development of conidial state usually precedes to the perithecial formation. Pycnidial stroma immerses in peridermal layer of the bark, then erumpent through epiderm, elevates hemisphaeric to conic pustule, 0.5～1 mm in diam., and ruptures by the central pore which is lysigeneously formed, prosenchymatous or pseudoparenchymatous. Pycnidial locule is lysigeneously formed, without distinct wall. Conidiophores arise from innermost layer of locule and are slender, straight, simple, hyaline, 7.5～15 μ in length. Two types of conidia are produced; one of which is called alpha conidium or A-spore, and is elliptic, unicellular, hyaline, granular, 5～11.5×1.5～4.5 μ in size, mostly 6～8×2～3 μ and 7.6×2.5 μ in average, the other beta conidium or B-spore is filiform or acicular, straight or hooked, hyaline, unicellular, 21～31×0.5～1.5 μ in size and 25.4×1.1 μ in average.

Host and Material: *Abies sachalinensis* (SCHM.) MAST. (Todo-matsu)—Eniwa, Hokkaido, IX-, 1963, by O. CHIBA (FPH-2298). *Cedrus deodara* (ROXB.) LOUD. (Himaraya-sugi)—Asakawa, Tokyo, III-22, 1960, by T.K. *Chamaecyparis obtusa* SIEB. et ZUCC. (Hinoki)—Kirishima, Kagoshima, XI-13, 1954 (FPH-1101). *Cryptomeria japonica* D. DON. (Sugi)—Nishidake, Miyazaki, VII-24, 1954, by T. NUKUMIZU (FPH-353); VIII-19, 1954, by T. NUKUMIZU (FPH-1095, 1096, 1098); Takachiho, Miyazaki, VII-30, 1954, by T. NUKUMIZU; Itsugi, Kumamoto, X-8, 1954 (FPH-1075); Kirishima,

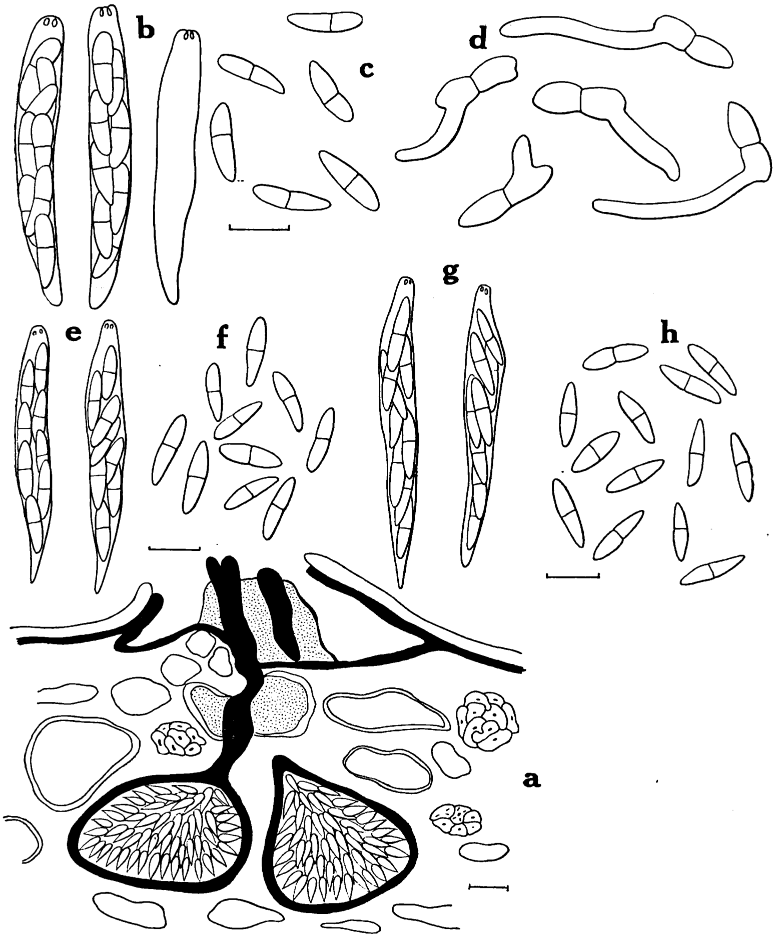

Figure 43. *Diaporthe conorum* (DESM.) NIESSL

a : A perithecial pustule having two perithecia beneath the decomposed conidial layer

b, e, g : Asci and ascospores　c, f, h : Ascospores　d : Germinating ascospores

a : On *Abies*　b∼d : On *Cryptomeria*　e, f : On *Cedrus*　g, h : On *Tsuga*

(⊔ : a=100 μ; b∼h=10 μ)

Kagoshima, X-9, 1954 (FPH-1099, 1100); Kuroiso, Tochigi, IV-, 1961, by K. SAITO (FPH-860); VI-, 1961 (FPH-866). *Larix leptolepsis* GORD. (Karamatsu)—Motohachioji, Tokyo, III-23, 1960, by T.K. (FPH-966). *Pinus strobus* L.—Shiono, Nagano, IX-21, 1967, by T.U. (FPH-3280). *Pseudotsuga taxifolia* BRIT. (Dagurasu-momi)—Morioka, Iwate, X-6, 1962, by T.K. (FPH-711). *Tsuga canadensis* CARR.—Asakawa, Tokyo, III-10, 1960, by T.K. (FPH-912).

Conidial state only: *Abies sachaliensis*—Sapporo, Hokkaido, X-26, 1954, by K. ONO (FPH-1062). *Cryptomeria japonica*—Meguro, Tokyo, X-28, 1952, by T.K.; Mt. Mitake, Tokyo, IV-29, 1959, by T.K. (FPH-1033). *Larix leptolepis*—Teshikaga, Hokkaido, IV-21, 1951, by T.U. (FPH-1488); Fujiyoshida, Yamanashi, V-, 1960, by A. ENDO (FPH-1356); VI-7, 1962, by T.K. (FPH-1929). *Larix dahurica* var. *koreana* NAKAI (Chosen-karamatsu)—Asahikawa, Hokkaido, X-4, 1960, by T. IGARASHI (FPH-3123). *Larix decidua* MILL. (Ōshu-karamatsu)—Meguro, Tokyo, V-4, 1959, by T.K. (FPH-1355). *Metasequoia glyptostroboides* HU et CHENG—Gamo, Kagoshima, V-, 1959, by T. KAWABATA (FPH-913). *Picea hondoensis* (MAYR) REHD. (Tohi)—Kisofukushima, Nagano, V-, 1960, by T. HAMA (FPH-908); Daimon, Nagano, IV-15, by T.K. (FPH-855). *Picea sitchensis* TRAUT. et MEY.—Yamabe, Hokkaido, IX-25, 1964, by T.K. (FPH-2616). *Pinus thunbergii* PARL. (Kuro-matsu)—Tanabe, Wakayama, X-, 1950, (FPH-214). *Pinus densiflora* SIEB. et ZUCC. (Aka-matsu) —Meguro, Tokyo, V-12, 1960, by Y. MAMIYA (FPH-1342). *Pinus parviflora* var. *pentaphylla* MAYR. (Kita-goyo-matsu)—Mt. Fuji, Narusawa, Yamanashi, VI-22, 1966, by T.U. (FPH-2848). *Pinus strobus*—Yamabe, Hokkaido, VI-10, 1959, by S. KAMEI (FPH-3175, 3176); Mitsuishi, Hokkaido, VI-27, 1959, by S. KAMEI (FPH-3163); Shibetsu, Hokkaido, VI-27, 1960 (FPH-3120). *Pseudotsuga taxifolia*—Oneyama, Gumma, V-26, 1962, by T.K. (FPH-1927); Yamabe, Hokkaido, IX-25, 1964, by T.K. (FPH-2447).

Distribution: Asia (Japan), Europe and North America.

Note: The present species has a wide host range on many coniferous plants and is quite similar to *Diaporthe eres* NIT. having wide host range on broad-leaved trees in its morphological characteristics (Figures 44 and 45). WEHMEYER (1933) united both species and treated *Diaporthe conorum* as a synonym of *D. eres*. As a pointed out in the author's earlier report (KOBAYASHI 1958), it would be preferable at the present time that *Diaporthe conorum* be maintained as an independent species until more precise evidence is obtained from further study and their life-history confirmed before uniting both species.

Since 1925 when the conidial state of the present species was first noticed in Japan by KITAJIMA, many reports on the canker or dieback disease of conifers caused by it have been published. KAMEI (1951) who studied the canker disease of todo-fir, *Abies sachalinensis*, in Hokkaido, identified the causal fungus as *Phomopsis occulta* (SACC.) TRAV. Then he discovered its perfect state, *Diaporthe conorum* (DESM.) NIESSL, on larch (1956) and also on *Pinus strobus* (1959). KITAJIMA (1925) considered a *Phomopsis* causing die-back disease of *Cryptomeria* to be a separate species and described it as *Phomopsis cryptomeriae* KITAJIMA et KAMEI. Later, it was reexamined with its perfect state found on *Cryptomeria* and *Chamaecyparis*, and, through comparative cultural and etiological studies of both species (KOBAYASHI 1958), proved to be the same species as the todo-fir canker fungus. On *Cephalotaxus nana*, SAWADA (1950) described a species of *Phomopsis* as *P. cephalotaxi* SAWADA. It is treated as a synonym of *Phomopsis occulta* (SACC.) TRAV.

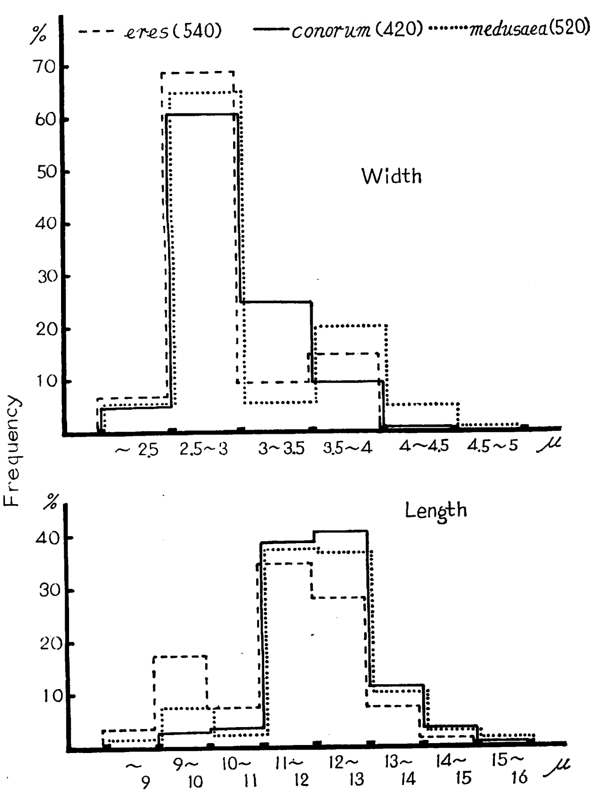

Figure 44. Histogram of width and length of ascospore in three similar species of *Diaporthe*. (Total account of measured spore)

Ascospore and alpha conidium easily germinated and developed a colony

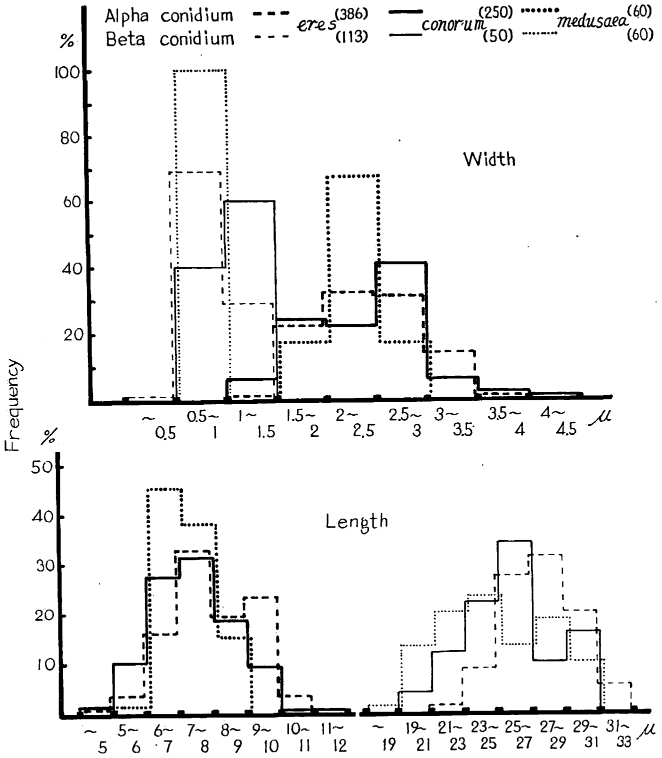

Figure 45. Histogram of width and length of alpha and beta conidium in three similar species of *Diaporthe*. (Total account of measured spore)

on potato-sucrose agar. The colony grew rapidly and flatly with felty aerial mycelia, and white to grayish white in colour. Colour of the old colony became darker and sphaeric bodies were produced on one- to two-months-old colony. These bodies soon matured and produced conidia. White to creamy white mucous masses of conidia oozed out from these bodies. Size of alpha and beta conidia produced on culture were measured to be 6∼9×2∼2.7 μ and 7.3×2.2 μ in average, and 22∼30×0.5∼1.5 μ in size and 24.7×1.2 μ in average, respectively. These dimensions are not different from those of conidia obtained on host plants. Intermediate type of conidia as those noted by HAHN (1930) was also found commonly in culture and rarely on host plant.

3) ***Diaporthe medusaea*** NITSCHKE, Pyren. Germ. 251, 1867—(Figure 46; Plate X: F∼I)—SACCARDO, Syll. Fung. 1 : 639, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 618, 1887; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9 : 101, 1933; GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 347, 1959; CHIBA & KOBAYASHI, Jour. Jap. For. Soc. 41 : 246, 1959; KOBAYASHI & CHIBA, Bull. Gov. For. Exp. Sta. 130: 24, 1961

Synonym: *Diaporthe italica* (SACC.) TRAV., in SACCARDO, Syll. Fung. 17 : 671, 1905
Other synonyms vide WEHMEYER (1933)

Conidial state: *Phomopsis rudis* (FR.) HÖHN., Sitzb. Kais. Akad. Wiss. Wien, Math. naturw. Kl. I, 115 : 680, 1906 (=*Sphaeria rudis* FR., *Rabenhorstia rudis* FR., Others vide WEHMEYER 1933).

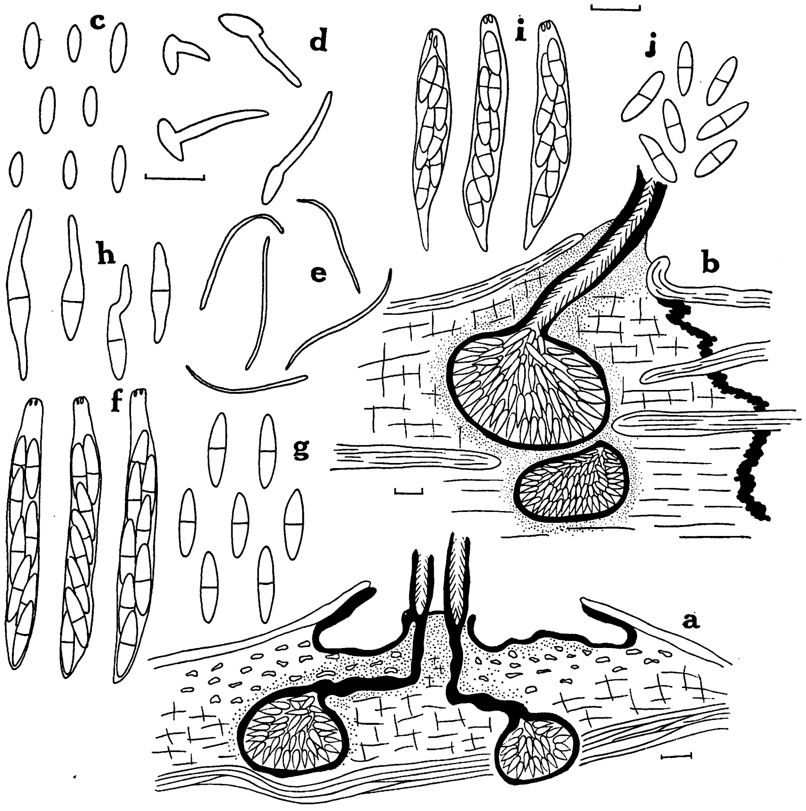

Figure 46. *Diaporthe medusaea* NIT.
a, b: Perithecial pustules　f, i: Asci and ascospores　g, j: Ascospores
h: Germinating ascospores　c: Alpha conidia　d: Germinating alpha conidia　e: Beta conidia　a, c～g: On *Populus*　b, i, j: On *Morus*
(⌴ : a, b=100 μ; c～j=10 μ)

Pustules on bark of cankered or dead stems and twigs; development of ectostroma usually poor; perithecia embedded within bark tissue and partly in wood, usually clustered beneath pycnidial stroma, globular or flattened at the bottom, 250～660 μ in diam., surrounded by loose hyphal net containing fragmentary tissue of substratum, with long neck at the top; perithecial wall membranaceous, composed of dark, flattened, thick-walled cells, innermost cells being strongly flattened, hyaline and thin-walled. Necks cylindric, collectively erumpent through peridermal layer or decomposed pycnidial stroma, protruding 1～5 mm or more from the bark surface, surrounded by hyphal elements but not forming compact disc. Black ventral and dorsal zone present, enveloping several perithecial pustules. Asci clavate or cylindric-clavate, furnished apical ring at the thickened tip, 38～59×5.5～9 μ in size and 45.3×7.2 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to fusoid, hyaline, 2-celled, not constricted at the septum when young and constricted in full maturity, 9～15.5×2.5～5 μ in size, mostly 10～14×3～4 μ and 12×3.2 μ in average.

Development of conidial state usually precedes to the perithecial formation. Pycnidial stroma is formed on cankered or dead bark, and first immerses within bark tissue, then breaks through epiderm, elevates hemisphaeric to conic, 0.5～2 mm in diam., lysigeneously forms conidial locules;

locules appear as linear crevice and finally become mouth-like, opening central ostiole; wall of locules is indistinct. Conidiophores arise from innermost layer of locule and are hyaline, slender, simple, 3～8 μ in length. Two types of conidia are produced; one of which is called alpha conidium or A-spore and is elliptic to fusoid, unicellular, hyaline, granular, 5.5～8.5×2～3 μ in size and 7.3 ×2.4 μ in average; the other beta conidium or B-spore is filiform or acicular, straight or hooked, unicellular, hyaline, 17～30×0.5～1 μ in size and 24.6×0.9 μ in average.

Host and Material: *Populus japono-gigas* (Kyodai-popura)—Tanashi, Tokyo, VII-15, 1958, by T.K. (FPH-1703, 1914); Motohachioji, Tokyo, III-23, 1961, by T.K. (FPH-870). *Populus deltoides* MARSH.—Meguro, Tokyo, IV-24, 1959, by T.K. (FPH-1869); Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-883, 889). *Populus maximowiczii* HENRY (Doronoki)—Meguro, Tokyo, VI-, 1960, by T. K.; Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-865, 884, 968, 969). *Populus koreana* (Chirimen-doro)—Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-853, 864). *Populus alba* L. (Gindoro)—Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-868, 969); Kamabuchi Yamagata, V-24, 1962, by Y. ZINNO (FPH-1938). *Populus sieboldii* MIQ. (Yamanarashi)—Meguro, Tokyo, V-18, 1961, by T. K. (FPH-890). *Populus nigra* L.—Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-882). *Populus nigra*×*P. maximowiczii* (Kamabuchi-1)—Meguro, Tokyo, V-10, 1963, by T. K. (FPH-2463). *Populus marilandica*—Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-886). *Populus grandis*—Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-867). *Populus euramericana* I-214—Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-862, 863). *Populus euramericana* I-455—Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-881). *Morus alba* L. (Kuwa)—Motohachioji, Tokyo, II-2, 1960, by T. K. (FPH-906); Asakawa, Tokyo, III-22, 1960, by T. K. & T. U. (FPH-877).

Conidial state only: *Populus alba*—Kamikamo, Kyoto, IX-9, 1965, by T. K. (FPH-3269). *Populus japono-gigas*—Shimokuisshiki, Yamanashi, V-13, 1960, by T.K. (FPH-910). *Populus nigra platierens*—Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-1958). *Populus koreana*×*P. trichocarpa*—Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-650). *Populus deltoides monilifera*—Motohachioji, Tokyo, III-13, 1962, by T. K. (FPH-1958). *Populus angulata*—Meguro, Tokyo, VI-25, 1959, by T. U. (FPH-1888); V-15, 1959, by T. K. (FPH-1867). *Populus eckhof*—Meguro, Tokyo, VII-22, 1959, by T. K. (FPH-1877); Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-645). *Populus euramericana* I-214—Yachiyama, Hokkaido, IX-1, 1960, by H. SAHO (FPH-3098). *Populus euramericana* I-72/51—Meguro, Tokyo, VI-26, 1959, by T. U. (FPH-1889). *Populus euramericana* I-476—Makubetsu, Hokkaido, VII-28, 1960, by H. YOKOYAMA (FPH-1038). *Populus leipzig*—Yamabe, Hokkaido, V-23, 1961, by H. SAHO (FPH-3109). *Populus charkowiensis*×*P. caudina*—Kuriyama, Hokkaido, VII-, 1959, by S. CHIBA (FPH-1969). *Populus maximowiczii* × *P. trichocarpa*—Motohachioji, Tokyo, III-23, 1961, by T. K. (FPH-958). *Populus davidiana*×*P. canescens*—Kamabuchi, Yamagata, IX-12, 1958, by O. CHIBA & T. K. (FPH-1911). *Populus sieboldii*×*P. canescens*—Meguro, Tokyo, IV-13, 1963, by T. K. (FPH-724).

Distribution: Asia (Japan), Europe and North America.

Note: The present species was differentiated from *Diaporthe eres* NIT. by the long clustered necks protruding from the bark surface and grouped perithecia (WEHMEYER 1933). Dimensions of the perfect and imperfect state in *Diaporthe medusaea* seem to be quite similar to those of *D. eres* (Figures 44 and 45). WEHMEYER did not prove experimentally the life-history of these two large species.

In Japanese materials listed above, morphology of the perfect and imperfect states is much alike to that of Japanese material of *Diaporthe eres* NIT. identified by the author, excepting the elongation of the clustered necks from the bark surface in the former. As pointed out by WEHMEYER

(1933), possibility of uniting these two species into one large species remains for future research. It may be said that the materials listed above are identified rather tentatively to ***Diaporthe medusaea*** NIT. sensu WEHM.

Two materials on *Morus* were quite accordant with those on *Populus* in all aspects. On *Morus* a very notable species of *Diaporthe*, that is *D. nomurai* HARA, has been known as a causal agent of the mulberry canker in Japan. Perfect state of *Diaporthe nomurai* is similar to that of *Diaporthe medusaea* or *D. eres*, so far as can be determined from HARA's description and figures (HARA 1914, 1925) and from examination of HARA's specimens preserved in the National Science Museum. However, size of alpha conidia in the *Phomopsis* state of *Diaporthe nomurai* is far larger than that of *D. eres* or *D. medusaea*. Conidia of *Diaporthe nomurai* were reported by HARA (1925) and NAKATA and TAKIMOTO (1928) to be 9～14×2.5～4 μ, whereas those of *D. medusaea* or *D. eres* were recorded as 5～10 μ in length. Diagnosis and figure of *Diaporthe nomurai* in many handbooks are direct translations from HARA's book (1925). ENDO (1927) reported two kinds of alpha conidia to be the imperfect state of the mulberry canker fungus. Larger conidia are quite accordant with those reported by HARA. Smaller conidia measure 5～8×1.5～3 μ and this size is identical with that of *Diaporthe medusaea* or *D. eres*. It is quite doubtful whether or not these two kinds of conidia which are distinctly separable in their shape and size belong to the same species. In foreign countries, *Diaporthe sociabilis* NIT. has been known on *Morus*. It is also similar to *Diaporthe nomurai*, but no conidial state has been proved to it. The present author was unable to examine fresh cankered materials having either conidial or perithecial state. Therefore, *Diaporthe nomurai* HARA is retained here to be an independent species having large alpha conidia (see page 98). It seems to be necessary to restudy the life-history of *Diaporthe nomurai*, especially in relation to the morphology of conidial state.

Diaporthe citri WOLF, the perfect state of *Phomopsis citri* FAWC. causing melanose of citrus, was also included in the synonym of *D. medusaea* by WEHMEYER (1933). In Japan citrus melanose widely distributes throughout warmer regions and its causal fungus was listed as *Diaporthe citri* WOLF (Anonymous 1965), though the perithecial state of the fungus has not been recorded from Japan. This being so, no further discussion about the taxonomic position of the citrus melanose fungus is made here.

Many isolates were obtained from the materials listed above. Cultural characters of these isolates were quite similar to those of *Diaporthe eres* and *D. conorum*. Growth of the fungus on potato-sucrose agar was vigourous and fast. Colony was flat and white at first, then appeared grayish brown patches with white cottony aerial mycelia at the marginal part. Several sphaeric bodies were produced on about one-month-old culture. They developed numerous conidia which later were pushed out from them as white to creamy mucous masses. Alpha conidia produced on culture, 5～6.5×2～3 μ in size and 5.4×2.3 μ in average, were somewhat smaller than those on host plants. Beta conidia are not different from those on host plants.

The present fungus is one of the causal organisms of the poplar canker which causes damage in young plantation of poplars (ITO 1959, CHIBA & KOBAYASHI 1959).

4) ***Diaporthe arctii*** **(LASCH) NITSCHKE**, Pyren. Germ. 268, 1868—(Figure 47; Plate XII: A, B)—SACCARDO, Syll. Fung. 1 : 653, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 606, 1887; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 6 : 22, 1933; MUNK, Dsk. Bot. Ark. 15 (2) : 87, 1953; 17 (1) : 275, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 345, 1959; DENNIS, Brit. cup fungi, 192, 1960

Synonym: *Sphaeria arctii* LASCH, Herb. Myc. 1046, 1846

Other synonyms vide WEHMEYER (1933)

Conidial state: *Phomopsis arctii* (SACC.) TRAV., Fl. Ital. Critt. 2:226, 1906 (=*Phoma arctii* SACC., Others vide WEHMEYER 1933).

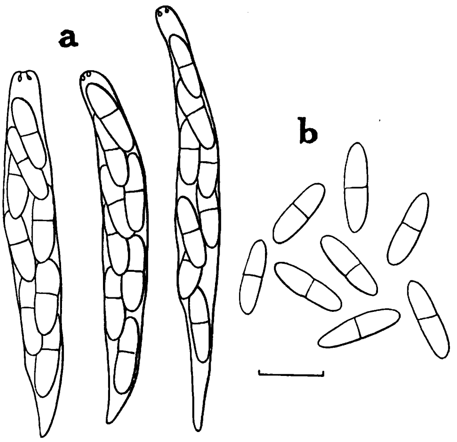

Figure 47. *Diaporthe arctii* (LASCH) NIT.
a : Asci and ascospores　b : Ascospores
(⌴ =10 μ)

Pustules on bark of dead stem, scattered, black, ruptured epiderm exposing black tip of necks. Perithecia embedded within bark or partly in wood, one or rarely two in a pustule, without distinct stroma, globular, 450～500 μ in diam., with neck at the top. Blackened zone effused within wood. Necks cylindric, solitary erumpent through bark tissue. Asci clavate or cylindric-clavate, furnished apical ring at thickened tip, 50～62×8.5～10 μ in size and 56.9×9.3 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic, narrowly rounded at the ends, straight or inaequilateral, 2-celled, only slightly constricted at the septum in full maturity, hyaline, 11～14×3～4 μ in size and 12.6×3.2 μ in average.

Host and Material: *Edgeworthia papyrifera* SIEB. et ZUCC. (Mitsumata)—Kamikano, Shizuoka, VII-8, 1959, by T. K. (FPH-874, 2960, 2970).

Distribution: Asia (Japan), Europe and North America.

Note: The present fungus is barely distinguishable from *Diaporthe eres* sensu lato by its singly scattered perithecium in large areas surrounded by blackened zone and somewhat larger ascus. According to WEHMEYER (1933), *Diaporthe arctii* is probably a primitive species in the genus *Diaporthe* and it predominantly inhabits herbaceous plants. *Phomopsis* state of *Diaporthe arctii* is not diffetent from that of *D. eres*. The fungus on stem of *Edgeworthia* which is similar to herbaceous stem was identified as *Diaporthe arctii* by its solitary perithecium, though its conidial state was not obtained.

5) ***Diaporthe santonensis*** SACCARDO, Fung. Gall. Ser. V, n. 2162, 1883; Syll. Fung. 9 : 717, 1891—(Figure 48; Plate XII: C～H)

Conidial State: *Phomopsis macrospora* KOBAYASHI et CHIBA, Bull. Gov. For. Exp. Sta. 130 : 29, 1961

Pustules on bark of cankered or dead stems and twigs, appearing as small black dot, broken through bark epiderm; ectostroma and entostroma quite scanty, only visible as loose hyphal elements twisting decomposed tissue of substrata. Perithecia embedded within bark tissue, loosely grouped one to several, globular or depressed at the bottom, 400～480 μ in diam., with black neck at the top. Perithecial wall about 25 μ in thickness, composed of several layers of dark, isodiametric, somewhat depressed, thick-walled cells, innermost cells being hyaline, thin-walled and strongly flattened. Necks cylindric, 600～660 μ in length, composed of elongated plectenchymatous cells, pierced by a pore furnishing periphyses, collectively erumpent through bark periderm or decomposed pycnidial stroma. Asci clavate or cylindric-clavate, thin-walled with thickened tip furnishing apical ring, 70～78×8.5～10 μ in size and 73×9.2 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores 2-celled, lower cell somewhat smaller than upper cell but not apiosporous, usually constricted at the septum, 14～18×3.5～5.5 μ in size and 16×4.5 μ in average, with hyaline appen-

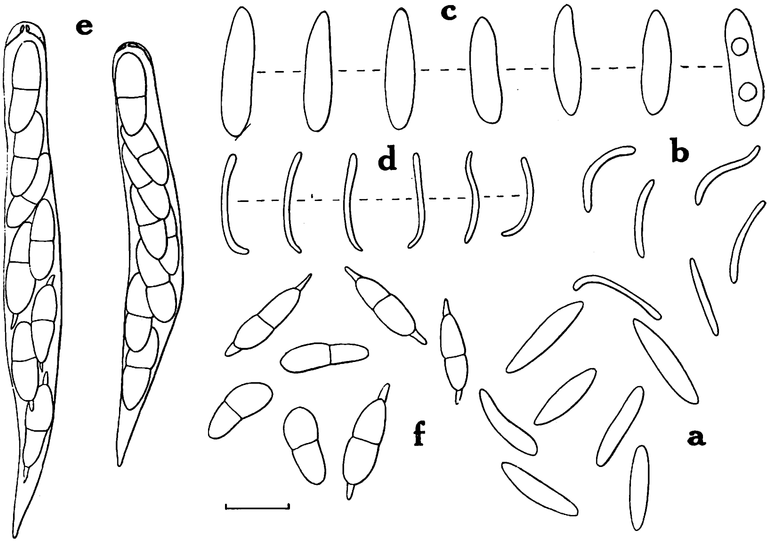

Figure 48. *Diaporthe santonensis* SACC.

a : Conidia produced on host　b : Beta conidia produced on host
c : Conidia produced on culture　d : Beta conidia produced on culture
e : Asci and ascospores　f : Ascospores　(└─┘=10 μ)

dage at both ends.

Conidial state usually separately formed from the perithecial state and the development of pycnidia precedes to the formation of perithecium. Pycnidial stroma first immerses within peridermal layer, then erumpent through bark epiderm forming small hemisphaeric pustules, prosenchymatous when young, 0.5 mm in height and 0.5～1 mm in width, and produces lysigeneously pycnidial locule which is first linear then becomes mouth-like with a central ostiole; wall of locule is indistinct, only distinguishable from the surrounding tissue by the differentiation of conidiophores at the innermost layer of locule. Conidiophores are simple, hyaline, 7.5～9 μ in length, produce conidia acrogeneously. Two types of conidia are produced; one of which is called alpha conidium or A-spore, and is fusoid to clavate, not acute at the ends, unicellular, large guttulate, hyaline, 14.5～19×3～3.7 μ in size and 16.4×3.2 μ in average; the other beta conidium is long cylindric but not acicular or filiform, straight or slightly curved, unicellular, hyaline, 11～14×1.5～2 μ in size and 12.6×1.5 μ in average, ingerminable. Both conidia are pushed out from the pore of pycnidial stroma under moist condition and often form sticky spore-horns of orange to reddish colour.

Host and Material: *Populus deltoides* MARSH.—Meguro, Tokyo, VI-1, 1960, by T. K. (FPH-2151). Conidial state only: *Populus deltoides*—Meguro, Tokyo, V-13, 1959, by T. K. (FPH-1886, Type of *Phomopsis macrospora*); Stoneville, Mississippi, U. S. A., IX-, 1964, by O. CHIBA (FPH-2391). *Populus nigra* L.—Meguro, Tokyo, VII-23, 1959 by T. K. (FPH-1882, 1971). *Populus maximowiczii* HENRY (Doronoki)—Meguro, Tokyo, VII-22, 1959, by T. K. (FPH-1881). *Populus deltoides* var. *monilifera* AIT.—Aomori-city, Aomori, I-, 1960, by Y. YOKOSAWA (FPH-918). *Populus bachelierii*—Meguro, Tokyo, VII-22, 1959, by T. K. (FPH-1878). *Populus robusta*—Meguro, Tokyo, VII-22, 1959, by T. K. (FPH-1879). *Populus eckhof*—Meguro, Tokyo, VII-22, 1959, by T. K. (FPH-1962). *Populus serotina* f. *erecta*—Meguro, Tokyo, VII-22, 1959, by T. K. (FPH-1963). *Populus deltoides*×*P. caudina* —Meguro, Tokyo, VII-22, 1959, by T. K. (FPH-1961). *Populus charkowiensis*×*P. caudina*—Kuriyama, Hokkaido, VI-24, 1959, by S. CHIBA.

Distribution: Asia (Japan), Europe and North America.

Note: The present fungus distinctly differs from *Diaporthe eres* NIT. and *D. medusaea* NIT. which is the predominant species on *Populus*, by its somewhat larger ascospore having appendage as well as the size and shape of conidial state. *Diaporthe tessella* (PERS.) REHM on *Salix* is also distinguishable from the present fungus by its far larger ascus and ascospore. *Diaporthe humboldiana* SPEG. and *D. catamarcensis* SPEG. which was considered to be synonymous with the former species by HÖHNEL (1918) and WEHMEYER (1933), are different from the fungus in question by their smaller ascus and ascospore. It was pointed out by WEHMEYER (1933) that *Diaporthe vogliniana* SACC. et TROTT. may not belong to *Diaporthe* because of its three-celled ascospore. Quite similar species to the present fungus was described by SACCARDO (1891) on *Salix* as *Diaporthe santonensis* SACC. Size of ascospore having appendage is quite accordant with that of the present fungus, though no record on the conidial state of *Diaporthe santonensis* was found. This species was treated by HÖHNEL (1918) and WEHMEYER (1933) as a synonym of *Diaporthe salicella* (=*Cryptodiaporthe salicina* (CURR.) WEHM.). In their treatment, description of *Diaporthe santonensis* was compared with *Diaporthe salicella* for the lack of authentic specimen in the former, and presence of the appendage of ascospore in *D. santonensis* was neglected by them. *Diaporthe salicella* (FR.) SACC. or *Cryptodiaporthe salicina* (CURR.) WEHM. was proved to be confused and an invalid species by BUTIN (1958). This and related species of *Cryptodiaporthe*, which were recorded on Salicaceae plants by many mycologists under different sense, were clearly rearranged into four species by BUTIN based on the morphology of their perfect and imperfect states. Relationship between the perfect and imperfect state of each species was proved experimentally through the cultural study and inoculation tests. These four *Cryptodiaporthe* have a conidial state different from each other and their ascospore does not furnish appendage. *Diaporthe santonensis* was excluded from the synonym of the species renamed by BUTIN.

On the other hand, *Diaporthe pruni* ELL. et EV. has quite similar characters to the present fungus among the species described on host plants other than Salicaceae. Its conidial state was experimentally proved by WEHMEYER (1926 c). According to him, size of alpha conidia of *Diaporthe pruni* was measured to be $10\sim16\times2.5\sim3\,\mu$ and that of beta conidia was $10\sim15\times1\sim1.5\,\mu$. At the same time he noted that the spore-horns of alpha conidia exuded from pycnidial locule were white and those of beta conidia were white to yellow in colour. *Diaporthe pruni* produces well developed ectostroma and entostromatic hyphae (WEHMEYER 1926 c, 1933), whereas in *D. santonensis* development of stroma is only a trace (SACCARDO 1891). In the present fungus development of ecto- and entostroma is quite as poor as that of *Diaporthe eres* NIT. Spore-horns exuded from pycnidia in the present *Diaporthe* were observed to be orange to reddish in colour (KOBAYASHI & CHIBA 1961). From the facts mentioned above, *Diaporthe santonensis* is considered to be a valid species in the genus *Diaporthe* and the present fungus is identified as *D. santonensis* SACC.

Distribution of the present species in North America was confirmed through the examination of the specimen collected by O. CHIBA in the United States.

Ascospore and alpha conidium easily germinated and developed colony on potato sucrose agar. Growth of colony was slow in comparison with that of *Diaporthe medusaea*, common species on *Populus* in Japan. Colony was first white and flat with felty serial mycelia, then became gray to brownish or greenish brown and somewhat uneven by the formation of many thick masses of mycelia on the surface of the colony. Some of these masses continued to enlarge and changed into pycnidial stroma. From these bodies mucous orange-coloured masses of conidia oozed out. Two types of conidia, alpha and beta conidium, were produced on culture. Alpha and beta conidia produced on the isolate from ascospore were measured as 12.5～17×3～4 μ and 10～14×1.5 μ, respectively. These conidia were quite accordant with those not only on host but also on culture isolated from conidium.

6) ***Diaporthe spiculosa*** (**ALBERTINI et SCHWEINITZ**) **NITSCHKE**, Pyren. Germ. 256, 1867—(Figure 49; Plate XII : I, J)—SACCARDO, Syll. Fung. 1 : 633, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 615, 1887; ELLIS & EVERHART, N. Amer. Pyren. 447, 1892; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9 : 110, 1933

Synonym: *Sphaeria spiculosa* ALB. et SCHW., Consp. Fung. Nisk. 16, 1805
Diatrype rhoina CKE. et ELL., Grev. 7 : 8, 1878
Calospora rhoina (CKE. et ELL.) SACC., Syll. Fung. 2 : 234, 1883
Diaporthe rhoina (CKE. et ELL.) ELL. et EV. (non *D. rhoina* (FELTG.) REHM), N. Amer. Pyren. 424, 1892; WEHMEYER, Mycol. 19 : 171, 1927
Other synonyms vide WEHMEYER (1933)

Conidial state: Undetermined.

Pustules on bark of dead twigs; perithecia gregarious, embedded within bark tissue, globular or depressed at the bottom, 380～460 μ in diam., with long neck at the top; wall membranaceous, composed of angular to slightly flattened, dark, thick-walled cells, innermost cells being hyaline, thin-walled and strongly depressed. Necks cylindric, 530～640 μ in length, collectively erumpent through bark periderm, first surrounded by scanty ectostromatic tissue and blackish rupture formed at the bark surface, then surrounding stromatic tissue being collapsed, blackened necks ultimately remain. Dorsal zone present but ventral zone absent. Asci clavate to cylindric-clavate, furnished apical ring at the thickened tip, 44～51×6.5～7.5 μ in size and 47.4×7 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, fusoid to oblong-elliptic, 2-celled, usually not constricted at the septum, hyaline, 11～14.5×3 μ in size and 12.4×3 μ in average.

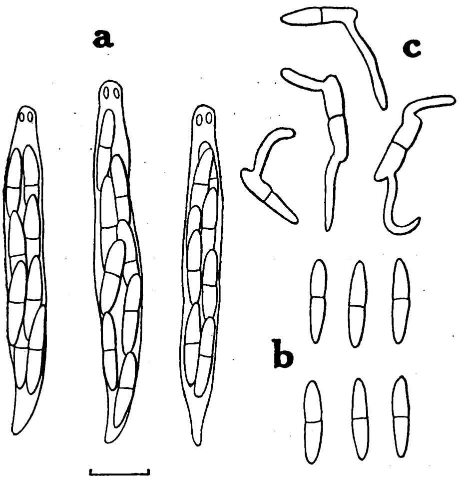

Figure 49. *Diaporthe spiculosa* (ALB. et SCHW.) NIT.
a : Asci and ascospores　b : Ascospores
c : Germinating ascospores　(└─┘=10 μ)

Host and Material: *Rhus verniciflua* STOK. (Urushi)—Kanazawa, Ishikawa, V-, 1959, by K. MUKAIMOTO (FPH-903).

Distribution: Asia (Japan), Europe and North America.

Note: Japanese material was identified as *Diaporthe spiculosa* (ALB. et SCHW.) NIT. based on the morphological characteristics being completely similar to the description made by WEHMEYER (1933). According to his earlier report (1927 b), *Diaporthe rhoina* (CKE. et ELL.) ELL. et EV. which was later included in a synonym of *D. spiculosa*, produced conidial state on oatmeal agar and sterilized twig. Isolate from Japanese material did not produced conidial state on potato-sucrose agar. Ascospore easily germinated. Development of the colony was relatively slow. Colony was flat with aerial mycelia and yellowish gray to yellowish green in colour. Many small sphaeric bodies were produced on lower marginal part of the colony, but they did not produced any type of conidia after all.

Cultural study of the present species on the host other than *Rhus* has not been carried out. Confirmation of the imperfect state of *Diaporthe spiculosa* seusu WEHM. is needed on the host plants other than *Rhus* through cultural study.

7) ***Diaporthe oncostoma*** **(DUBY) FUCKEL**, Symb. Myc. 205, 1869—(Figure 50; Plate XIII: A~C)—SACCARDO, Syll. Fung. 1 : 612, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 655, 1887; ELLIS & EVERHART, N. Amer. Pyren. 423, 1892; WEHMEYER, Pap. Michig. Acad. Sci. 3 : 247, 1923; Univ. Michig. Stud. Sci. Ser. 9 : 141, 1933; MUNK, Dsk. Bot. Ark. 17 (1) : 263, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 353, 1959; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11 (2) : 763, 1962

Synonym: *Sphaeria oncostoma* DUBY ap. RABH., Fung. Europ. 253, 1856
Valsa oncostoma (DUBY) CKE., Handb. Brit. Fung. 2:834, 1871
Chorostate oncostoma (DUBY) TRAV., Fl. Ital. Crypt. 2:205, 1906
Valsa enteroleuca CURR., Trans. Linn. Soc. Lond. 22:275, 1858
Diaporthe enteroleuca (CURR.) SACC., Syll. Fung. 1:612, 1882
Diaporthe fasciculata NIT., Pyren. Germ. 247, 1867; SACCARDO, Syll. Fung. 1:639, 1882
Valsa personata CKE. et ELL., Grev. 7:9, 1878
Diaporthe personata (CKE. et ELL.) SACC., Syll. Fung. 1 : 612, 1882
Diaporthe dolosa SACC. et ROUM., Rev. Myc. 5:234, 1883; SACCARDO, Syll. Fung. 9:718, 1891

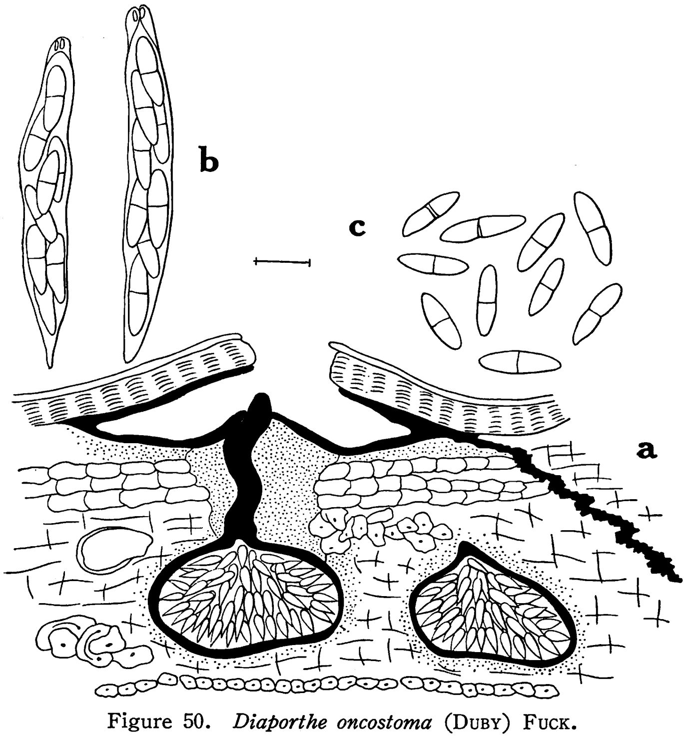

Figure 50. *Diaporthe oncostoma* (DUBY) FUCK.
a : Perithecia formed beneath the decomposed empty pycnidium
b : Asci and ascospores　　c : Ascospores
(⊢⊣ : a=100 μ; b, c: 10 μ)

Diaporthe sublutea ELL. et EV. ap. WEHM., Univ. Michig. Stud. Sci. Ser. 9:151, 1933
Conidial state: *Phomopsis petiolorum* (DESM.) GROVE, Kew Bull. Misc. Inform. 1917:60 (=*Phoma petiolorum* DESM., Others vide WEHMEYER 1933)

Pustules on bark of dead or cankered stems and twigs, 0.5～1.5 mm in diam., elevated as conic rupture; perithecia clustered in small group beneath the pycnidial stroma and seated on woody tissue, globular to subglobular, 400～500 μ in diam., with neck at the top. Blackened zone present within bark and wood, completely circumscribing several perithecial pustules. Necks cylindric, collectively erumpent through decomposed pycnidial stroma, 230～500 μ in length, penetrated by a pore furnishing hyaline periphyses. Asci clavate to cylindric-clavate, thin-walled, thickened at the tip furnishing apical ring, tapered toward the base, 50～71×7.5～9.5 μ in size and 56.4×8.5 μ in average, 8-spored, loosed from perithecial wall. Ascospores irregularly biseriate, oblong-elliptic to fusoid, hyaline, 2-celled, slightly constricted at the septum, 12.5～18.5×3～5 μ in size and 15.4×4 μ in average.

Host and Material: *Elaeagnus umbellata* THUNB. (Aki-gumi)—Akita-city, Akita, IX-, 1953, by K. SATO (FPH-1268).

Distribution: Asia (Japan), Europe and North America.

Note: The present *Diaporthe* differs from *D. beckhausii* NIT. having a synonym of *D. elaeagni* REHM, by its larger asci and ascospores. No other species described on *Elaeagnus* was found. Among the large-spored species of *Diaporthe* in WEHMEYER's monograph (1933), *D. oncostoma* (DUBY) FUCK. and *D. sublutea* ELL. et EV. ap. WEHM. are quite identical with the fungus on *Elaeagnus*. The former species was reported from Europe and North America on *Robinia* plant. The latter was collected on *Cornus* in Canada. As already pointed out by WEHMEYER, *Diaporthe sublutea* was quite similar to *D. oncostoma*. So far as can be judged from his description and figure, no difference is found between both species excepting the difference in host plant. Although WEHMEYER tentatively separated *Diaporthe sublutea* from *D. oncostoma*, this treatment seems to be inconsistent with his stand to unite many species which are not different from each other in their morphology, into a large species having wide host range. From the characteristics mentioned above, the fungus on *Elaeagnus* is identified as *Diaporthe oncostoma*, and *D. sublutea* is also deemed to be synonymus with *D. oncostoma*.

According to WEHMEYER (1923, 1933), *Diaporthe oncostoma* produces normal *Phomopsis* type of conidia, namely, shorter elliptic to fusoid alpha conidia and long filiform beta conidia. From Japanese material, the fungus was isolated and culture was perserved in our laboratory. However, its conidial formation was not recorded at that time. Now, the culture may be infertile.

8) *Diaporthe larseniana* MUNK, Dsk. Bot. Ark. 14(8):3, 1952; 17(1):255, 1957—(Figure 51; Plate XIII: D～F)

Conidial state: Undetermined species of *Phomopsis*.

Pustules on bark of dead stems, 0.5～1 mm in diam., immersed at first, then erumpent and broken through the bark epiderm exposing dark to blackish mass of the top of necks. Development of ectostroma scanty, visible only around necks; entostromatic area large, composed of loose hyphal elements and the decomposed tissue of substrata, compact hyphal masses found in resin canals. Perithecia embedded within such entostromatic area, often beneath the pycnidial stroma, globular or depressed at the bottom, often obliquely placed at outermost part, 500～600 μ in diam., with black neck at the top. Blackened zone present within bark and wood surrounding one to several entostromatic areas, constituted from several layers of blackish, isodiametric, thick-walled

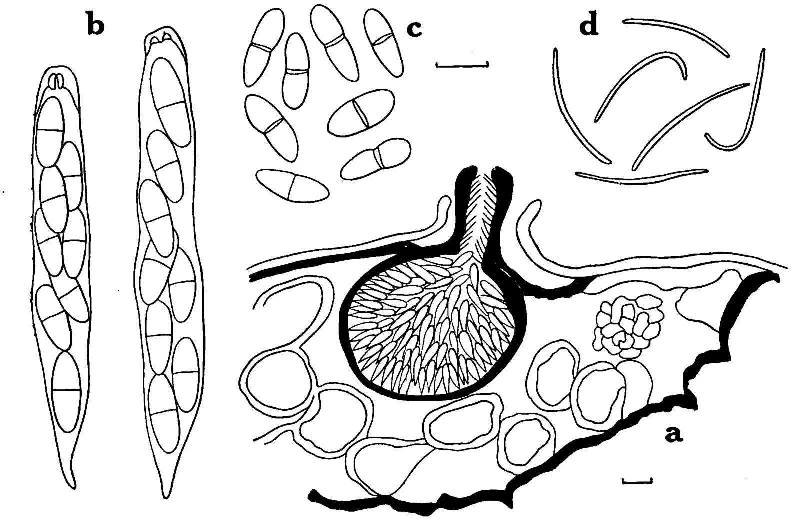

Figure 51. *Diaporthe larseniana* MUNK

a : Perithecium formed beneath the empty decomposed conidial layer
b : Asci and ascospores　　c : Ascospores　　d : Beta conidia produced on culture　　(⌴ : a=100μ; b∼d=10μ)

cell. Perithecial wall constituted from two layers of cell; outer layer composed of angular, dark brown to black, thick-walled cells, inner one composed of flattened, hyaline, thin-walled cells. Necks cylindric, erect or bent toward the disc, 250∼500μ in length, collectively erumpent through periderm or decomposed pycnidial stroma, composed of vertically elongated plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses. Asci clavate or cylindric-clavate, thin-walled with thickened tip furnishing apical ring, 63∼88×10∼12.5μ in size and 75×11.4μ in average, 8-spored, loosed irregularly in perithecium. Ascospores elliptic to fusoid, narrowly rounded at the ends, straight, 2-celled, slightly constricted at full maturity, hyaline, 14∼22.5×4.5∼6.5μ in size and 17.7×5.3μ in average.

Host and Material: *Abies veitchii* LIND. (Shirabe)—Mt. Fuji, Narusawa, Yamanashi, VI-22, 1966, by T.U. & T.K. (FPH-2843).

Distribution: Asia (Japan) and Europe.

Note: On the host plant only empty and decomposed conidial layers, which were presumed to be the pycnidial cavity of *Phomopsis*, were observed. Isolate from ascospore of the fungus developed similar culture to that of *Diaporthe* forming *Phomopsis* type of conidia. Ascospore germinated quite well and grew fast. White and flat colony with cottony aerial mycelia at marginal area covered the whole surface of potato-sucrose agar slant within one to two weeks. Colony then turned to grayish white and brownish streaks often appeared on it. Several large sphaeric bodies, 1∼3 mm in diam., were scatteredly formed on the colony and white to creamy drops of conidia oozed out from them. Only ingerminable beta conidia were produced on culture. They were hyaline, unicellular, acicular to filiform, straight or hooked, 20∼30×0.8∼2μ in size and 24.4×1.7μ in average. Alpha conidia were not produced after all. This conidial state may belong to the form-genus *Phomopsis*, judging from the general character of the culture, the type of beta conidia produced on culture, and the empty pycnidial cavity found on the host plant. Finding of alpha conidia is necessary to complete the life-history on the host plant.

On conifers, only a few large-spored species of *Diaporthe* have been known. Among them, *Diaporthe pinophylla* PLOW. et PHIL., to which SACCARDO (1882) gave the size of ascospore as 17～18×5 μ, was included in the same group as the conifer form of *Diaporthe eres* NIT. (=*D. conorum* (DESM.) NIESSL) by WEHMEYER (1933), who reexamined the authentic specimen of *D. pinophylla* and found its ascospore to be 9～12×2.5～4 μ. Ascospore of *Diaporthe griseo-gingens* (BERK. et CURT.) SACC. was said by SACCARDO (1882) to be 20 μ in length. Reexamination of the type specimen by WEHMEYER (1933) revealed, however, that it was not a *Diaporthe* but a species of *Physalospora*. *Diaporthe larseniana* MUNK based on a fungus on *Picea* (MUNK 1952, 1957) is quite accordant with the present fungus in its morphological characters. Conspicuous development of blackened zone enveloping perithecial pustules and large-sized ascospore are quite common characters among Danish and Japanese materials. No other species identical with the present *Diaporthe* was found. MUNK did not record the conidial state of the fungus.

9) ***Diaporthe evonymi*** **DEARNESS**, Mycol. 8:99, 1916—(Figure 52; Plate XIII: G)—WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9:124, 1933
Conidial state: Unknown.

Pustules on bark of dead twigs; perithecia embedded singly or in small group within bark tissue, surrounded by loose hyphae twisting the decomposed tissue of substrata, black, globular or depressed, about 600 μ in diam., with neck at the top. Blackened zone present within bark and wood. Necks cylindric, collectively erumpent through periderm exposing small black papillae in the longitudinal slit of the bark surface, about 500 μ in length, surrounded by prosenchymatous ectostromatic tissue of hyphae. Asci clavate or cylindric-clavate, furnished apical ring at the thickened tip, tapered toward the base, 58～68×9～10 μ in size and 63×9.8 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, fusoid to oblong-elliptic, hyaline, 2-celled, constricted at the septum, 15～17.5×4.5～5.5 μ in size and 16.6×5.1 μ in average.

Host and **Material**: *Euonymus sieboldianus* BL. (Mayumi)—Karuisawa, Nagano, IX-13, 1961, by T.K. (FPH-2162).

Distribution: Asia (Japan) and North America.

Note: Among the four species of *Diaporthe* on *Euonymus* differentiated by WEHMEYER (1933), *D. eres* NIT. and *D. pardalota* (MONT.) FUCK. distinctly differ from the present fungus in their smaller asci and ascospores. *Diaporthe laschii* NIT. also differs from the fungus in question by its narrower ascospore having appendage. The Japanese fungus quite agrees with the description of *Diaporthe evonymi* sensu WEHM. In the original description (DEARNESS 1916), the size of ascospore was given as somewhat shorter, 12～15×6～7 μ, while the dimension of WEHMEYER on the type material, 13～17×4～6.5 μ in size, was identical with that of Japanese material. No record on the imperfect state of the present species was found.

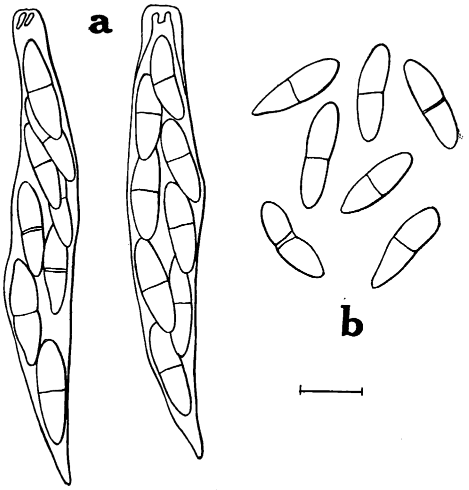

Figure 52. *Diaporthe evonymi* DEARN.
a : Asci and ascospores b : Ascospores
(⊢⊣ =10 μ)

10) ***Diaporthe dubia*** **Nitschke**, Pyren. Germ. 317, 1867—(Figure 53; Plate XIII: H, I)—Saccardo, Syll. Fung. 1:678, 1882; Winter, Rabh. Kryptgfl. I, 2:626, 1887; Wehmeyer, Univ. Michig. Stud. Sci. Ser. 9:152, 1933; Munk, Dsk. Bot. Ark. 17(1):260, 1957; Gilman et al., Ia. St. Coll. Jour. Sci. 33:356, 1959.

Synonym: *Diaporthe subcongrua* Ell. et Ev., N. Amer. Pyren. 425, 1892; Saccardo, Syll. Fung. 11:308, 1895

Diaporthe congener Ell. et Ev., N. Amer. Pyren. 426, 1892; Saccardo, Syll. Fung. 11: 309, 1895

Diaporthe ontariensis Ell. et Ev., N. Amer. Pyren. 426, 1892; Saccardo, Syll. Fung. 11:308, 1895

Diaporthe robusta Peck, Rept. N.Y. St. Mus. 48:15, 1895; Saccardo, Syll. Fung. 14:544, 1899

Diaporthe moriokaensis Sawada, Bull. Gov. For. Exp. Sta. 53:172, 1952

Conidial state: Undetermined species of *Phomopsis*.

Pustules on bark of dead branches, small, 0.5～1 mm in diam., black, immersed at first, then erumpent through bark epiderm, elevated conic to angular rupture; ectostroma scanty, only visible

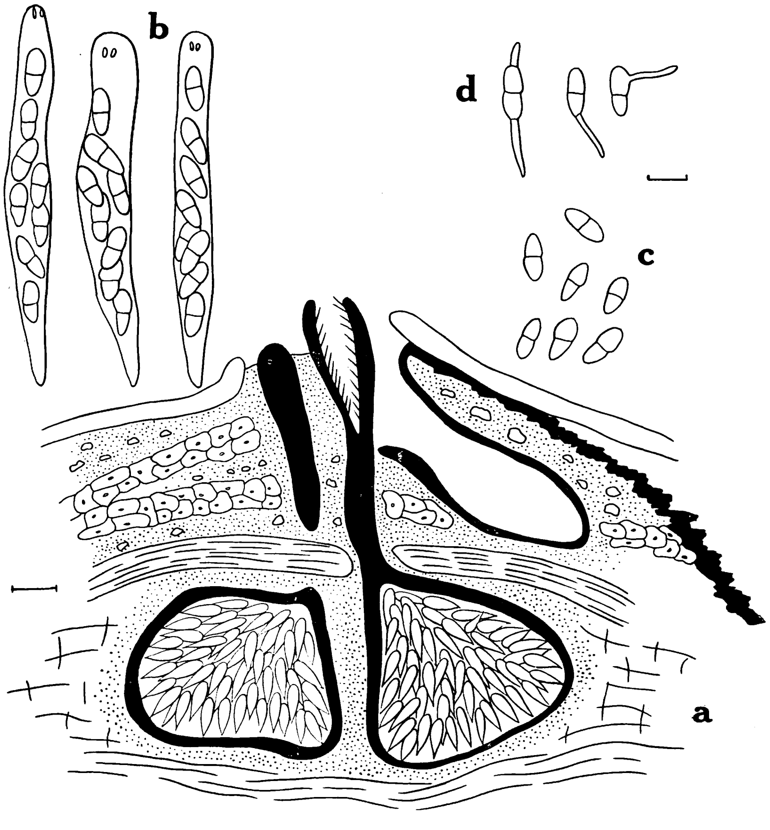

Figure 53. *Diaporthe dubia* Nit.

a : Perithecia formed beneath the decomposed pycnidium

b : Asci and ascospores　　c : Ascospores

d : Germinating ascospores　(└─┘: a=100 μ; b～d=10 μ) around the necks. Blackened zone present, surrounding one to several perithecial pustules. Perithecia embedded singly or in small group within bark tissue, surrounded by loose hyphae twisting decomposed tissue, globular to depressed, 450～500 μ in diam., with long neck. Necks cylindric, collectively erumpent through the bark or decomposed pycnidial stroma, about 650 μ in length, surrounded by ectostromatic hyphal element, composed of elongated plectenchymatous cells and pierced by a pore furnishing hyaline periphyses. Asci clavate oblong-clavate, with thin membrane, thickened at the tip furnishing apical ring, loosed from perithecial wall, 8-spored, 70～83×10～14 μ in size and 76.8×11.9 μ in average. Ascospores irregularly uni- to biseriate, elliptic to fusoid, rounded at the ends, straight or inaequilateral, 2-celled, constricted at the septum, 15～19×6.5～7.5 μ in size and 16.6×6.6 μ in average.

Host and Material: *Acer palmatum* Thunb. (Iroha-momiji)—Hashimoto, Kanagawa, X-20, 1959, by T.U. (FPH-3306).

Distribution: Asia (Japan), Europe and North America.

Nnte: On *Acer*, five species of *Diaporthe* have been reported from Europe and North America (Wehmeyer 1933). Among them, *Diaporthe dubia* Nit. having largest ascospore is quite identical with the present *Diaporthe*. Imperfect state of *Diaporthe dubia* was proved to be a species of *Phomopsis* by Wehmeyer (1930). In Japanese material, conidial state has not yet been determined for the lack of cultural study. However, the present *Diaporthe* is identified as *D. dubia* by the complete accordance in its morphology of the perfect state with the detailed descriptions and figures of Wehmeyer (1933) and Munk (1957). The present species is characterized by the enclosed blackened zone on wood or bark tissue and wider ascospore than those of the other *Diaporthe* on *Acer*.

In Japan, Sawada (1952) described a species of *Diaporthe* on *Acer*, namely *D. moriokaensis* Sawada. Judging from his description and figure, this species is quite identical with *Diaporthe dubia*, so the author treats *D. moriokaensis* to be a synonym of *D. dubia*.

11) ***Diaporthe varians*** **(Currey) Saccardo**, Syll. Fung. 1:614, 1882—(Figure 54; Plate XIV: A)—Wehmeyer, Univ. Michig. Stud. Sci. Ser. 9:156, 1933

Synonym: *Diatrype* (*Valsa*) *varians* Curr., Trans. Linn. Soc. Lond. 22:270, 1858
Diaporthe aceris Fuck., Symb. Myc. 204, 1869; Saccardo, Syll. Fung. 1:610, 1882

Conidial state: Unknown.

Pustules on bark of dead branches, scattered, 0.5～1 mm in diam., erumpent through bark epiderm exposing converged necks. Blackened zone present within bark and wood. Perithecia embedded in small group within bark tissue, globular or depressed, 590～750 μ in diam., surrounded by loose hyphae twisting the disintegrated tissue of substrata, with long neck at the top. Necks cylindric, collectively erumpent through bark periderm, 680～850 μ in length, composed of vertically elongated, plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses. Asci clavate to cylindric-clavate, with thin membrane, thickened at the tip furnishing apical ring, tapered toward the base, 84～99×9.5 μ in size, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to fusoid, rounded at the ends, straight or inaequilateral, hyaline, 2-celled, usually not constricted at the septum, 14～18×4～5.5 μ in size and 16.5×5.3 μ in average.

Host and Material: *Acer palmatum* var. *amoenum* (Carr.) Ohwi (O-momiji)—Kamabuchi, Yamagata, X-1, 1960, by T.K.

Distribution: Asia (Japan) and Europe.

Note: The present fungus differs from the previous species in its narrower and not-constricted ascospore. Among the other four species on *Acer* considered to be valid by WEHMEYER (1933), *Diaporthe eres* NIT. and *D. acerina* (PECK) SACC. are distinguishable from the present fungus by their smaller ascospore, being not over 15 μ in length. *Diaporthe pustulata* (DESM.) SACC. is also different from the fungus in question by its apparent pustulate form of stromatic area and smaller ascospore. *Diaporthe varians* (CURR.) SACC. recorded from Europe is a little known species and it was differentiated from *D. dubia* NIT. by its narrower ascospore showing inaequilateral shape by WEHMEYER. Morphological characters of Japanese material is quite identical with *Diaporthe varians* sensu WEHM. Hence, the present fungus is identified as *Diaporthe varians*. Cultural study of Japanese material was not conducted.

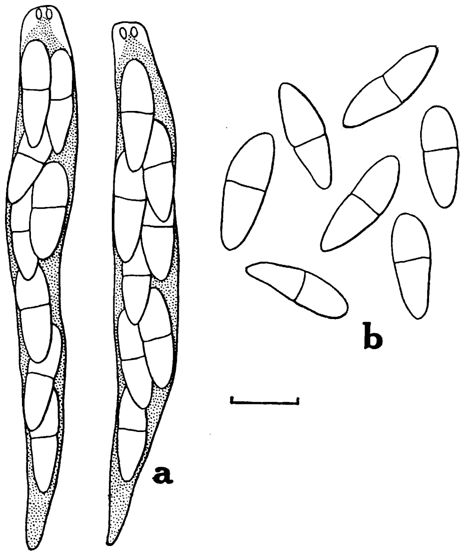

Figure 54. *Diaporthe varians* (CURR.) SACC.
a : Asci and ascospores　b : Ascospores
(⎵ =10 μ)

12) ***Diaporthe pustulata*** (**DESMAZIÉRES**) **SACCARDO**, Syll. Fung. 1:610, 1882—(Figure 55; Plate XIV: B, C)—WINTER, Rabh. Kryptgfl. I, 2:657, 1887; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9:153, 1933

Synonym: *Sphaeria pustulata* DESM., Ann. Sci. Nat. Ser. III, 6:70, 1846
Aglaospora pustulata (DESM.) TUL., Sel. Fung. Carp. 2:163, 1863
Diaporthe niesslii SACC. (non KZE.), Mich. 1:391, 1871; Syll. Fung. 1:610, 1882; WINTER, Rabh. Kryptgfl. I, 2:656, 1887
Chorostate niesslii (SACC.) TRAV., Fl. Ital. Crypt. 2:196, 1906
Calospora zopfii (KZE.) SACC., Syll. Fung. 2:232, 1883

Conidial state: Undetermined.

Pustules on bark of dead branches, 1～2 mm in diam., scattered, elevated conic to truncate conic ruptures, broken through bark epiderm as angular rupture forming gray to black disc with convergent necks and ectostroma surrounding necks. Perithecia clustered and embedded within bark, globular or depressed at the bottom, 200～490 μ in diam., with neck at the top, surrounded by loose entostromatic hyphae twisting decomposed tissue of substrata. Neck cylindric, collectively erumpent through periderm or decomposed pycnidial stroma, 520～720 μ in length, penetrated by a pore furnishing hyaline periphyses. Blackened zone distinctly present within bark and wood, enveloping several perithecial pustules. Asci clavate to cylindric-clavate, with thin membrane, furnished apical ring at thickened tip, 43～58×6～8 μ in size and 46.8×6.7 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to fusoid, straight or inaequilateral, 2-celled, only slightly constricted at full maturity, hyaline, 11～14×2.5～4 μ in size and 12.3×3 μ in average.

Host and **Material**: *Acer palmatum* var. *amoenum* (CARR.) OHWI (Ō-momiji), Asakawa, Tokyo,

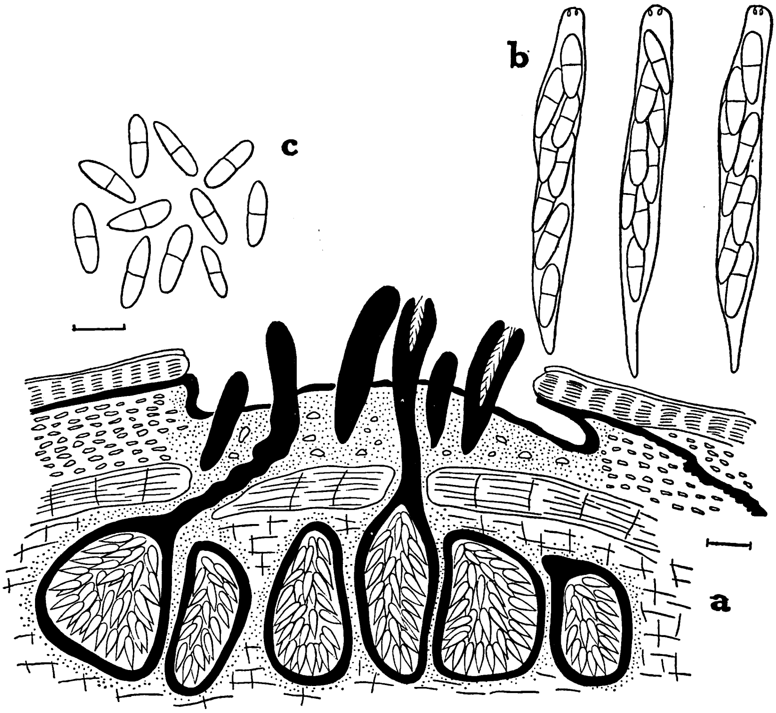

Figure 55. *Diaporthe pustulata* (DESM.) SACC.

a : Perithecial pustule　b : Asci and ascospores　c : Ascospores

(⊢—⊣ : a=100 μ; b, c=10 μ)

III-22, 1960, by T.K. (FPH-872, 873, 1211, 1215); Hazama nursery, Asakawa, Tokyo, IV-10, 1960, by T.K. (FPH-1205, 1206).

Distribution: Asia (Japan) and Europe.

Note: The present fungus differs from *Diaporthe eres* NIT. by its clustered perithecia and pustulate form of stromatic area. It is also different from *Diaporthe medusaea* NIT. in its non-elongation of necks from the bark surface and more thickly aggregated form of stroma. The fungus collected in Japan is quite accordant with *Diaporthe pustulata* (DESM.) SACC. among the species of *Diaporthe* recorded on *Acer* in its general features and also dimensions of ascus and ascospore. Characteristic pustulate form figured by WEHMEYER (1933) is also found on Japanese materials. WEHMEYER described the size of ascospore of *Diaporthe pustulata* as 12~15(16)×3~4(5) μ from the examination of authentic specimens including *Sphaeria pustulata*, while MUNK (1957) noted its size as 14~19×3.5~5.5 μ. MUNK's dimension on Danish material was very large, and it was suggested from his description that the Danish fungus probably belongs to *Diaporthe varians* (CURR.) SACC.

In literature (SACCARDO 1882, WEHMEYER 1933), *Phomopsis pustulata* (SACC.) TRAV. has been considered to be the imperfect state of *Diaporthe pustulata* without any experimental proof.

13) ***Diaporthe detrusa*** (**FRIES**) **FUCKEL**, Symb. Myc. 205, 1869—(Figure 56; Plate XIV: D~F)—SACCARDO, Syll. Fung. 1:619, 1882; WINTER, Rabh. Kryptgfl. I, 2:653, 1887; WEHMEYER, Pap.

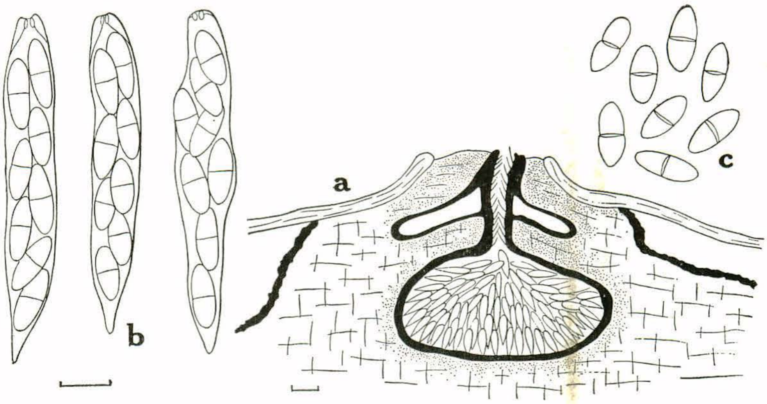

Figure 56. *Diaporthe detrusa* (Fr.) Fuck.
a : Perithecium formed beneath the empty pycnidial layer
b : Asci and ascospores　c : Ascospores
(└─┘: a=100 μ, b, c=10 μ)

Michig. Acad. Sci. 9:477, 1929; Univ. Michig. Stud. Sci. Ser. 9:175, 1933; Munk, Dsk. Bot. Ark. 17(1):259, 1957

Synonym: *Sphaeria detrusa* Fr., Syst. Myc. 2:382, 1823
Valsa detrusa Fr., Sum. Veg. Scand. 411, 1846
Chorostate detrusa (Fr.) Trav., Fl. Ital. Crypt 2:195, 1906
Diaporthe pycnostoma Otth, Mitt. Nat. Ges. Bern, Nachtr. 7:99, 1870
Diaporthe mahoniae Speg., Mich. 1:456, 1879
Diaporthe crassiuscula Sacc. et Bizz., Mich. 2:378, 1882
Chorostate crassiuscula (Sacc. et Bizz.) Trav., Fl. Ital. Crypt. 2:194, 1906

Conidial state: *Phomopsis detrusa* (Sacc.) Died., Krypt. Markbr. VII, 9:247, 1912 (=*Phoma detrusa* Sacc., *Phomopsis mahoniae* Grove).

Pustules on bark of dead stems, 0.5～1 mm in diam., scattered in the darkened patches on bark, breaking through bark epiderm as conic or angular rupture; perithecia embedded singly or in small group beneath decomposed pycnidial stroma and seated within bark tissue or on wood, about 700 μ in diam., globular or depressed at the bottom, with neck on the top. Necks cylindric, about 400 μ in length, collectively erumpent through decomposed pycnidial stroma, penetrated by a pore furnishing hyaline periphyses. Blackened zone present within bark and wood, completely circumscribing several perithecial pustules. Asci clavate to cylindric-clavate with thin membrane, furnished apical ring at the thickened tip, 65～73×10～12.5 μ in size and 68.5×11.6 μ in average, with short evanescent stalk, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, fusoid to elliptic-fusoid, 2-celled, constricted at the septum, hyaline, 14～17.5×5～6.5 μ in size and 16.1×5.6 μ in average.

Conidial state was not collected on the host plant. On culture two types of conidia belonging to *Phomopsis* were obtained from single ascospore culture on potato-sucrose agar. One of these is called alpha conidium and is elliptic to fusoid, unicellular, hyaline, 10～12.5×2.5～4.5 μ in size and 11.2×3.1 μ in average; the other beta conidium is long filiform to acicular, straight or hooked to wavy, unicellular, hyaline, 25～40×0.8～1.3 μ in size and 31.6×0.9 μ in average.

Host and Material: *Hydrangea paniculata* SIEB. (Nori-utsugi)—Nippara, Tokyo, XI-9, 1963, by T.K. (FPH-2336).

Distribution: Asia (Japan), Europe and North America.

Note: No large-spored species of *Diaporthe* has been known on *Hydrangea*. *Diaporthe hydrangeae* ELL. et EV. is a small-spored species and was included in the synonym of *Diaporthe eres* NIT. by WEHMEYER (1933). Among the large-spored species of *Diaporthe* described on the host other than *Hydrangea*, five are similar to the present material in their size of asci and ascospore. *Diaporthe inaequalis* (CURR.) NIT. on *Amorpha* etc., *D. tuberculosa* (ELL.) SACC. on *Amelanchier*, and *D. ampelopsides* (ELL.) ELL. et EV. on *Psedera* are different from the fungus on *Hydrangea* by their morphological characters in the imperfect state (WEHMEYER 1933). *Diaporthe viburni* DEARN. et BISBY and its variety *spiraeicola* WEHM. which has similar imperfect state to the present fungus are also distinguishable from the fungus in question by the absence of blackened zone and solitary perithecium (BISBY et al. 1929, WEHMEYER 1933).

Diaporthe detrusa (FR.) FUCK. widely distributes throughout Europe on *Berberis* and morphology of the fungus on *Hydrangea* is quite accordant with that of *Diaporthe detrusa* reported by WEHMEYER (1933) and MUNK (1957), not only in the perfect state but also imperfect state. According to WEHMEYER (1929), *Diaporthe detrusa* produced two types of conidia in the single ascospore isolate on oatmeal agar and on sterilized twig. His alpha and beta conidia are mostly overlapped by those obtained on monoascospore culture of Japanese metarial. As the difference of host plant seems to be not essentially important to separate species in the genus *Diaporthe*, the fungus on *Hydrangea* is identified as *Diaporthe detrusa* (FR.) FUCK.

Ascospore of the fungus easily germinated and developed its colony on potato-sucrose agar. Colony grew fast and white to grayish white in colour, then became felty with white aerial mycelia at the marginal area. Colour of colony turned to gray to grayish brown with more darker irregular stripes. Within one to two months after isolation, large sphaeric bodies were produced on the colony. These bodies were the pycnidial stroma and sometimes aggregated two or more stromata in a large mass. From these bodies large mucous drops, creamy white in colour, oozed out. Alpha and beta conidia described above were mixed together in these drops.

14) *Diaporthe alleghaniensis* ARNOLD, Can. Jour. Bot. 45 : 787, 1967 — (Figure 57)

Conidial state: *Phomopsis alleghaniensis* ARNOLD, Can. Jour. Bot. 45:787, 1967

Pustules on dead bark, 0.5 mm in diam., scattered; ectostroma scanty. Perithecia clustered in small group, embedded within bark tissue, globular or depressed

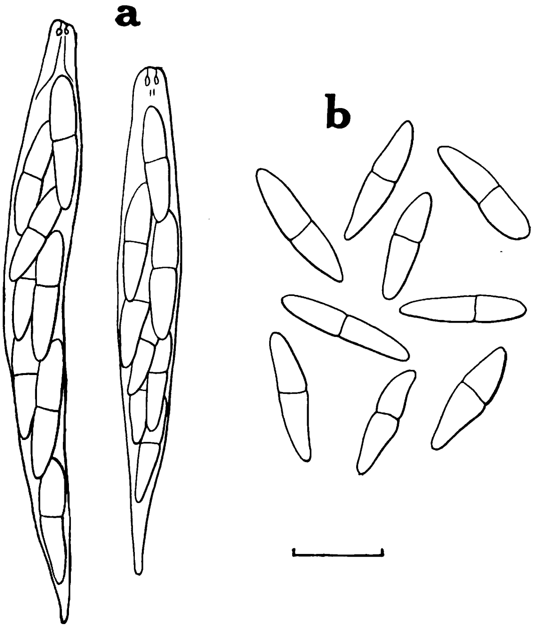

Figure 57. *Diaporthe alleghaniensis* ARNOLD
a : Asci and ascospores　b : Ascospores
(⌴ =10 μ)

at the bottom, $350\sim500\,\mu$ in diam., with neck at the top. Blackened zone present, enclosed several perithecial pustules. Neck cylindric, about $500\,\mu$ in length, penetrated by a pore furnishing hyaline periphyses, collectively erumpent through bark epiderm, appearing small black pustule. Asci clavate or cylindric-clavate, thin-walled with thickened tip furnishing apical ring, $59\sim67\times7\sim8.5\,\mu$ in size and $62.6\times8.1\,\mu$ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, fusoid to oblong elliptic, straight or inaequilataral, hyaline, 2-celled, $12.5\sim17\times3\sim4\,\mu$ in size and $15.7\times3.7\,\mu$ in average.

Host and Material: *Betula papyrifera* MARSH (Ōshu-shira-kanba)—Asakawa, Tokyo, III-23, 1961, by T.K.

Distribution: Asia (Japan) and North America.

Note: On *Betula*, four species of *Diaporthe* have been known, namely *D. eres* NIT. (=*D. exasperans* NIT.), *D. beckhausii* NIT. (=*D. transversalis* KARST.), *D. pruni* ELL. et EV. and *D. alleghaniensis* ARNOLD. Among them, *Diaporthe eres* differs from the present fungus by its smaller ascospore and *D. beckhausii* also differs by its smaller ascospore and beta conidium. *Diaporthe pruni* is apparently distinguished from the present *Diaporthe* by its larger ascospore having appendage. The fungus in question is much like *Diaporthe alleghaniensis* described recently from Canada, though the conidial state of the former is not found. Among the large-spored species of *Diaporthe* which are recorded on the other host plants than *Betula*, *D. padi* OTTH having wide host range is quite similar to the present fungus. The author doubts whether *Diaporthe alleghaniensis* ARNOLD is distinguishable from *Diaporthe padi* sensu WEHM. or not. However, no experimental proof was presented for the life history of *Diaporthe padi*. Therefore, *Diaporthe alleghaniensis* is considered provisionally to be an independent species and Japanese fungus is identified to it.

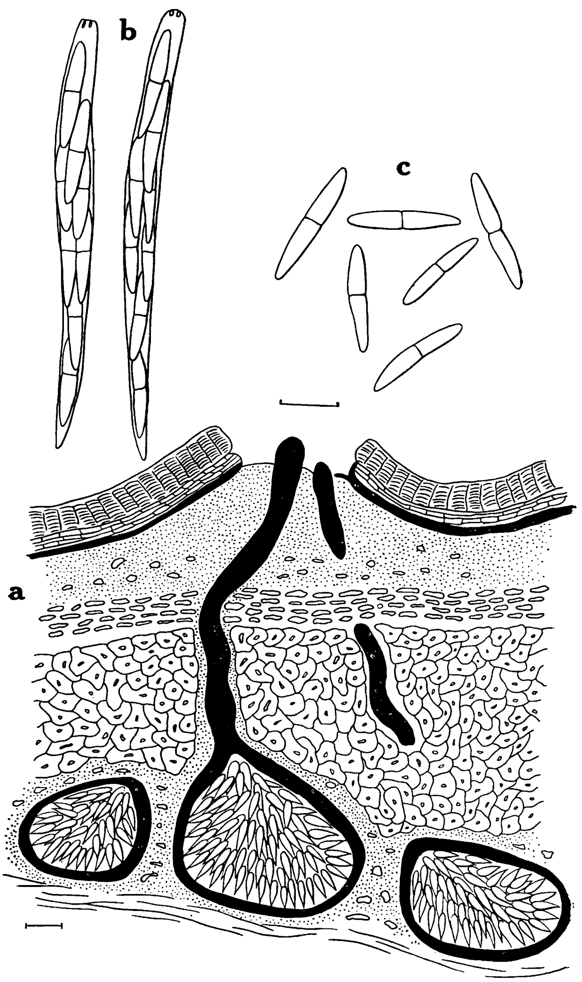

Figure 58. *Diaporthe melanocarpa* DEARN.
a: Perithecial pustule　b: Asci and ascospores
c: Ascospores　(⊢⊣: a=100 μ; b, c=10 μ)

15) ***Diaporthe melanocarpa*** **DEARNESS**, Mycol. 18 : 247, 1926—(Figure 58; Plate XIV: G~I)—WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9:150, 1933; GILMAN et al., Ia. St. Coll. Jour. Sci. 33:353, 1959

Conidial state: Unknown.

Pustules on bark of dead twigs, scattered or gregarious, $0.5\sim1$ mm in diam.; ectostroma scanty forming small black disc with converged necks. Perithecia in small group, embedded within bark tissue, globular or depressed at the bottom, 560～750 μ in diam., with long neck at the top. Necks cylindric, often wavy, 250～800 μ in length, collectively erumpent through disc or decomposed pycnidial stroma. Asci clavate or cylindric-clavate, with apical ring at thickened tip, 50～85×7～9 μ in size and 69.7×7.8 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, fusoid or oblong-elliptic, straight or inaequilateral, hyaline, 2-celled, 16.5～22.5×2.8～4.2 μ in size and 19×3.4 μ in average. Blackened zone present within bark and on wood, surrounding several perithecial pustules.

Host and Material: *Betula platyphylla* var. *japonica* (MIQ.) HARA (Shira-kanba)—Tsumagoi, Gunma, X-1, 1960, by T. U. (FPH-854).

Distribution: Asia (Japan) and North America.

Note: The present fungus distinctly differs from the four *Diaporthe* described on *Betula* by its longer ascospore.

Diaporthella platasca (PECK) WEHM. apparently differs from the present material in its well compactly developed stroma and elongate neck protruding more than 1 mm from the bark surface (WEHMEYER 1933). Among the large-spored *Diaporthe* recorded on the other host plants, *Diaporthe melanocarpa* DEARN. is quite accordant with the present fungus in its morphological characteristics, *Diaporthe melanocarpa* was first recorded on *Pyrus* (DEARNESS 1926), and two other hosts, *Amelanchier* and *Cornus,* were added by WEHMEYER (1933) and GILMAN et al. (1959). On Japanese mrterial, empty decomposed pycnidial stroma was found. As no cultural study was conducted, conidial state of the present species is unknown.

16) ***Diaporthe padi*** **OTTH**, MITT. Nrt. Ges. Bern, Nachtr. 7:99, 1870—(Figure 59; Plate XV: A, B)—SACCARDO, Syll. Fung. 14:543, 1899; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9:136, 1933; GILMAN et al., Ia. St. Coll. Jour. Sci. 33:353, 1959

Synonym: *Diaporthe decorticans* (LIB.) SACC. et ROUM., Rev. Myc. 3 (11): 42, 1881; SACCARDO, Syll. Fung. 1:619, 1882; WINTER, Rabh. Kryptgfl. I, 2:650, 1887
Diaporthe patria SPEG., Atti Soc. Critt. Ital. Milan. 3:53, 1881; SACCARDO, Syll. Fung. 1:617, 1882
Chorostate patria (SPEG.) TRAV., Fl. Ital. Critt. 2:198, 1906

Conidial state: *Phomopsis padina* (SACC. et ROUM.) DIED., Ann. Myc. 9:27, 1911 (=*Phoma padina* SACC. et ROUM.)

Pustules on dead bark, 0.5～1 mm in diam., scattered; ectostroma scanty. Perithecia clustered in small group, embedded within bark tissue, globular or depressed at the bottom, 400～750 μ in diam., with neck at the top. Blackened zone present, several perithecial pustules enclosed. Necks cylindric, 750～800 μ in length, penetrated by a pore furnishing hyaline periphyses, collectively erumpent through bark periderm. Asci clavate or cylindric-clavate, thin-walled with thickened tip furnishing apical ring, 48～58×7.5～10 μ in size and 52.8×9.0 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores fusoid to oblong elliptic, rounded at the ends, irregularly biseriate, straight or inaequilateral, hyaline, 2-celled, 12.5～16.5×2.5～4 μ in size and 14.5×3.2 μ in average.

Host and Material: *Malus sieboldii* (REG.) REHD. (Zumi)—Karuisawa, Nagano, IX-25, 1960, by T. U. (FPH-852).

Distribution: Asia (Japan), Europe and North America.

Note: On *Malus* four species of *Diaporthe* have been known. Among them, *Diaporthe eres*

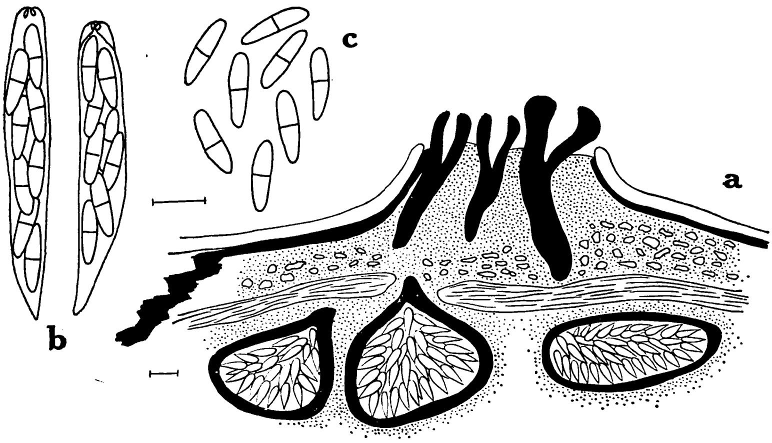

Figure 59. *Diaporthe padi* Otth
a : Perithecial pustule b : Asci and ascospores
c : Ascospores (⊢—⊣: a=100 μ; b, c=10 μ)

Nit. and *D. medusaea* Nit. differ from the present fungus by their smaller ascospore and nature of perithecial pustules, *Diaporthe melanocarpa* Dearn. and *D. mali* Bres. also differ by their much longer ascospore. Among the large-spored species of *Diaporthe*, *D. padi* Otth inhabiting various host plants is quite similar to the present fungus. According to Munk (1957), ascospore of his *Diaporthe padi* has filiform appendage at both ends, and size of ascospore given by him is larger than those given by other workers. His fungus on *Cerasus* is probably not *Diaporthe padi* but *D. pruni* Ell. et Ev. *Diaporthe padi* was first described on *Prunus*, then several other host plants, such as *Aesculus*, *Rhamnus*, *Quercus*, *Sorbus* and *Ulmus*, were added to it (Wehmeyer 1933, Gilman et al. 1959). No other species identical with the present fungus was found.

Conidial state of the present species has not yet been proved, though *Phomopsis padina* (Sacc. et Roum.) Died. was considered to be the imperfect state of *Diaporthe padi* in literature (Saccardo 1884, Wehmeyer 1933).

17) ***Diaporthe impulsa*** **(Cooke et Peck) Saccardo**, Syll. Fung. 1:618, 1882—(Figure 60; Plate XV:C～E)—Wehmeyer, Pap. Michig. Acad. Sci. 9:483, 1929; Univ. Michig. Stud. Sci. Ser. 9:171, 1933

Synonym: *Valsa impulsa* Cooke et Peck, Rept. N.Y. St. Mus. 27:109, 1877
Diaporthe expatriata Rehm (?) in Sydow, Myc. March. 1657, 1887
Diaporthe strumelloides Rehm, Fung. Europ. 3753, 1890
Diaporthe sorbicola (Nit.) Bref., Unters. Mykol. 10:236, 1891
Diaporthe aucupariae Hazal., Sphaer. Hung. 193, 1892
Diaporthe woroniniae Jacz., Bull. Soc. Imp. Nat. Moscou 1:236, 1896
Diaporthe congesta Ell. et Ev., Jour. Myc. 9:165, 1903

Conidial state: Undetermined species of *Phomopsis*.

Pustules on bark of dead branches, scattered, 1～2 mm in diam., first elevated conic with epiderm, then broken through the bark epiderm. Perithecia embedded within bark tissue in small group, globular or depressed at the bottom, 500～800 μ in diam., surrounded by loose hyphal twines consisting of fragmental tissue of substrata, furnished long neck at the top. Necks cylindric, 800～1,100 μ in leugth, collectively erumpent through the decomposed conidial layer or ectostromatic hyphal tissue. Blackened zone present within bark and wood, enveloping several perithecial pustules. Asci clavate or cylindric-clavate, 60～73×7.5～10 μ in size and 65.6×8.5 μ in average, furnished apical ring in thickened membrane at the tip, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to obtuse-fusoid, straight or inaequilateral, 2-celled, only slightly constricted at the septum in full maturity, hyaline, 12.5～17.5×2.5～4 μ in size and 15.1×3.6 μ in average.

Only decomposed conidial layer was found on the host plant, Two types of condia were produced on potato-sucrose agar. Alpha conidia fusoid, hyaline, unicellular, 12.5～20×2.5～3 μ in size and 15.6×2.7 μ in size and 15.6×2.7 μ in average. Beta conidia slender, curved, hyaline, unicellular, 10～20×1～2 μ in size and 14.2×1.1 μ in average.

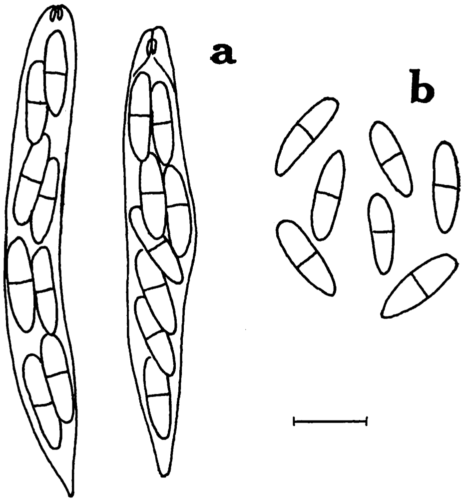

Figure 60. *Diaporthe impulsa* (Cke. et Pk.) Sacc.
a : Asci and ascosporses　b : Ascospores
(⊢⊣ =10 μ)

Host and Material: *Sorbus commixta* Hedl. (Nanakamado)—Mt. Fuji, Narusawa, Yamanashi, VI-22, 1966, by T. U. (FPH-2803).

Distribution: Asia (Japan), Europe and North America.

Note: Among the five species of *Diaporthe* described on *Sorbus*, *Diaporthe eres* Nit., *D. spiculosa* (Alb. et Schw.) Nit. differs from the present fungus by their smaller ascus, ascospore and alpha conidium. *Diaporthe fibrosa* (Pers.) Fuck. has wider ascospore and shorter and wider alpha conidium than the present *Diaporthe*. In *Diaporthe padi* Otth, which has similar size of ascospore to this fungus, alpha conidium is apparently small, measuring 9～11×3 μ. *Diaporthe impulsa* (Cke. et Peck) Sacc. described by Wehmeyer (1929, 1933) is quite identical with the present *Diaporthe* in its morphology of the perfect and imperfect states. According to Wehmeyer, ascus of *Diaporthe impulsa* is measured 60～70×7～10 μ, ascospore is 13～18×2.5～5.5 μ, alpha conidium is 15～27×2.5～5 μ and beta conidium is 10～15×1～1.5 μ, respectively. These measurements are quite in agreement with those by the author. Therefore, the Japanese fungus collected on Mt. Fuji is identified as *Diaporthe impulsa* (Cke. et Peck) Sacc.

Isolate from ascospore of the fungus developed similar colony to that of the other species of *Diaporthe*. Ascospore germinated quite well and grew fast. White and flat colony with cottony aerial mycelia covered the whole surface of potato-sucrose agar slant within one to two weeks. Colony then turned to gray, and brownish streaks often appeared on its surface. Several small sphaeric bodies, 1-2 mm in diam., were produced on the colony and white to creamy drops consisting of the alpha and beta conidia oozed out from them.

18) ***Diaporthe amorphae*** **Ellis et Everhart.**, Erythea 2:21, 1894—(Figure 61; Plate XV: F～H)—Saccardo, Syll. Fung. 11:308, 1895; Wehmeyer, Univ. Michig. Stud. Sci. Ser. 9:144, 1933
Conidial state: Unknown.

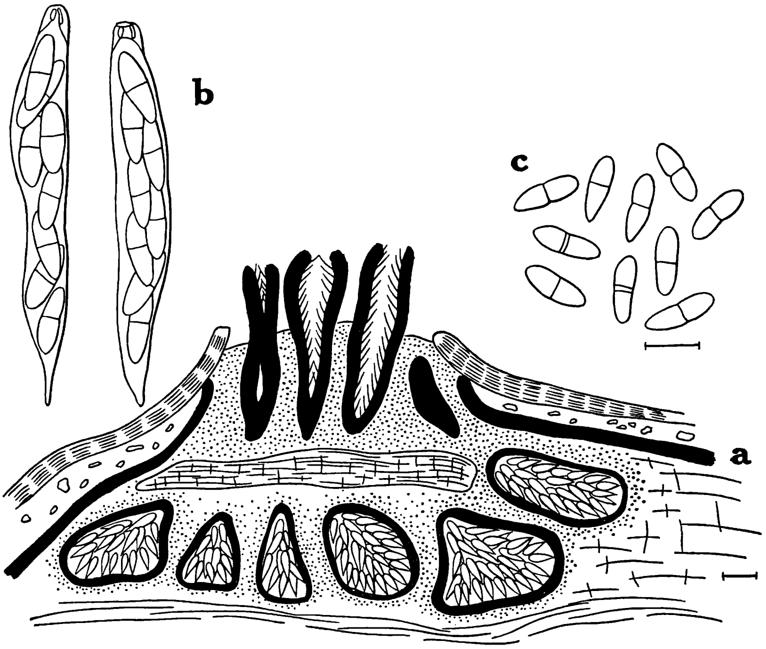

Figure 61. *Diaporthe amorphae* Ell. et Ev.
a : Perithecial pustule　b : Asci and ascospores　c : Ascospores
(⊢—: a=100 μ; b, c=10 μ)

Pustules on bark of dead twigs, scattered, 1∼2 mm in diam., first elevated conic with epiderm, then broken through the bark epiderm and sharply protruded by the tip of necks. Perithecia embedded within bark tissue in group, globular or depressed at the bottom, 300∼500 μ in diam., surrounded by loose hyphal twines consisting of fragmental tissue of substrata, furnished long neck at the top. Necks cylindric, 900∼1,100 μ in length, collectively erumpent, surrounded by ectostromatic hyphal tissue. Blackened zone present within bark and wood, enveloping several perithecial pustules. Asci clavate or cylindric-clavate, 58∼70×7.5∼10 μ in size and 64.8×8.4 μ in average, furnished apical ring in thickened membrane at the tip, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic to fusoid, straight or inaequilateral, 2-celled, only slightly constricted at the septum in full maturity, hyaline, 11∼15×3.5∼4.5 μ in size and 12.4×3.9 μ in average.

Host and **Material:** *Maackia amurensis* var. *buergeri* Schn. (Inu-enjyu)—Karuisawa, Nagano, IX-21, 1965, by T. K. (FPH-2637, 2640).

Distribution: Asia (Japan) and North America.

Note: The present fungus is distinguishable from *Diaporthe eres* Nit. by its apparent pustulate form of discs, larger ascus and wider ascospore. It is also different from *Diaporthe medusaea* Nit. by its non-projecting necks and more aggregated perithecia. The fungus is accordant with *Diaporthe amorphae* Ell. et Ev. in Wehmeyer's monograph in which morphology of *D. amorphae* was fully mentioned, so that the fungus on *Maackia* is identified as *D. amorphae.* No conidial state was recorded on this species.

Isolate from ascospore on *Maackia* showed similar developmental type on potato-sucrose agar to that of *Diaporthe eres* or *D. medusaea,* but fruiting bodies produced on agar did not mature after all. Structure of immature bodies was similar to that of *Phomopsis*.

19) ***Diaporthe nomurai*** **HARA**, Diseases of cultivated plants p. 140, 1925
Synonym: *Diaporthe niphonia* (NOMURA) HARA, Trans. Jap. Sericult. Soc. 273, 1914
Conidial state: *Phomopsis niphonia* (NOMURA) HARA, nom. seminud., (=*Phoma niphonia* NOMURA, *Phoma mori-abae* HORI, *Phoma japonica* HORI, *Sphaeronema mori* HORI, *Dothidiopsis mori* HORI).

Pustules on bark of dead stem or twig, scattered, 0.5～1 mm in diam.; perithecia embedded within bark tissue in small group, globular or depressed at the bottom, 380～550 μ in diam. with long neck at the top. Necks cylindric, 200～320 μ in length, collectively erumpent forming small black disk-like pustules, penetrated by a pore furnishing numerous hyaline periphyses. Blackened zone present within bark and wood, enveloping several perithecial pustules. Asci clavate to cylindric-clavate, 50～63×5～10 μ in size and 54.1×7.9 μ in average, furnished apical ring at thickened tip, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, oblong-elliptic to fusoid, rounded at the ends, hyaline, straight or inaequilateral, 2-celled, 10～15×2.5～5 μ in size and 11.8×4.1 μ in average.

"Development of conidial state usually precedes to the perithecial formation. Pycnidial stroma immerses beneath peridermal layer of bark, then erumpent through epiderm, 400～800 μ in width and 100～200 μ in height, depressed at the bottom, ruptured by a central pore of 80～120 μ height, composed of pseudoparenchymatous tissue, dark brown at upper part and subhyaline at the locular part. Conidiophores filiform simple, hyaline, 10～15×1～2 μ. Two kinds of conidia are produced; one of which is called alpha conidium or *Phoma*-type condidium and is fusoid to oblong-elliptic, hyaline, 9～14×2.5～4 μ; the other beta conidium or *Rhabdospora*-type conidium is filiform or acicular, curved, hyaline, 28～35×0.8～1.5 μ."

Host and Material: *Morus bombycis* KOIDZ. (Kuwa)—Fukara, Shizuoka, III-, 1921, by K. HARA (NSM-HARA's 209511); Nakakawane, Shizuoka, II-, 1927, by K. HARA (NSM-HARA's 209510).

Distribution: Asia (Japan and Korea).

Note: As mentioned in the early part (page 78), *Diaporthe nomurai* HARA causing mulberry canker is considered to be an independent species having large alpha conidium. As the author had no opportunity to examine the material *Diaporthe nomurai* having conidial state, description of the imperfect state of the mulberry fungus is translated from HARA's description. Morphology of the ascigerous state was examined on the authentic specimens in the HARA collection preserved at the National Science Museum. Comparison of *Diaporthe nomurai* with the other species of *Diaporthe* was mentioned in the note of *D. medusaea* NIT. (see page 78). The present fungus has been well known as a causal agent of the mulberry canker in Japan. First, it was known under various species name based on its imperfect state, such as *Phoma niphonia*, *P. japonica*, *Sphaeronema mori*, etc. Later, HARA found its perfect state and he recognized it to be an independent species. Pathogencity of the fungus on mulberry tree and predisposing factors to the development of the disease were discussed in detail by AOKI (1945) based on his many experimental data. According to EMOTO and YAMADA (1932), alpha conidium of the fungus died after 30 minutes of exposure at 45°C, and 5 minutes at 50°C, and the thermal death point of mycelia was at 50°C with the exposure of 10 minutes.

20) **Notes on the other *Diaporthe* reported from Japan**

In 1913, HARA described a species of *Diaporthe* on dead culm of bamboo. According to him, ascospore of *Diaporthe take* HARA was contained uni-seriately in each ascus and was three-celled with two transversal septa. This bamboo inhabitant is, therefore, to be excluded from the genus *Diaporthe*.

Diaporthe japonica SACC. was listed by SHIRAI and HARA (1927) on twigs of *Kerrya japonica* DC., but they did not make reference to the original publication in Japan. No specimen of the fungus was found among the HARA collection preserved in the National Science Museum. *Diaporthe japonica* was included in a synonym of *D. eres* NIT. by WEHMEYER (1933).

On *Aucuba japonica*, *Diaporthe aucubae* SACC. was recorded by FUKUI (1933) and *Phomosis aucubae* TRAV. was noted several years later by ASUYAMA (1938). FUKUI obtained both *Diaporthe* and *Phomopsis* states on the plant and he identified the fungus as *D. aucubae*. His dimensions on *Phomopsis* state were somewhat different from those of ASUYAMA, though ASUYAMA considered his *Phomopsis* to be identical with that of FUKUI. Alpha and beta conidia were measured by FUKUI to be 8～12×2～4 μ, mostly 10×3 μ, and 17～20×1～1.5 μ, respectively, whereas ASUYAMA noted the size of his *Phomopsis* as 6～10×2～3 μ and 18～36×1～1.5 μ respectively. These two *Phomopsis* seem to be different from each other, judging from their dimensions and figures. Unfortunately, FUKUI did not describe the size of ascospore, so there is no data to support his identification. The present author could not obtain any material of *Diaporthe* on *Aucuba*. Hence, FUKUI's report that *Diaporthe aucubae* SACC. distributes in Japan is accepted here with some doubt..

7. ***Valsa*** FRIES, Sum. Veg. Scand. sect. post. 410, 1849; SACCARDO, Syll, Fung. 1 : 108, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 671, 1887; ELLIS & EVERHART, N. Amer. Pyren. 460, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 456, 1897; HÖHNEL, Ann. Myc. 16 : 134, 1918; WEHMEYER, Amer. Jour. Bot. 13 : 640, 1926; DÉFAGO, Beit. Kryptgfl. Schw. 8(3) : 5, 1935; MUNK, Dsk. Bot. Ark. 15(2) : 79, 1953; 17(1) : 222, 1957; KERN, Pap. Michig. Acad. Sci. 40 : 10, 1955; GILMAN et al., Ia. St. Coll. Jour. Sci. 31 : 626, 1957; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 7, 1958; DENNIS, Brit. cup fungi, 186, 1960

Conidial state: *Cytospora* EHRH., *Cytophoma* HÖHN. and *Cytosporina* SACC.

Pustules on bark of cankered or dead stems and twigs; ectostroma variable, none to rich, prosenchymatous or pseudoparenchymatous, first immersed within bark, then broken through bark epiderm exposing white or black disc which is composed of convergent necks and ectostroma around them. Perithecia embedded within bark tissue, clustered in group or arranged circularly, globular or flattened at the bottom, with long neck at the top; wall usually divided in two layers, outer layer composed of black, isodiametrical, thick-walled cells; inner one composed of hyaline, strongly flattened, thin-walled cells. Necks cylindric, usually collectively, rarely separately erumpent through bark periderm or ectostromatic disc, composed of vertically elongated plectenchymatous cells, penetrated by a pore furnishing periphyses. Asci cylindric to clavate, furnished apical ring at the swollen tip, usually 8-spored, sometimes containing fewer than 8-spores, loosed irregularly in perithecium, aparaphyses. Ascospores typically allantoid, sometimes inaequilateral to nearly elliptic, unicellular, hyaline.

Conidial state separately or simultaneously develops to the perithecial state. Pycnidia have or have not wall; in the case of pycnidial type, pycnidia develop singly or rarely in two or three in a stroma with confluent central ostiole, and globular to subglobular, sometimes strongly depressed; development of ectostroma being quite well and compact. In the case of locular type, pycnidial stroma is first immersed within peridermal layer of bark, then breaks through bark epiderm, and is pseudoparenchymatous or prosenchymatous, multilocular; locules usually coalesce into a large irregular uni-locule with central pore, without distinct pycnidial wall. Conidiophores arise from innermost cells of pycnidia or locules, usually branch and are hyaline. Conidia are produced acrogenously on the tip of conidiophore, and are small, allantoid, unicellular, hyaline. The form-genus *Cytophoma* Höhnel was segregated from *Cytospora* Ehrh. for the pycnidial type of imperfect state.

The genus *Valsa* is a large group in the family Diaporthaceae. Since the establishment of the genus *Valsa* by Fries, it was accepted by many mycologists under quite variable senses. In 1867, Nitschke divided the genus *Valsa* into five subgenera, namely Eutypa, Crytosphaeria, Eutypella, Euvalsa and Leucostoma. Among them *Eutypa* Tul. was added by him to the subgenus of *Valsa* and the other four subgenera were divided newly by him. Saccardo (1882) segregated three subgenera of Nitschke from *Valsa* and regarded them as separate genera, namely *Eutypa* Tul., *Cryptosphaeria* (Nit.) Sacc. and *Eutypella* (Nit.) Sacc. Winter (1887) expanded the concept of *Valsa* more than Nitschke did. In addition to Nitschke's subgenera, he added newly four genera, that is *Endoxyla* Fuck., *Cryptovalsa* Ces. et de Not., *Cryptosphaerella* Sacc. and *Valsella* Fuck., to *Valsa* as subgenera. Lindau (1897) added one subgenus Endoxylina Rom. to *Valsa* sensu Winter. Saccardo (1899) again treated these subgenera except Euvalsa and Leucostoma to be independent genus respectively. He considered these genera segregated from *Valsa* to be members of the family Valsaceae.

Through the first to second decade of this century, these fungous groups were critically restudied by Höhnel, and he came to the conclusion (1917a, 1918) that these genera were to be divided into two groups by the structure of the perithecial centrum. *Euvalsa*, *Leucostoma* and *Valsella* constituted the first group in which perithecia had membranaceous wall and filled with free asci without paraphyses. The second group was constituted from seven genera leveled up by Saccardo from Lindau's subgenus, and was characterized by the perithecia having coriaceous wall and hymenial layer along wall with asci and paraphyses. When he established Diaporthaceae (Höhnel 1917a), *Valsa*, *Leucostoma* and *Valsella* were placed in this family as the independent genera, and the genera of the second group were considered to be members of Diatrypaceae. However, Höhnel (1918) again combined the genera of the first and second groups for the establishment of new family Allantosphaeriaceae, and the name of subfamily Valseae was given to the first group and Diatrypeae to the second group.

Wehmeyer (1926a) reunited Höhnel's subfamily Valseae of Allantosphaeriaceae with Diaporthaceae based on his critical study on the morphology of this group compared with the other subfamily and with Diaporthaceae sense Höhnel (1918). Since the treatment of Wehmeyer, the genus *Valsa*, *Leucostoma* and *Valsella* were generally accepted as members of Diaporthaceae excepting Dennis' system (1960), in which these genera having allantoid ascospore were included in Diatrypaceae. Structure of perithecial centrum of these genera is the same as *Diaporthe* and other Diaporthaceous genera but differs distinctly from that of Diatrypaceae.

In addition to the problem mentioned above, there is another point of contention as to whether or not *Valsa*, *Leucostoma*, and *Valsella* must be differentiated from each other as separate genus respectively. Distinguishing points to separate them are commonly accepted as follows: *Valsa*—black zone surrounding stroma (=conceptacle) absent; *Leucostoma*—conceptacle present, asci containing fewer than 8-spores; *Valsella*—conceptacle present, asci multispored. After the establishment of the genus *Leucostoma* by Höhnel (1917a) and *Valsella* by Fuckel (1870), these genera were separately treated at various times (Wehmeyer 1926a, Défago 1935, 1942, Kern 1955, 1957, Urban

1958, Dennis 1960) and united with *Valsa* at other times (Petrak 1919, 1921a, 1923, Munk 1957, Gilman et al. 1957).

Among the many materials of *Valsa* and *Leucostoma* examined by the present author, several intermediate types of stroma between the two genera in the construction of conceptacle were found. Usually conceptacle is constituted from only fungal cells and entirely circumscribes one stroma, whereas in such intermediate type, several fragmentary masses showing conceptacle-like structure are found at the bottom of stroma. In one particular case, conceptacle is brown and constituted from the compact compound of fungal hyphae and decomposed tissue of substratum. Investigators who accepted these genera to be separable had also observed a similar intermediate type to that of Japanese materials, and the general opinion held by them is that separation of these genera was rather arbitrary but practically useful for determination of the species in this large fungous group.

The present author also accepted *Valsa* and *Leucostoma* to be the separate genus from each other. The first reason is that the formation of incomplete conceptacle may depend upon the condition of the bark, such as thickness, hardness and distribution of stone cells or resin conals. The same fungus sometimes forms a complete conceptacle and sometimes an incomplete one. Second reason is that the species having conceptacle in its perfect state always has the imperfect state having conceptacle in its pycnidial stroma, and vice versa. The third reason is that *Cytospora* state of the genus *Valsa* produces commonly much branched and persistent conidiophore, while conidiophore of *Leucocytospora* state of the genus *Leucostoma* is usually simple and evanescent in later stage. The fourth arbitrary reason is the same as the generalization cited above, namely, that separation of genus *Valsa, Leucostoma* and *Valsella* afford us a practical and convenient means of decreasing the identifying the species of this large fungous group.

In Japan nineteen species of *Valsa* were listed by Hara (1954) and ten in "Common names of economic plant diseases in Japan" (Anonymous 1965). Some of them are treated in the following part as the synonym of the other older species, and certain species of *Valsa* are newly added to Japanese fungous flora. Differentiating points of Japanese species of *Valsa* are shown in the following key and in Figure 62.

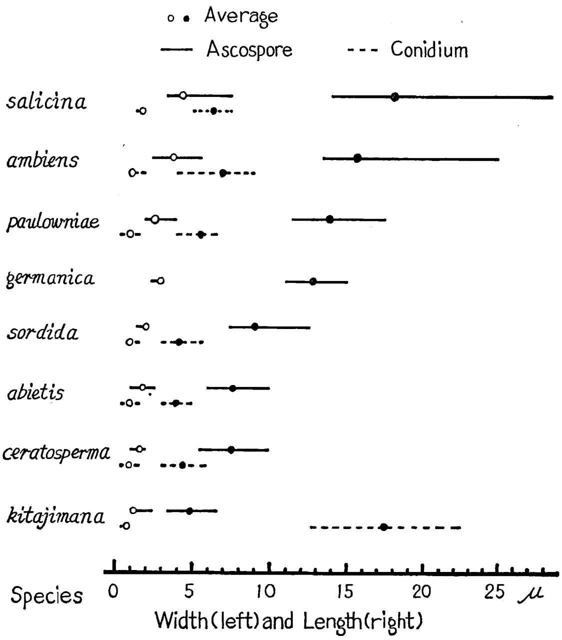

Figure 62. Size of ascospore and conidium of *Valsa* in Japan.

Key to Japanese species of *Valsa*

A₁: Perithecial neck erumpent separately and not collectively, on *Populus* ·························· ·················*V. germanica* (p. 115)

A₂: Perithecial neck erumpent collectively through ectostroma

B₁: Ascus usually 4-spored, disc whitish···*V. salicina* (p. 117)

B₂: Ascus usually 8-spored, disc gray to blackish

C₁: Ascospore less than 10 μ in length
  D₁: Ascospore strongly curved, 3.5∼6.5×1∼2.5 μ, conidial state
      Cytosporina ……………………………………………… *V. kitajimana* (p. 102)
  D₂: Ascospore curved but not so strong, conidial state *Cytospora*
    E₁: On conifers ……………………………………………… *V. abietis* (p. 109)
    E₂: On broad-leaved trees ……………………………………… *V. ceratosperma* (p. 106)
C₂: Ascospore more than 10 μ in length
  D₁: Development of ectostroma quite good, conidial state *Cytophoma*,
      on *Paulownia* ……………………………………………… *V. paulowniae* (p. 103)
  D₂: Development of ectostroma variable, conidial state *Cytospora*
    E₁: Ascus and ascospore usually 30 μ and 10-12 μ in length, respectively
      F₁: On *Populus*, ascospore 7.5∼12.5×1.5∼2 μ……………… *V. sordida* (p. 311)
      F₂: On conifers, ascospore 9∼12×2 μ…………………………… *V. friesii* (p. 123)
    E₂: Ascus and ascospore 43∼83×6.5∼14 μ and 14∼27×3.5∼7.5 μ
        on broad-leaved trees……………………………………… *V. ambiens* (p. 119)

1) ***Valsa kitajimana*** **KOBAYASHI**, sp. nov.—(Figure 63; Plate XV: I, J)

Conidial state: Undetermined species of *Cytosporina* SACC. or *Gelatinosporis* PECK.

Pustulae ramicola, primo immersa, dein erumpens, 0.5∼1 mm diam.; ectostromata sparse, constituto hypha e ostiola, primo albido dein grisea vel nigricans; perithecia aggregata in corticis, globula vel applanata, 250∼450 μ diam., ostiolatis, parietis membranaceis, nigricans; ostiola cylindrica, nigris, erumpens per ectostroma, 300∼700 μ longa, donatus hyaline periphyses numerosis; asci clavatis, minutis, 13∼23×2.5∼5 μ, apice incrassata donatus annula, 8-sporis, maturesco liberata e parietis, aparaphysatis; ascosporae in irregulariter colligata, allantoidea, graviter curvata, continua, hyalina, nunquam colorata, 3.5∼6.5×1∼1.2 μ.

Hab. on dead twigs or branches of *Albizzia julibrissin* DUR. (Nemunoki)—Kamabuchi, Yamagata, X-4, 1962, by T. K. (FPH-651, Type). *Morus alba* L. (Kuwa)—Kambara, Shizuoka, III-9, 1928, K. HARA (NSM-HARA's 216444, as *Valsa moricola* ENDO). *Prunus yedoensis* MATSUM. (Somei-yoshino)—Sapporo, Hokkaido, V-8,

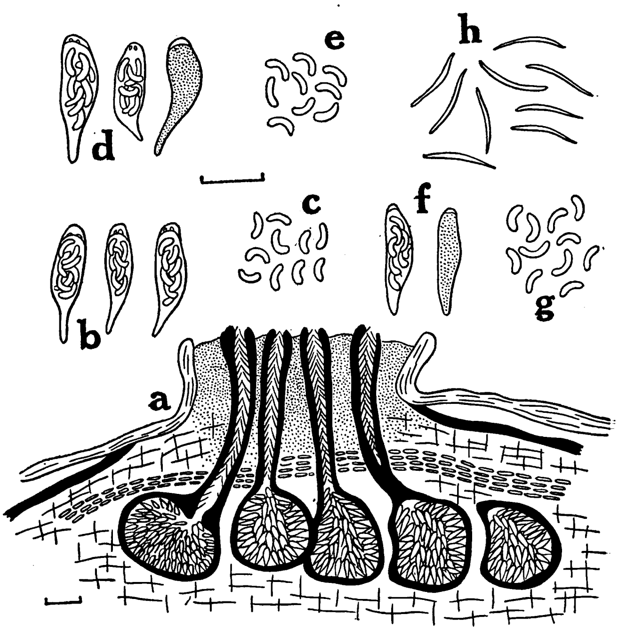

Figure 63. *Valsa kitajimana* sp. nov.

a: Section of a perithecial pustule　b, d, f: Asci and ascospores　c, e, g: Ascospores　h: Conidia produced on culture　a∼c: On *Albizzia*　d, e: On *Prunus*　f∼h: On *Zelkowa*

(└─┘: a=100 μ; b∼h=10 μ)

1965, by K. ONO (FPH-2661). *Zelkowa serrata* MAKINO (Keyaki)—Nishigahara, Tokyo, VI-3, 1965, by T. K. (FPH-2422).

Distribution: Asia (Japan).

Note: Conidial state was not found on host plants, but was formed on culture isolated from ascospore. Colony developed on potato-sucrose agar was white and flat with thick felty aerial mycelia. Growth of colony was fast and whole surface of agar slant in test tube was covered within one to two weeks. Thick cottony aerial mycelia were formed at the marginal area of the colony. Colour of colony gradually turned to creamy white to dusty yellow and white sphaeric bodies were produced scatteredly on the lower part of colony about two to three months after isolation. Then, orange yellow to orange coloured masses or tendrils oozed out from them. Only one type of conidia was produced. Conidia were hyaline, acicular, but not hooked as beta conidia of *Phomopsis*, acute at both ends, unicellular, $13\sim23\times0.5\sim1\ \mu$ in size and $17.3\times0.7\ \mu$ in average. Section of sphaeric bodies produced on culture showed that these bodies were masses of uni- to multi-locular type of pycnidia. The structure of pycnidial bodies was quite variable, from simple pycnidium type opening by irregular pore to complex stromatic type composed of labyrinth locules similar to those of *Cytospora*. So far as can be judged from these characters noted above, conidial state of the present fungus may belong either to the form-genus *Cytosporina* SACC. or *Gelatinosporis* PECK (=*Gelatinosporium*). This is an interesting case in the genus *Valsa*, because no species having such imperfect state has hitherto been known. Usually, *Cytospora* EHRH. and *Cytophoma* HÖHN. have been proved to be the imperfect state of *Valsa* (DÉFAGO 1942, URBAN 1958, etc.), while *Cytosporina* was reported to be the imperfect state of the genera belonging to Diatrypaceae (HÖHNEL 1918, GROVE 1935, etc.). Asci of the present fungus first form subhymenial layer along perithecial wall without paraphyses and central part of perithecium become empty by the dissolution of pseudoparenchymatous tissue. Then, asci detach from their adhering tissue and whole cavity of perithecium is completely filled with free asci. Ascospores of the fungus are always hyaline. In the Diatrypaceous genera, asci having long stalk form perisistent hymenial layer with paraphyses and are not loosed from their adhering tissue after all. Then, ascospore usually becomes pale yellowish brown to olive brown in full maturity and are freed from ascus by the dissolution of ascus membrane before discharge.

From the facts mentioned above, it may be said that the present fungus is an intermediate or transitional form between the genus *Valsa* and Diatrypaceae. It is, however, considered to be a member of the genus *Valsa* by its structure of perithecial centrum and wall, ascus having distinct apical ring, and hyaline ascospore. Among the species of *Valsa* described on the host plants listed above, no identical species with the present fungus was found. *Valsa mori* SAWADA which was found on *Morus* spp. and reported from Formosa (SAWADA 1959) and Japan (SAWADA 1952), has a quite similar size of asci and ascospores to those of the present fungus. However, *Valsa mori* would be excluded from the genus *Valsa* and transferred to the genus *Eutypella* of Diatrypaceae, if we are to judge from his description and notes. Hence, the author proposes to treat the present fungus as a new species of *Valsa* and species name *kitajimana* is dedicated to the memory of the late Dr. K. KITAJIMA, an eminent pioneer in the field of forest pathology in Japan.

2) ***Valsa paulowniae*** **MIYABE et HEMMI**, Bot. Mag. 30 : 312, 1916—(Figure 64; Plate XVI: A～E)—HEMMI, Trans. Sapporo Nat. Hist. Soc. 6 : 145, 1916; Jour. Pl. Prot. 3 : 687, 1916; TANAKA, Mycol. 9 : 168, 1917; SACCARDO, Syll. Fung. 24 : 715, 1928

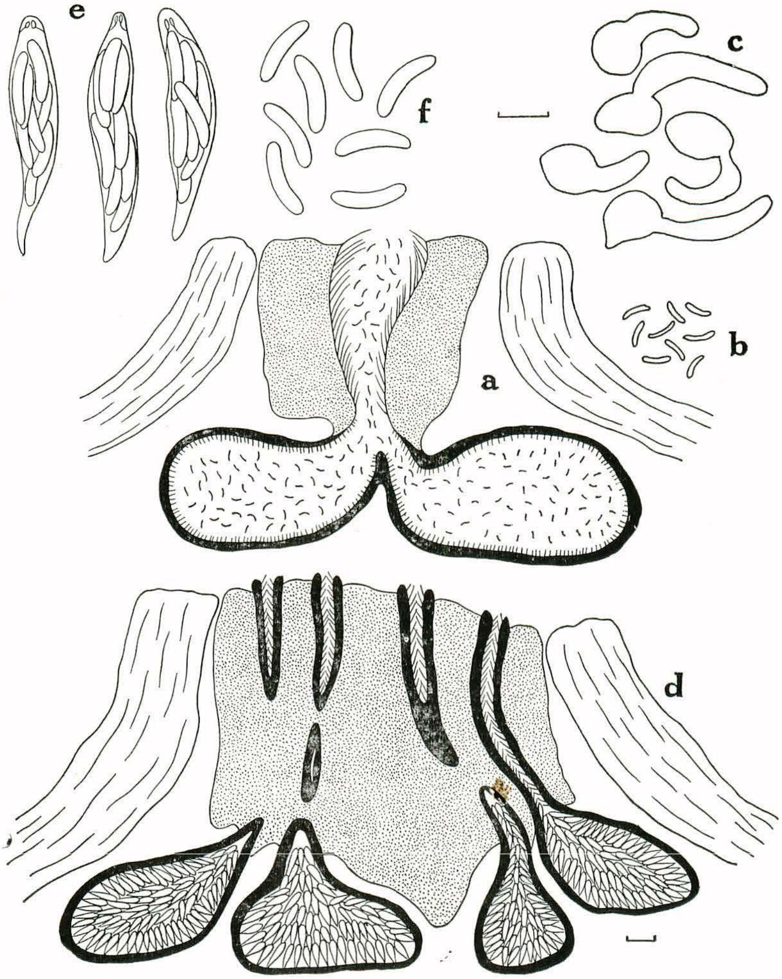

Figure 64. *Valsa paulowniae* MIYABE et HEMMI

a: Pycnidial stroma　b: Conidia　c: Germinating conidia
d: Perithecial stroma　e: Asci and ascospores　f: Ascospores
(⊔: a, d=100 μ; b, c, e, f=10 μ)

Conidial state: *Cytophoma paulowniae* MIYABE et HEMMI, nom. seminud., Trans. Sapporo Nat. Hist. Soc. 6 : 145, 1916

Pustules on bark of cankered or dead stems and branches, 1～5 mm in daim., elevated conic and broken through the bark epiderm exposing truncate-conic disc which is constituted from well developed ectostroma and necks. Ectostroma pseudoparenchymatous, composed of campact, dark, thick-walled cells, fusing to clypeus formed beneath the epiderm. Perithecia clustered 20 to 50, hanging to the bottom of ectostroma by their necks which penetrate through it, globular to subglobular, 200～660 μ in diam., first surrounded by integrating tissue of substrata and loose hyphae twisting them, then such entostromatic elements disappear gradually, with black neck at the top; wall of perithecia composed of isodiametric, blackish thick-walled cells, innermost cells being hyaline, flattened and thin-walled. Necks cylindric, erumpent through ectostromatic disc, 500～1, 100 μ in length, penetrated by a pore furnishing hyaline periphyses; wall of necks distinguished from the tissue of ectostroma by its vertically elongated and plectenchymatous cells. Asci clavate to cylindric-clavate, thin-walled with thickened tip furnishing apical ring, 38～59×7.5～10 μ in size and 46.1×8.8 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly bi- to tri-seriate, allantoid or inaequilateral, rounded at both ends, unicellular, hyaline, 12.5～17.5×2～4 μ in size and 14.2×2.6 μ in average.

Conidial stroma is separately formed from the perithecial stroma, first immerses within bark periderm, then erumpent and breaks through bark epiderm exposing black truncate-conic disc, and develops distinct pycnidia at their base. Pycnidia are formed one to two in one pustule, and are globular or flattened, 560～1,400 μ in diam. and 840～1,300 μ in height, open through ectostroma by the central ostiole; ostiole is 300～550 μ in height; wall of pycnidia is distinct, dark brown to black, and composed of flattened, dark, thick-walled cells, innermost cells being hyaline and pseudoparechymatous. Conidiophores arise from innermost layer of pycnidial wall, and are hyaline, repeatedly branched, 15～50 μ in length, produce conidia at the tip of each branch. Conidia are allantoid, rounded at the ends, unicellular, hyaline, 4～6.5×0.5～1.5 μ in size and 5.6×1 μ in average.

Host and Material: *Paulownia tomentosa* (THUNB.) STEUD. (Kiri)—Sapporo, Hokkaido, X-, 1914, by T. HEMMI (HUH-paratype); Sebetsu, Hokkaido, VIII-, 1915, by K. HASHIGUCHI (HUH-paratype); Yoyogi, Tokyo, III-, 1926, by KUSANO (NSM-KUSANO); Aisari, Iwate, III-23, 1951, by H. YOKOYAMA (FPH-510, 2796); Takahagi, Ibaraki, V-28, 1952, by K. ITO & T. K. (FPH-1196); Yamanouchi, Nagano, IX-20, 1959 by T. K. (FPH-892).
Conidial state only: *Paulownia tomentosa*—Sapporo, Hokkaido, VII-, 1915, by K. MIYABE (HUH); Utsunomiya, Tochigi, 1925 (NSM-KUSANO); Yoyogi, Tokyo, IV-8, 1926, by T. OGAWA (NSM-KUSANO); Shioya, Tochigi, XI-20, 1926, by S. KUSANO (NSM-KUSANO); Takahagi, Ibaraki, VI-7, 1950, by K. SHIBUKAWA (FPH-117, 371, 631); XI-9, 1950, by K. ITO & O. CHIBA (FPH-195).

Distribution: Asia (Japan).

Note: The present species is characterized by its black, well developed ectostroma and pycnidium having distinct wall. This type of conidial state is apparently identical with that of *Valsa cypri* TUL., to which HÖHNEL (1914) established a new form-genus *Cytophoma*. URBAN (1958) erected subgenus Cypriae in the genus *Valsa* for the species having *Cytophoma* type of conidial state. The present *Valsa* differs from *Valsa cypri* having wide host range, on the basis of its somewhat smaller ascospore, narrower ascus, conspicuous black ectostromatic disc, and smaller conidia. No other species accordant with the present species was found among many species of *Valsa* described hitherto. Therefore, *Valsa paulowniae* described by HEMMI (1916a) would be maintained to be a valid species.

Valsa paulowniae distributes throughout mid- to northern Japan and causes severe canker disease on paulownia tree (HEMMI 1916a, b, KITAJIMA 1916, ITO 1960). HEMMI and KITAJIMA presumed the predisposing factor to the canker disease caused by *Valsa paulowniae* to be frost or cold injury, and TOGASHI and UCHIMURA (1933) endorsed experimentally such presumption. Certain series of cultural experiment on the present fungus were conducted by HEMMI (1916 a, b). Cultural characters of the fungus on potato-sucrose agar observed by the author were accordant with those reported of HEMMI.

Ascospore and conidium swelled remarkably prior to producing germ-tube on sucrose agar, and then bore grem-tube from the end or side of swollen spore. Flat and white colony developed within one to two weeks after isolation. Whole surface of agar slant in test tube was covered by flat and pale yellowish colony showing felty appearance. About two months after isolation, large, sphaeric bodies, 1～3 mm in diam., were produced on the lower marginal part of colony. These bodies soon matured and pale orange drops of conidia were exuded from them. Size and shape of conidia were not different from those on host plant. Perithecial state was not produced after all.

According to TOGASHI and UCHIMURA (1933), the present fungus grew well at 22～27°C with maximum of 30～32°C and minimum below 5°C.

3) ***Valsa ceratosperma*** (**TODE ex FRIES**) **MAIRE**, Publ. Inst. Bot. 3(4) : 20, 1937—(Figure 65; Plate XVI: F～I)—URBAN, Rozp. Cesk. Akad. Ved. Roc. 68, Ses. 12 : 58, 1958; HUBBES, Phytop. Zeits. 39 : 73, 1960

Synonym: *Sphaeria ceratosperma* TODE, F. Mecklenb. 2 : 53, 1791

Sphaeria ceratosperma TODE ex FR., Syst. Myc. 2 : 364, 1823

Diatrype ceratosperma (TODE) FR., Sum. Veg. Scand. 385, 1849

Valsa decorticans FR., Sum. Veg. Scand. 413, 1849; ELLIS & EVERHART, N. Amer. Pyren. 473, 1892

Valsa ceratophora TUL., Sel. Fung. Carp. 2 : 191, 1863; SACCARDO, Syll. Fung. 1 : 108, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 707, 1887; ELLIS & EVERHART, N. Amer. Pyren. 461, 1892; YASUDA, Bot. Mag. 38 : 148, 1924; KOBAYASHI, Y. et al., in Asahina's Kryptgfl. Japan, 265, 1939; DÉFAGO, Phytop. Zeits. 14 : 104, 1942; MUNK, Dsk. Bot. Ark. 17(1) : 228, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 31 : 631, 1957

Valsa rubi FUCK., Symb. Myc. 2 : 200, 1869

Valsa rhamicola FABRE, Ann. Sci. Nat. Ser. VI, 9 : 69, 1878

Valsa cerasi FELTG., Vorst. Pilz. Luxemb. Nachtr. 2 : 113, 1901

Valsa mali MIYABE et YAMADA ap. IDETA, Handb. Pl. Dis. Jap. (4th. edit.), 295, 1909; MIURA, Rept. Aomori Agr. Exp. Sta. 15 : 131, 1915; TANAKA, Mycol. 11 : 150, 1919; TOGASHI, Jour. Coll. Agr. Hokkaido Imp. Univ. 12 : 267, 1924; SACCARDO, Syll. Fung. 24 : 713, 1928

Valsa theae HARA, Chyagyokai 14(11) : 15, 1919; Dis. of tea plant, 201, 1932; TANAKA, Mycol. 13 : 326, 1921

Other synonyms vide DÉFAGO (1942) and URBAN (1958).

Conidial state: *Cytospora rosarum* GREV. ap. BALL., Syst. de Pilze, 81, 1858; SACCARDO, Syll. Fung. 3 : 253, 1884; GROVE, Coel. I : 280, 1935 (=*Cytospora capreae* FUCK., *C. ceratophoma* SACC., *C. dolosa* SACC., *Torsellia dolosa* (SACC.) HÖHN., *Cytospora fuckelii* SACC., *C. schweinitzii* SACC., *C. mandshurica* MIURA, Orch. in Mansh. 146, 1925; Fl. Mansh. & Mongolia III, 176, 1928)

Pustules on bark of cankered or dead stems and branches, scattered or gregarious, appearing as black small rupture or fascicle of many necks, 0.5～2 mm in diam.; development of ectostroma variable from none to rich depending on the condition of the bark such as thin or thick and smooth or rough. Perithecia embedded within bark tissue or seated on wood, clustered in one to two layers, globular or depressed at the bottom, 200～700 μ in diam., with black neck at the top; wall of perithecia composed of flattened dark-brown, thick-walled cells, innermost cells being hyaline and thin-walled. Necks cylindric, collectively erumpent through bark periderm or ectostroma, 350～700 μ in length, composed of vertically elongated plectenchymatous cells, pierced by a pore furnishing periphyses. Asci small, clavate to cylindric-clavate, tapered toward the base, thin-walled with thickened tip furnishing apical ring, 23～35×4～7.5 μ, mostly 28～33×4.5～5.5 μ

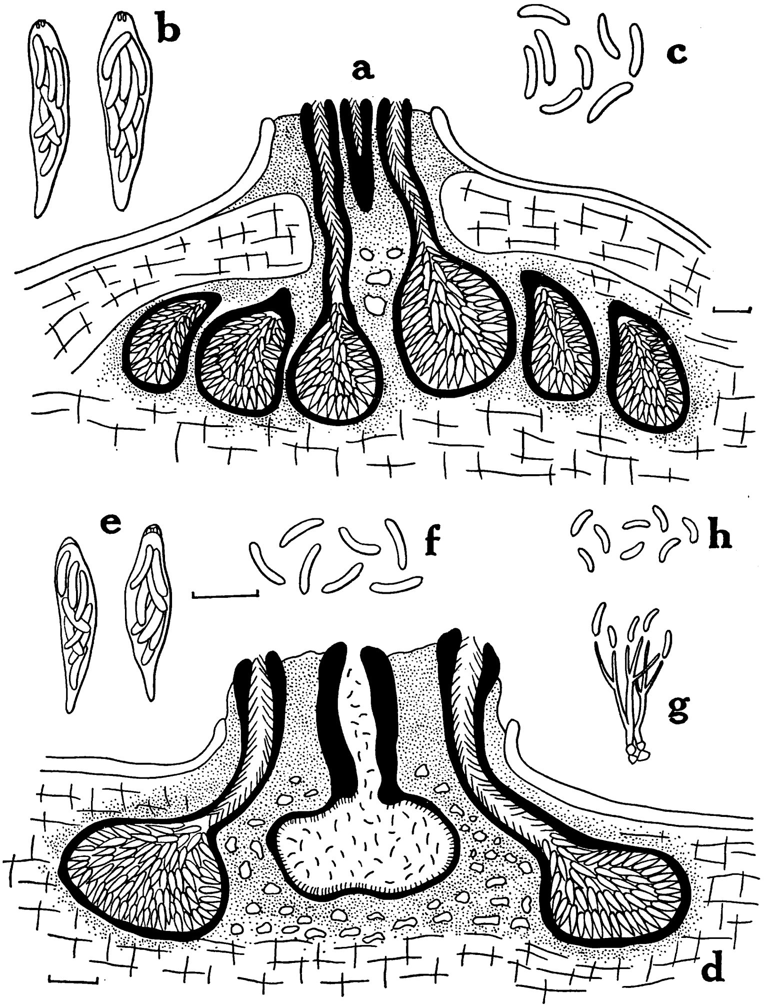

Figure 65. *Valsa ceratosperma* (Tode ex Fr.) Maire

a: Perithecial stroma　d: Stroma having perithecia and pycnidial locule　b, e: Asci and ascospores　c, f: Ascospores　g: A part of locule showing branched conidiophores　h: Conidia　a～c: On *Castanea*　d～h: On *Malus*　(⌴: a, d=100 μ; b, c, e～h=10 μ)

and 29.8×5 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores allantoid, rounded at the ends, unicellular, hyaline, 5.5～9×1～2 μ in size, mostly 7～8×1.5～2 μ and 7.5×1.7 μ in average.

Development of conidial state usually precedes to the perithecial formation, rarely conidial state is formed simultaneously with the perithecial state in one stroma. Pycnidial pustules are somewhat smaller than those of perithecial one, 0.5～1.5 mm in diam. and 0.5～1 mm in height; pycnidial locule usually clusters beneath the clypeus-like ectostroma, with thin wall showing quite irregular shape, and is erumpent with confluent neck or ostiole at the centre part of pycnidial cluster; wall of pycnidial locule is membranaceous, thin, composed of flattened, brown to dark brown, thick-walled cells. Conidiophores arise from the innermost hyaline cells of the wall of locule, usually much branched, and are hyaline, 8～38 μ in length, often with long sterile fibrils among them. Conidia are produced on the tip of each branch of conidiophore, are allantoid, hyaline, unicellular, 3～6×0.5～1.5 μ in size, mostly 4～5×0.8～1 μ and 4.3×0.9 μ in average, often oozed out from the central ostiole of pycnidial locules as sticky orange tendrils under moist conditions.

Host and Material: *Acer palmatum* var. *amoenum* (CARR.) OHWI (Ō-momiji)—Akanuma, Saitama, X-18, 1965, by T. K. (FPH-3276). *Alnus inokumai* MUR. et KUS. (Tanigawa-hannoki)—Morioka, Iwate, X-9, 1962, by T. K. (FPH-690). *Alnus glutinosa* GAERTN. (Ōshu-kurohannoki)—Morioka, Iwate, X-9, 1962, by T. K. (FPH-687). *Alnus faurii* LEV. et VAN. (Miyama-kawara-hannoki)—Kamabuchi, Yamagata, X-2, 1960, by T. K. (FPH-1583). *Betula ermanii* CHAM. (Dake-kanba)—Akanuma, Saitama, X-18, 1965, by T. K. (FPH-2827). *Betula maximowicziana* REG. (Udai-kanba)—Akanuma, Saitama, X-19, 1965, by T. K. (FPH-2914). *Bischofia javanica* BL. (Akagi)—Kamikamo, Kyoto, IX-9, 1965, by T. K. (FPH-2696). *Castanea crenata* SIEB. et ZUCC. (Kuri)—Yokohama, Kanagawa, X-13, 1959, by K. KATO (FPH-435, 2158); XII-3, 1959, by K. KATO (FPH-2155); Nakatsugawa, Gifu, IX-15, 1960, by Y. MORIMOTO (FPH-1578); Yabuki, Fukushima, X-4, 1963, by Y. ZINNO (FPH-2338). *Forsythia suspensa* VAHL. (Rengyo)—Morioka, Iwate, X-9, X-9, 1962, by T. K. (FPH-712). *Juglans ailanthifolia* CARR. (Oni-gurumi)—Asakawa, Tokyo, III-10, 1960, by T. K. (FPH-1521). *Liquidamber styraciflua* L. (Amerika-fū)—Mito, Ibaraki, X-3, 1966, by T. K. (FPH-3259). *Liquidamber formosana* HANCE (Taiwan-fū)—Kamikamo, Kyoto, IX-9, 1965, by T. K. (FPH-2702). *Mallotus japonicus* MULL. (Akame-gashiwa)—Matsudo, Chiba, XI-16, 1963, by T. K. (FPH-2333). *Malus baccata* var. *mandshurica* SCHN. (Ezono-koringo)—Kamabuchi, Yamagata, X-1, 1960, by T. K. (FPH-1588). *Malus pumila* MILL. (Ringo)—Sapporo, Hokkaido, VIII-21, 1913, by HEMMI (NSM-KUSANO, as *Valsa mali* MIY. et YAM.); V-17, 1918, by K. MIYABE (HUH, paratype of *Valsa mali*); V-20, 1921, by K. TOGASHI (HUH, as *Valsa mali*); Iwate-machi, Iwate, XII-, 1965, by K. SAWAMURA (FPH-2825). *Morus bombycis* KOIZ. (Yamaguwa)—Chichibu, Saitama, III-2, 1960, by T. K. (FPH-1597). *Quercus mongolica* var. *grosseserrata* BL. (Mizu-nara)—Kaida, Nagano, IX-3, 1963, by T. K. (FPH-2332). *Rhamnus crenata* SIEB. et ZUCC. (Isonoki)—Kamikamo, Kyoto, IX-9, 1965, by T. K. (FPH-2687). *Rhododendron kaempferi* PL. (Yama-tsutsuji)—Kamabuchi, Yamagata, X-2, 1960, by T. K. (FPH-1528). *Rosa multiflora* THUNB. (Noibara)—Asakawa, Tokyo, XII-16, 1959, by T. U. (FPH-906). *Rubus palmatus* f. *coptophyllus* MAK. (Ki-ichigo)—Karuisawa, Nagano, IX-13, 1961, by T. K. (FPH-2160). *Salix integra* THUNB. (Inukori-yanagi)—Karuisawa, Nagano, IX-25, 1960, by T. U. (FPH-1590). *Vitex agnus-castus* L. (Seiyo-ninjinboku)—Asakawa, Tokyo, III-13, 1962, by T. K. (FPH-2311).

Conidial state only: *Acer palmatum* var. *amoenum*—Karuisawa, Nagano, IX-21, 1965, by T.K. (FPH-2630). *Betula verrucosa* EHRH.—Koshunai, Hokkaido, IX-23, 1964, by T. K. (FPH-2434). *Betula lenta* L.—Kuriyama, Hokkaido, IX-23, 1964, by T. K. (FPH-2407). *Castanea crenata*—Isehara, Kanagawa, X-12, 1959, by, K. KATO (FPH-2187). *Malus pumila*—Ômagari, Akita, I-, 1968, by T. KUDO (FPH-3354). *Prunus persica* (LINN.) BATSCH (Momo)—Haramachi, Shizuoka, II-, 1921, by K. HARA (NSM-HARA's 210440).

Distribution: Asia (Japan, Manchuria, Korea, China), Europe and North America.

Note: The present fungus has been known commonly as *Valsa ceratophora* TUL. until URBAN (1958) and HUBBES (1960) recently accepted MAIRE's treatment, who proposed adoption of species name *ceratosperma* based on its nomenclatural priority about thirty years ago. The fact that *Sphaeria ceratosperma* and *Valsa ceratophora* were nothing but the same fungus was already recognized by WINTER (1887), but he authorized *V. ceratophora* and included *Sphaeria ceratosperma* in the synonyms of *V. ceratophora*. This error was accepted heedlessly for a long time.

This is of the largest species of the genus *Valsa* having wide host range and distribution. In Japan, a record of *Valsa ceratophora* TUL. was made by MIYAKE (1916) on *Morus*, but it was based only on the conidial state. First report of *Valsa ceratophora* with perithecial state in Japan was made by YASUDA (1924). His description based on a material of *Euonymus sieboldiana* is quite identical with those of foreign authors and of the present author. Recently, SAWADA (1952) listed it on *Rosa* spp.

A famous species of *Valsa*, *V. mali* MIYABE et YAMADA, has long been known in Japan as a causal agent of canker disease of *Malus* and *Prunus* since 1903, when the binomial was given as nomen nudum (Anonymous 1903). Full description of *Valsa mali* was first given by IDETA (1909) and later by MIURA (1915) and TOGASHI (1924). It was also reported from Korea (NAKATA & TAKIMOTO 1928), Manchuria (MIURA 1925, 1928) and northern China (NAKATA 1941). Morphology of *Valsa mali* is quite identical with that of *V. ceratosperma* described by URBAN (1959) and that of *V. ceratophora* by DÉFAGO (1942), MUNK (1957) and GILMAN et al. (1957). Examination of the authentic specimens of *Valsa mali* showed that there was no difference in the morphological characteristics between *V. mali* and the *Valsa* considered to be *V. ceratosperma* by the author. Culture from a *Valsa* and a *Cytospora* on *Malus* canker was quite similar to those from other host plants listed above, and conidia produced on them were indistinguishable one from the other. From the foregoing facts, the author treats *Valsa mali* as a synonym of *V. ceratosperma* (TODE ex FR.) MAIRE.

No specimen of *Valsa theae* HARA was found among the HARA's collection perserved at the National Science Museum. Judging from his description (HARA 1919, 1932, TANAKA 1921), its morphology is quite accordant with that of *Valsa ceratosperma.* Though the author could not obtain any materials of *Valsa* and *Cytospora* on *Thea* plant, *V. theae* HARA is treated here as a synonym of *V. ceratosperma* by the accordance in the morphological characteristics.

Ascospore and conidium of the fungus swelled remarkably before germination, swellings being most conspicuous in conidium. Colony was flat and white at first, then became thicker and felty with white to grayish brown aerial mycelia. Thereafter, colour of colony turned to brown ("Verona brown" or "brown"). About one to two months after isolation, many small or several large sphaeric bodies (pycnidial stromata) were produced on the colony. Mucous masses of conidia, yellowish to golden yellow colour, oozed out from them. Size of conidia produced on culture, $4\sim6.5\times0.5\sim1.5\,\mu$ in size and $4.5\times0.9\,\mu$ in average, as well as their shape was not different from those on host plants.

Cultural characters of many isolates obtained by the author on potato-sucrose agar were accordant with those reported by TOGASHI (1924) and DÉFAGO (1942). According to them, the fungus develops well at a temperature ranging from 23 to 29°C with maximum at 33～35°C and minimum at 5～10°C. TOGASHI (1924) confirmed that the fungus isolated from *Malus* was able to invade several tree species including *Malus* through the wounded tissue of the bark.

Recently, UI et al. (1966) reported the results of their extensive survey on the apple canker disease in Hokkaido, in relation to the distribution of the disease, correlation between disease development and environmental conditions, susceptibility of apple variety, ecology of conidia of the causal fungus, and methods for chemical control.

4) ***Valsa abietis*** **FRIES**, Sum. Veg. Scand. 412, 1849—(Figure 66; Plate XVII: A～E)—SACCARDO, Syll. Fung. 1 : 111, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 710, 1887; ELLIS & EVERHART, N. Amer. Pyren. 463, 1892; SAWADA, Bull. Gov. For. Exp. Sta. 46 : 139, 1950; GILMAN et al, Ia. St. Coll. Jour. Sci. 31 : 631, 1957; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 52, 1958

Synonym: *Sphaeria abietis* FR., Syst. Myc. 2 : 298, 1823

Valsa cryptomeriae KITAJIMA, Sanrin-koho 1918(1) : 12; Jour. Pl. Prot. 5 : 719, 1918; Bull. Gov. For. Exp. Sta. 18 : 155, 1919

Valsa cryptomeriae HARA, Dainihon-sanrinkaiho 428 : 52, 1918

Valsa cryptomeriaecola HARA, Dis. of for. trees, 120, 1925

Valsa sugifolia HARA, Dainihon-sanrinkaiho 428 : 52, 1918

Valsa chamaecyparisii HARA, Dainihon-sanrinkaiho 428 : 52, 1918

Conidial state: *Cytospora abietis* SACC., Syll. Fung. 3 : 269, 1884; GROVE, Coel. I : 262, 1935

Pustules on bark of dead or cankered stems and twigs, 0.5～1 mm in diam., scattered or gregarious, broken through bark epiderm exposing small conic to truncate-conic rupture; ectostroma usually scanty, only visible as loose hyphal twines around necks. Perithecia embedded within bark tissue, clustered in a layer, globular or depressed at the bottom, 150～400 μ in diam., with

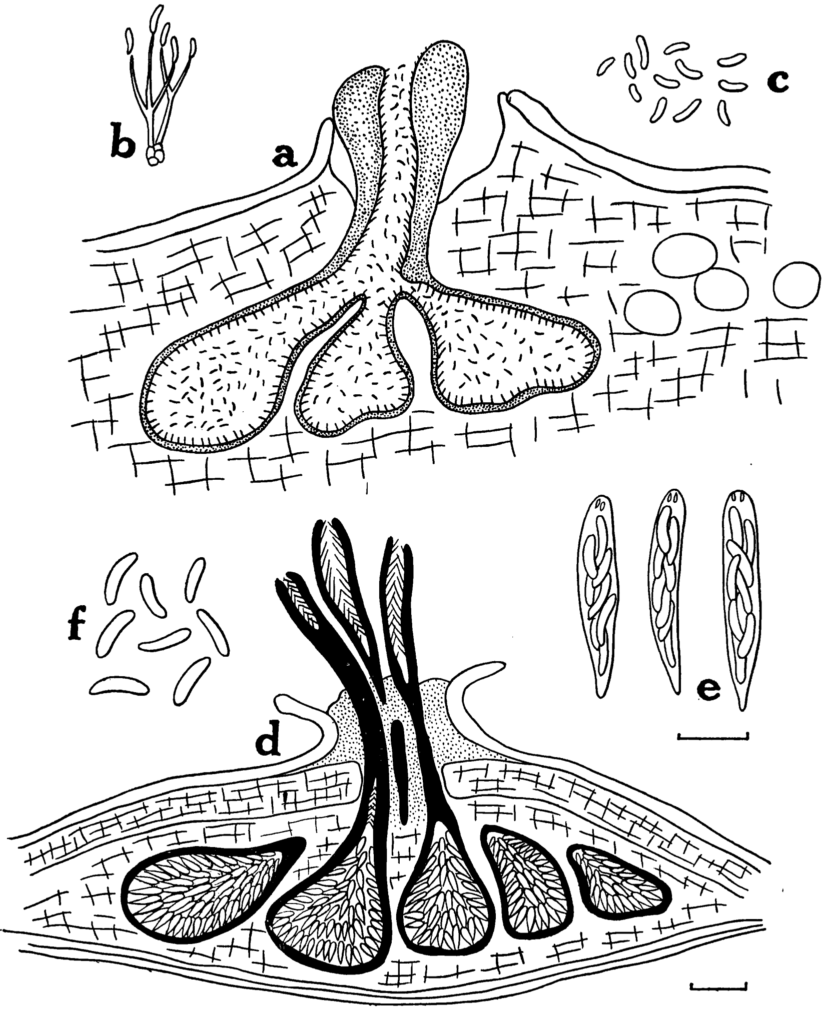

Figure 66. *Valsa abietis* FR.

a: Pycnidial stroma　　b: Conidiophores　　c: Conidia
d: Perithecial stroma　　e: Asci and ascospores　　f: Ascospores
(└─┘: a, d=1000 μ; b, c, e, f=10 μ)

black neck at the top; wall of perithecia composed of flattened, dark, thick-walled cells. Necks cylindric, collectively erumpent through epiderm forming disc-like pustule, 350∼650 μ in length, composed of elongate plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses. Asci clavate, tapered toward the base, thin-walled, with apical ring at swollen tip, 27∼48×4∼6 μ in size and 31×4.9 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores allantoid, rounded at both ends, hyaline, unicellular, 6∼10×1∼2.5 μ in size, mostly 6.5∼8×1∼2 μ and 7.6×1.8 μ in average.

Development of conidial state usually precedes the perithecial formation. Pycnidial stroma is 0.5∼1.5 mm in diam., and 0.5∼1 mm in height, immerses within periderm, then breaks through epiderm exposing small disc and is usually multi-locular; locules without distinct wall, often coalesce to a large irregular locule in fully matured stage, and congregate at the central pore. Conidiophores arise from the innermost cells of locule and are hyaline, branched, 7∼33 μ in length. Conidia produced on the tip of each branch of conidiophore are unicellular, hyaline, allantoid, 3∼5×0.5∼1.5 μ in size and 4.2×0.9 μ in average, often ooze out sticky yellowish tendrills from the pore of pycnidial stroma under moist conditions.

Host and Material: *Chamaecyparis obtusa* SIEB. et ZUCC. (Hinoki)—Asakawa, Tokyo, III-22, 1960, by T. U. & T. K. (FPH-1506); Usuda, Nagano, IX-27, 1961, by T. K. & T. U. (FPH-1896). *Cryptomeria japonica* D. DON (Sugi)—Nagaizumi, Shizuoka, XII-14, 1923, by K. HARA (NSM-HARA's 214437, paratype of *Valsa cryptomeriae* HARA = *V. cryptomeriaecola* HARA); Yakushima, Kagoshima, VII-28, 1959 (FPH-1516); Asakawa, Tokyo, VII-, 1960, by T. U. (FPH-897, 898, 925); Shinko, Nagano, XII-17, 1760, by T. HARA. *Larix leptoleptis* GORD. (Karamatsu)—Karuisawa, Nagano, IX-25, 1960, by T. U. (FPH-1593); Miyota, Nagano, IX-26, 1960, by T. U. (FPH-1595); Tobira. Nagano, IX-17, 1963, by T. K. (FPH-2219, 2221, 2237). *Sequoia sempervirens* ENDL.—Kamabuchi, Yamagata, X-2, 1960, by T, K. (FPH-1526).

Conidial state only: *Abies firma* SIEB. et ZUCC. (Momi)—Asakawa, Tokyo, VII-7, 1960, by T. K. (FPH-1531). *Abies holophylla* MAX.—Asahikawa, Hokkaido, X-4, 1960, by T. IGARASHI (FPH-3139). *Chamaecyparis obtusa*—Togano, Kochi, II-23, 1951, by H. WADA (FPH-320); Shimizu, Kochi, II-2, 1951 (FPH-321); Amagi, Shizuoka, VII-, 1959, by T. U. (FPH-950); Mt. Fuji, Yoshihara, Shizuoka, IX-, 1960, by Y. ZINNO (FPH-1587); Nishinasuno, Tochigi, VIII-13, 1964, by T. K. (FPH-2269). *Chamaecyparis lawsoniana* PARL. (Beihi)—Kiyomi, Gifu, VII-16, 1962, by Y. MORIMOTO (FPH-2150). *Cryptomeria japonica*—Kamikamo, Shizuoka, IX-1, 1960, by T. U. (FPH-960); Sejiri, Shizuoka, VIII-1, 1961, (FPH-1406); Nishitosa, Kochi, V-21, 1963, by A. ONISHI (FPH-2933); Kiyomi, Gifu, V-28, 1963, by Y. MORIMOTO (FPH-664); Akita-city, Akita, VII-6, 1966, by E. TSUKAMOTO (FPH-2800). *Cunninghamia sinensis* (Kôyozan)—Asakawa, Tokyo, VIII-28, 1965, by T.U. (FPH-3275). *Larix leptolepis*—Imagane, Hokkaido, VIII-31, 1951, by T. U. (FPH-938); Nakasato, Niigata, V-20, 1963, by H. ITO; Aizuwakamatsu, Fukushima, X-2, 1963, by Y. ZINNO (FPH-2325). *Picea excelsa* LINK. (Ôshu-tôhi)—Wada, Nagano, IX-25, 1960, by T.K. (FPH-1594). *Picea sitchensis* TRAUT. et MEY.—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2617). *Pinus densiflora* SIEB. et ZUCC. (Aka-matsu)—Miyota, Nagano, IX-25, 1960, by T.U. *Pseudotsuga taxifolia* BRIT.—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2459). *Thuja occidentalis* L. (Nioi-hiba)— Kamabuchi, Yamagata, X-2, 1960, by T. K. (FPH-1538). *Tsuga canadensis* CARR.—Asakawa, Tokyo, III-10, 1950, by T. K. (FPH-1504).

Distribution: Asia (Japan), Europe and North America.

Note: On conifers, three species of *Valsa* are generally recognized to be independent from other (MUNK 1957, GILMAN et al. 1957, URBAN 1958). Among them, *Valsa friesii* (DUBY) FUCK. is different from the Japanese fungus by its larger ascospore being usually more than 10 μ in length. The other two, *Valsa pini* (ALB. et SCHW. ex FR.) FR. and *V. abietis* FR., are members of small-spored species in the genus *Valsa* and have wide host range. Size of ascus, ascospore and conidium mostly overlap each other, and are difficult to separate them only for reason of size of these fruiting bodies. According to URBAN (1958) and GILMAN et al. (1957), perithecia of *Valsa pini* are embedded circinately within bark tissue and erumpent their necks around disc as *V. germanica*, while in the case of *Valsa abietis*, perithecia aggregate in a cluster and their necks are collectively erumpent through ectostromatic hyphal disc.

In the earlier report (KOBAYASHI & HAMA 1969), it was conclusively stated that the *Valsa* causing dieback or stem canker of *Cryptomeria* in Japan was identified as *V. cryptomeriae* KITAJIMA, and, *V. cryptomeriaecola* HARA (=*V. cryptomeriae* HARA) and *V. sugifolia* HARA were treated as the synonyms of *V. cryptomeriae* KITAJIMA. At the same time, they pointed out that *Valsa cryptomeriae* seemed to be quite similar to *V. abietis* FR. inhabiting various conifer plants in foreign countries. Hence, many Japanese materials of *Valsa* collected on various coniferous trees were compared with three Valsae reported from the foreign countries through the research on the morphologic characters of the perfect and imperfect states and on their cultural characters. From such research it was revealed that perithecia of Japanese materials aggregate beneath the ectostromatic structure in a cluster and are not arranged in a circle, and that the size of ascus, ascospore and conidium are indistinguishable from each other and seem to be very much similar to those of *Valsa abietis* rather than to *V. pini*.

On the other hand, six species of *Valsa* have been recorded on coniferous plants in Japan. They are *Valsa abietis* FR. on *Thuja* (SAWADA 1950), *V. cephalotaxi* SAWADA on *Cephalotaxus* (SAWADA 1950), *V. chamaecyparisii* HARA on *Chamaecyparis* (HARA 1918), *V. cryptomeriae* KITAJIMA on *Cryptomeria* (KITAJIMA 1918a, b), *V. cryptomeriae* HARA=*V. cryptomeriaecola* HARA on *Cryptomeria* (HARA 1918, 1925), and *V. sugifolia* HARA on *Cryptomeria* (HARA 1918). The fact that the morphologic characteristics of *Valsa cryptomeriae* KIT., *V. cryptomeriaecola*, *V. sugifolia* and *V. chamaecyparisii* were quite identical with those *Valsa abietis* described by SAWADA and by the foreign investigators (e. g. MUNK 1957, GILMAN et al. 1957, URBAN 1958, etc.) was pointed out already (KOBAYASHI & HAMA 1969). No noticeable difference in the cultural characters was observed among the isolates from many Japanese materials. Size and shape of conidia produced on these isolates were also indistinguishable from each other. From the foregoing facts, all materials examined by the author are identified as *Valsa abietis*. FR,

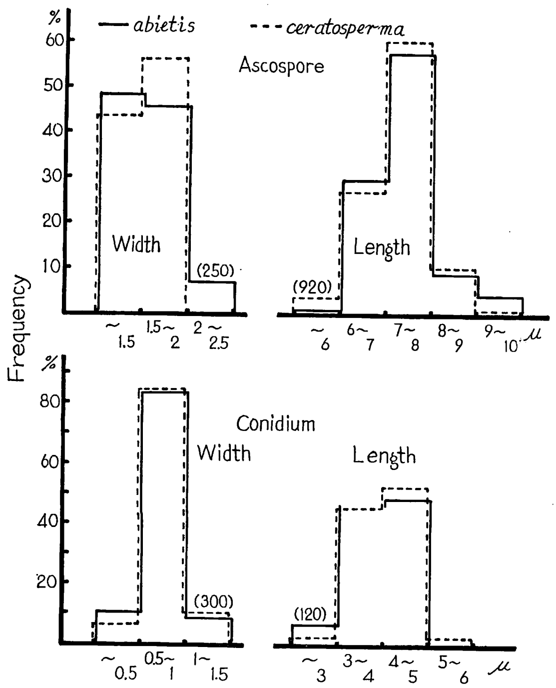

Figure 67. Histogram of width and length of ascospore and conidium in two species of *Valsa* (Total account of measured spore).

and, *V. cryptomeriae* Kit., *V. cryptomeriae* Hara, *V. cryptomeriaecola*, *V. sugifolia* and *V. chamaecyparisii* are treated as its synonyms. On the other hand, morphologic characteristics of *Valsa abietis* Fr. are similar to those of *V. ceratosperma* (Tode ex Fr.) Maire. Size of ascus and ascospore of these two species completely overlap each other (Figures 62 and 67). However, the author follows the foreign investigators (Urban 1968, Munk 1957, etc.) who rocognize *Valsa abietis* inhabiting conifers as a separate species from *V. ceratosperma* on broad-leaved trees. Further study is needed to confirm whether *Valsa abieties* is really different from *V. ceratosperma* or not. As already pointed out by Sawada (1950), morphology of *Valsa cephalotaxi* Sawada is similar to that of *V. friesii* (Duby) Fuck. and the former seems to be the same species as the latter.

Ascospore and conidium swelled remarkably before germination. Growth of colony was relatively slow. Colony was first white and flat, then became thick with felty aerial mycelia and yellowish brown to grayish brown. On one-month-old culture, several large sphaeric bodies were produced. These bodies matured gradually and yellowish mucous masses of conidia oozed out from them. Conidia produced on culture measured 4.5∼5.5×0.8∼1.3 μ in size and 4.9×1 μ in average. No difference in cultural characters was found between isolates from ascospore and conidium. According to Kobayashi and Hama (1969), the fungus isolated from *Cryptomeria* grew well on potato-sucrose agar at 15∼25°C with minimum at 4∼5°C and maximum at 30°C., and developed stem canker on *Cryptomeria* inoculated in the early winter.

5) ***Valsa sordida*** Nitschke, Pyren. Germ. 203, 1867—(Figure 68; Plate XVII: F∼I)—Saccardo, Syll. Fung. 1 : 120, 1882; Winter, Rabh. Kryptgfl. I, 2 : 722, 1887, Ellis & Everhart, N. Amer. Pyren. 477, 1892; Schreiner, Amer. Jour. Bot. 18 : 3, 1931; Christensen, Phytop. 30 : 461, 1940; Munk, Dsk. Bot. Ark. 17(1) : 226, 1957; Gilman et al., Ia. St. Coll. Jour. Sci. 31 : 623, 1957; Butin, Mitt. Biol. Bund. L.-u. Forstw. 91: 35, 1952; Urban, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 39, 1958

Conidial state: *Cytospora chrysosperma* Persoon ex Fries, Syst. Myc. 2 : 542, 1823; Saccardo, Syll. Fung. 3 : 260, 1884; Kamei, Trans. For. Soc. Hokkaido 306 : 3, 1928; Schreiner, Amer. Jour. Bot. 18 : 3, 1931; Grove, Coel. I : 272, 1935; Naito, Agr. Manchuria 11(9) : 706, 1939; Christensen, Phytop. 30 : 461, 1940; Hemmi, Agr. Educ. 11(11):12, 1942; Urban, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 40, 1958; Chiba & Kobayashi, Jour. Jap. For. Soc. 41 : 248, 1959; Kobayashi & Chiba, Bull.

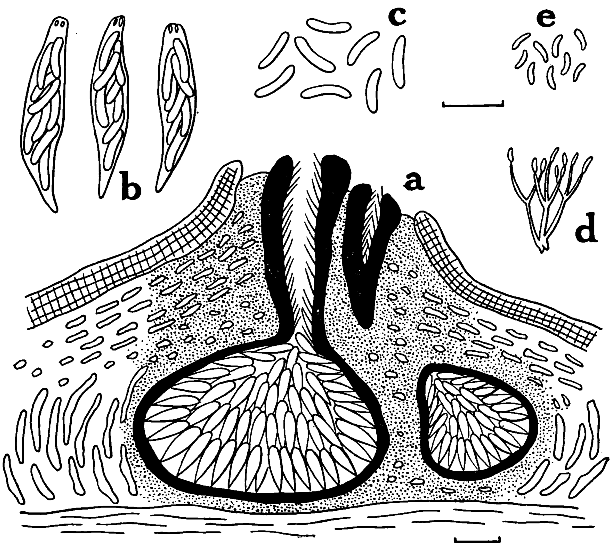

Figure 68. *Valsa sordida* Nit.

a: Perithecial pustule b: Asci and ascospores
c: Ascospores d: Conidiophores
e: Conidia (└─┘: a=100 μ: b∼e=10 μ)

Gov. For. Exp. St. 130 : 30, 1961 (=*Naemospora chrysosperma* PERS.).

Pustules on bark of cankered or dead stems and twigs, scattered or gregarious, elevated conic to truncate-conic and broken through bark epiderm exposing gray to black prominent disc, 0.5～2 mm in diam.; ectostroma prosenchymatous or only hyphal elements around necks. Perithecia embedded within bark tissue, clustered in a layer, globular or depressed at the bottom, surrounded by loose hyphae twisting the decomposed tissue of substrata, 180～500 μ in diam., with long neck at the top; wall of perithecia constituted from flattened, dark brown, thick-walled cells, innermost cells being hyaline and thin-walled. Necks cylindric, collectively erumpent through ectostroma, 500～700 μ in length, composed of vertically elongated plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses. Asci clavate to oblong clavate with thin-membrane, tapered toward the base, thickened at the tip furnishing apical ring, 28～33×5～5.5 μ in size and 29.8×5.1 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, allantoid, rounded at both ends, unicellular, hyaline, 7.5～12.5×1.5～2.2 μ in size, mostly 8～10×1.5～2 μ and 9×1.9 μ in average.

Formation of conidial state precedes to the development of perithecial state. Pycnidial stroma is formed on bark lesions, immerses within bark periderm then erumpent and breaks through bark epiderm exposing hemisphaeric rupture on thin and smooth bark or large angular rupture on thick and rough bark, 0.5～1.5 mm in diam. and 0.5～1 mm in height, multilocular; locules often coalesce into a large irregular cavity in later stage and are congregated at the central pore, without distinct wall. Conidiophores arise from innermost cells of locule and usually branch, and are hyaline, 8～38 μ in length, sometimes forming sterile long-filiform bodies among them. Conidia produced on the tip of each branch of conidiophore are hyaline, allentoid, unicellular, 3～5.5×0.9～1.5 μ in size and 4.1×1 μ in average, often ooze out from central pore as orange, sticky tendrills under moist conditions.

Host and Material: *Populus grandis*—Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-2328). *Populus eckhof*—Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-721). *Populus koreana*×*P. trichocarpa* (Peace)—Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-722). *Populus maximowiczii*×*P. nigra platierens*—Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-723). *Populus euramericana* I-72/51—Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-720).

Conidial state only: *Populus maximowiczii* HENRY (Doronoki)—Tomakomai, Hokkaido, VII-, 1958; Kamabuchi, Yamagata, IX-, 1959, by T. K. (FPH-940); Koshunai, Hokkaido, IX-23, 1964, by T. K. (FPH-2609); Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2421). *Populus charkowiensis*×*P. caudina*—Kuriyama, Hokkaido, VI-24, 1959, by S. CHIBA. *Populus strathglass*—Kuriyama, Hokkaido, VI-24, 1959, by S. CHIBA (FPH-953, 965). *Populus alba* L. (Gindoro)—Asakawa, Tokyo, III-23, 1961, by T. K. (FPH-1446). *Populus deltoides* var. *missouriensis*—Meguro, Tokyo, IV-13, 1963, by T. K. (FPH-718). *Populus euramericana* I-455—Asahi, Niigata, VI-14, 1960, by U. HASEGAWA (FPH-1502); Rubeshibe, Hokkaido, VIII-28, 1960, by H. YOKOYAMA (FPH-955); Makubetsu, Hokkaido, VII-28, 1960, by H. YOKOYAMA (FPH-1394); Asakawa, Tokyo, III-8, 1963, by T. K. (FPH-2322). *Populus euramericana* I-77—Koshunai, Hokkaido, IX-23, 1964, by T. K. (FPH-2410). *Populus alba*×*P. tacamahaca*—Yamabe, Hokkaido, IX-24, 1964, by T.K. (FPH-2622). *Populus koreana* (Chirimendoro)—Meguro, Tokyo, V-10, 1065, by T. K. (FPH-2448). *Populus euramericana* I-154—Yorii, Saitama, V-6, 1961, by T. K. (FPH-1465); Komoro, Nagano, IX-22, 1965, by T. K. (FPH-2631). *Populus deltoides* MARSH.—Yamabe, Hokkaido, VI-11, 1959, by S. YOKOTA (FPH-3151); Asahikawa, Hokkaido, X-4, 1960, by T. IGARASHI (FPH-3194). *Populus gerlica*—Asahikawa, Hokkaido, VIII-3, 1960, by S. KAMEI (FPH-3171). *Populus marilandica*—Nopporo, Hakkaido, VI-, 1962, by M. INOUE (FPH-3172). *Populus* *trichocarpa* Mook.—Meguro, Tokyo, III-6, 1963, by T. K. (FPH-2304, 2345). *Populus euramericana* I-476—Rubeshibe, Hokkaido, VIII-28, 1960, by H. Yokoyama (FPH-956). *Populus euramericana* I-214 —Asahi, Niigata, VI-14, 1960, by U. Hasegawa (FPH-1515); Rubeshibe, Hokkaido, VII-28, 1960, by H. Yokoyama (FPH-1573). *Populus koreana*×*P. trichocarpa*—Takizawa, Iwate, V-9, 1960, by Y. Yokosawa (FPH-1596). *Populus maximowiczii*×*P. berolinensis* (Oxford)—Hakodate, Hokkaido, VII-28, 1960, by H. Yokoyama (FPH-1571); Akita-city, Akita, IX-30, 1960, by T. K. (FPH-1525).

Distribution: Asia (Japan, Manchuria, China), Europe and North America.

Note: The present species widely distributes throughout the northern hemisphere and is well known as a causal agent of the poplar canker. Many records are found on the conidial state of the fungus, whereas formation of perithecial state seems to be relatively rare. In Japan, all materials of the perfect state were obtained only once in the spring of 1963 when unusual cold injury occurred throughout the central part of Japan, though correlation between perithecial formation of the present fungus and abnormal climatic condition during this winter is uncertain. Genetic relationship between *Valsa sordida* and *Cytospora chrysosperma* was already proved experimentally by Schrhiner (1931) and Christensen (1940). Cultural experiment conducted by the author on Japanese materials confirmed the results obtained by them, and endorsed the earlier identification based on the conidial state of the fungus (Kamei 1928) to be acceptable. Poplar canker caused by *Cytospora chrysosperma* was also reported from Manchuria (Miura 1928, Naito 1939) and northern China (Hemmi 1942).

Ascospore and conidium swelled remarkably before germination. Growth of germ-tube was relatively slow. Germinating spore developed visible colony about two weeks after transplantation to potato-sucrose agar. Colony was first white and flat, then became felty mat-like in appearance with rough cottony aerial mycelia at marginal area and yellowish brown to dusty brown in colour. Within one to two months after isolation, several pycnidial bodies were produced at the lower part of agar slant. In large ones, several pycnidial stromata were aggregated. From these bodies, orange to reddish mucous of conidia oozed out. Conidia produced on culture, $4\sim5\times0.5\sim1.5\,\mu$ in size and $4.3\times0.9\,\mu$ in average, were not different from those on host plants.

Parasitism and physiology of the present fungus were studied in detail by foreign research workers. According to Schreiner (1931), the fungus grew well at 25°C with minimum at 2～5°C and maximum at 35°C. Soil condition, drought, cold injury, or fire damage were assumed to be the predisposing factors to the development of canker (Long 1918, Povah 1921, Schreiner 1931). On the other hand, Schmidle (1953) concluded from the results of many inoculation tests that the fungus can invade only quite weakened poplars affected by certain unfavourable conditions, and such trees as those that suffered from the attack of the fungus were probably killed by the effect of these bad environmental factors, even if the fungus was absent. Butin (1955) proved that the establishment and development of poplar canker fungus were brought about by the decrease of water contents in the bark tissue, phenomenon of which resulted from the various environmental factors.

In Japan, it is often observed that poplar canker develops severely on the trees that have had almost all leaves injured by insects in the previous growing season and have releaved in autumn. This may cause the decrease of resistance to cold in poplars which is considered to be one of the predisposing factors on the *Cytospora* canker of poplars.

6) ***Valsa germanica*** Nitschke, Pyren. Germ. 216, 1867—(Figure 69; Plate XVIII: A, B)—Saccardo, Syll. Fung. 1 : 133, 1882; Winter, Rabh. Kryptgfl. I, 2 : 731, 1887; Munk, Dsk. Bot.

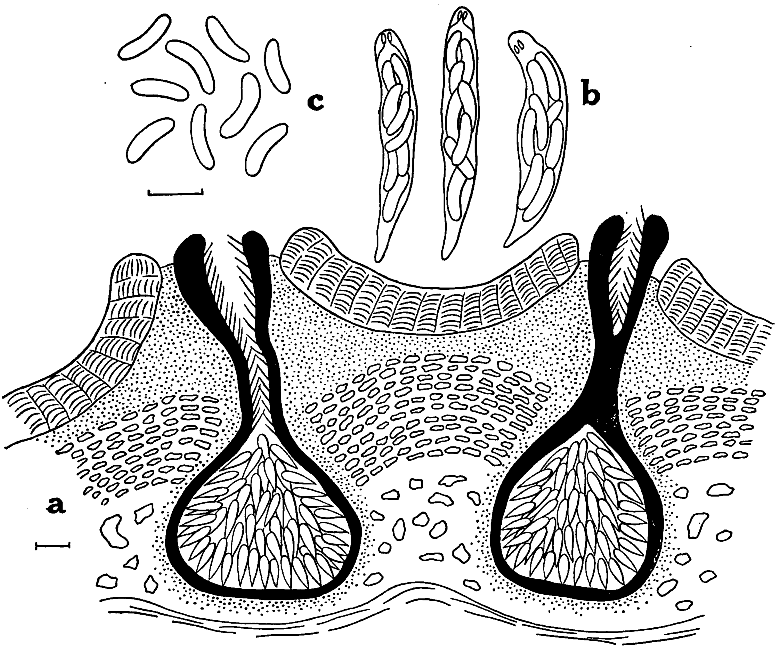

Figure 69. *Valsa germanica* Nit.
a: Two perithecia with separately erumpent neck b: Asci and Ascospores
c: Ascospores (⊢—⊣: a=100 μ; b, c=10 μ)

Ark. 17(1) : 223, 1957; Urban, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 14, 1958

Synonym: *Sphaeria tessella β decedens* Alb. et Schw., Consp. Fung. 23, 1805
Valsa socialis Ell. et Ev., Bull. Torr. Bot. Clb. 24 : 132, 1897

Conidial state: *Cytospora germanica* Sacc., Syll. Fung. 3 : 262, 1884; Grove, Coel. I : 283, 1935; Urban, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 15, 1958.

Pustules on bark of dead stem or twig, minute, 0.5～1 mm in diam., scattered or aggregated; development of ectostroma scanty, only visible as hyphal element around the neck; disc usually indistinct. Perithecia embedded singly or in small group within bark tissue, surrounded by loose hyphal elements and integrating tissue of substrata, globular or depressed at the bottom, 400～500 μ in diam., with long neck at the top; wall of perithecia composed of flattened, dark brown to blackish, thick-walled cells, innermost cells being hyaline and thin-walled. Necks cylindric, erumpent singly or loosely convergent at the outside of small disc-like pustules, not congregated at the center part of pustules, 500～700 μ in length, composed of elongated plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses. Asci clavate or cylindric-clavate, tapered toward the base, thin-walled with thickened tip furnishing apical ring, 40～53×9～10 μ in size and 4.6×9.4 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly 2- or 3-seriate, allantoid, unicellular, hyaline, 11～15×2.5～3 μ in size and 12.7×2.9 μ in average.

Host and Material: *Populus trichocarpa*—Meguro, Tokyo, III-6, 1963, by T. K. (FPH-705). *Populus* sp.—Hanawa, Fukushima, X-4, 1963, by Y. Zinno (FPH-2327).

Distribution: Asia (Japan), Europe and North America.

Note: The present species is characterized by the conspicuous mode of emergence of perithecial neck (Munk 1957, Urban 1958). The necks emerge scatteredly on the bark surface and are separately erumpent. As no other species showing such characteristic has hitherto been known, Japanese materials on poplar are identified as *Valsa germanica*, though asci of Japanese materials are somewhat shorter than those reported by foreign investigators.

Relationship between present *Valsa* and *Cytospora germanica* SACC. was mentioned to be conclusive by many mycologists. It is necessary to prove experimentally this relationship, because the *Cytospora* found on the same material as a *Valsa* has not always related to the *Valsa*. As cultural study of the present fungus was not conducted, description of *Cytospora* state of the fungus is retained, though a *Cytospora* which is quite accordant with *C. germanica* was obtained on *Populus*.

Recently, HUBBES (1960) combined *Valsa germanica* NIT. with *V. ambiens* (PERS.) FR. together with some other species, namely *V. sordida* NIT. and *V. salicina* FR., and these species were treated as the synonyms of *V. ambiens* NIT. sensu HUBBES. However, his sense is not acceptable because these species are fairly well defined in their spore size and other characters.

7) ***Valsa salicina*** **(PERSOON ex FRIES) FRIES**, Sum. Veg. Scand. 412, 1849—(Figures 70 and 71; Plate XVIII: C～F)—SACCARDO, Syll. Fung. 1 : 131, 1882: WINTER, Rabh. Kryptgfl. I, 2 : 728, 1878; ELLIS & EVERHART, N. Amer. Pyren. 477, 1892; MUNK, Dsk. Bot. Ark. 17(1) : 224, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 31 : 628, 1957; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 19, 1958; BUTIN, Mitt. Biol. Bund. Land.-u. Forstw., Berl. Darl. 98 : 28, 1960

Synonym: *Sphaeria salicina* PERS., Syn. Meth. Fung. 47, 1801
Sphaeria salicina PERS. ex FR., Syst. Myc. 2 : 401, 1823
Valsa salicina TUL., Sel. Fung. Carp. 2 : 178, 1863
Valsa salicina var. *tetraspora* BERK., Ann. Mag. Nat. Hist. III, 3 : 367, 1859
Valsa tetraspora BERK., Ann. Mag. Nat. Hist. III, 3 : 367, 1859
Sphaeria dolosa FR., Syst. Myc. 2 : 405, 1823
Valsa dolosa (FR.) NIT., Pyren. Germ. 200, 1867; SACCARDO, Syll. Fung. 1 : 136, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 720, 1887; ELLIS & EVERHART, N. Amer. Pyren. 481, 1892
Valsa populina FUCK., Symb. Myc. Nachtr. 1 : 314, 1871; SACCARDO, Syll. Fung. 1 : 131, 1882
Valsa populina var. *astoma* REHM, Hedw. 24 : 16, 1885
Valsa populicola WINT., Rabh. Kryptgfl. I, 2 : 729, 1887

Conidial state: *Cytospora fugax* BULL. ex FR., Syst. Myc. 2 : 544, 1823; SACCARDO, Syll. Fung. 3 : 263, 1884; GROVE, Coel. I : 282, 1935; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 23, 1958; BUTIN, Mitt. Biol. Bund. Land.-u. Forstw. Berl. Darl. 98 : 38, 1960 (=*Naemospora salicis* CDA., *Cytospora salicis* (CDA.) RABH.).

Pustules on bark of dead twigs, scattered, 0.5～2 mm in diam., usually exposing white to dusty yellow disc at the surface of the bark, or small black fascicle of necks in poorly developed ectostroma; discs composed of prosenchymatous ectostroma and converged necks, or, only loose hyphal element around necks. Perithecia embedded singly or in small group within bark tissue, arranged circinately or in a layer, globular or depressed at the bottom, 200～500 μ in diam., with black neck at the tip; wall of perithecia membranaceous, constituted from flattened, dark-brown to blackish, thick-walled cells, innermost cells being hyaline and thin-walled. Necks cylindric, stout or bent towards disc, collectively erumpent through ectostroma, 200～600 μ in length, composed of elongated plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses. Asci clavate or cylindric-clavate, with thin-membrane, furnished apical ring at thickened tip, tapered toward the base, 45～75×7.5～13 μ in size and 55.4×10.3 μ in average, 4-spored, loosed irregularly in

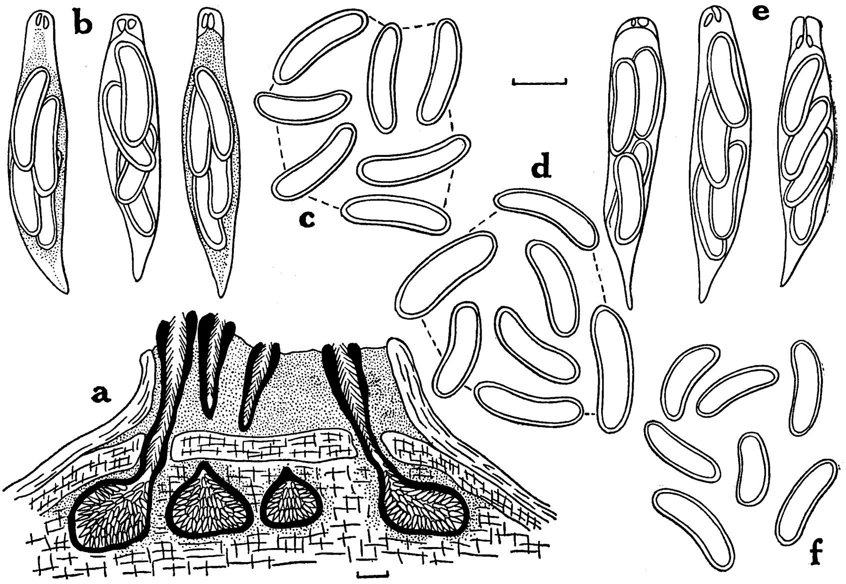

Figure 70. *Valsa salicina* (PERS. ex FR.) FR.
a: Perithecial pustule b, e: Asci and ascospores
c, f: Ascospores produced on host plant d: Ascospores produced on culture a∼d: On *Populus* e, f: On *Alnus*
(⊔: a=100 μ; b∼f=10 μ)

perithecium. Ascospores irregularly biseriate, allantoid or somewhat inaequilateral, rounded at both ends, unicellular, hyaline, with thick membrane, 14∼27×3.5∼7.5 μ in size and 18.2×4.4 μ in average.

Pycnidial pustules are formed on bark, mixing with the perithecial pustules; disc is somewhat smaller and flattened than perithecial one; pycnidial stroma immerses within peridermal layer, then erumpent and breaks through bark epiderm exposing white to creamy white disc, and is prosenchymatous, multilocular with a central ostiole; wall of locule is indistinct but distinguishable from the surrounding stromatic tissue by a layer of flattened, parallely lined, pale brownish coloured cells. Conidiophores arise from innermost cells of locules, and are hyaline, simple, 10∼14 μ in length. They conglutinate or evanesce in full maturity. Conidia are unicellular, allantoid, hyaline, 5∼7.5×1.3∼2 μ in size and 6.3×1.9 μ in average.

Host and Material: *Populus alba* L. (Gindoro)—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2621). *Populus nigra*×*P. maximowiczii* (Kamabuchi-1)—Morioka, Iwate, X-9, 1962, by T. K. (FPH-707). *Populus euramericana* I-455—Obihiro, Hokkaido, X-25, 1961, by S. KAMEI (FPH-3132). *Salix integra* THUNB. (Inukori-yanagi)—Karuisawa, Nagano, IX-25, 1960, by T. U. (FPH-1606). *Alnus inokumai* MUR. et KUS. (Tanigawa-hannoki)—Morioka, Iwate, X-9, 1962, by T. K. (FPH-695). *Pseudotsuga taxifolia* BRIT. (Dagurasu-momi)—Morioka, Iwate, X-9, 1962, by T. K. (FPH-689); Yamabe, Hokkaido, XII-8, 1967, by H. SAHO & I. TAKAHASHI (FPH-3372).

Distribution: Asia (Japan), Europe and North America.

Note: The present species is characterized by whitish disc, usually 4-spored asci and large ascospores. Morphological characteristics of Japanese materials listed above were quite identical with those of *Valsa salicina* critically reexamined by URBAN (1958). As mentioned in the note of

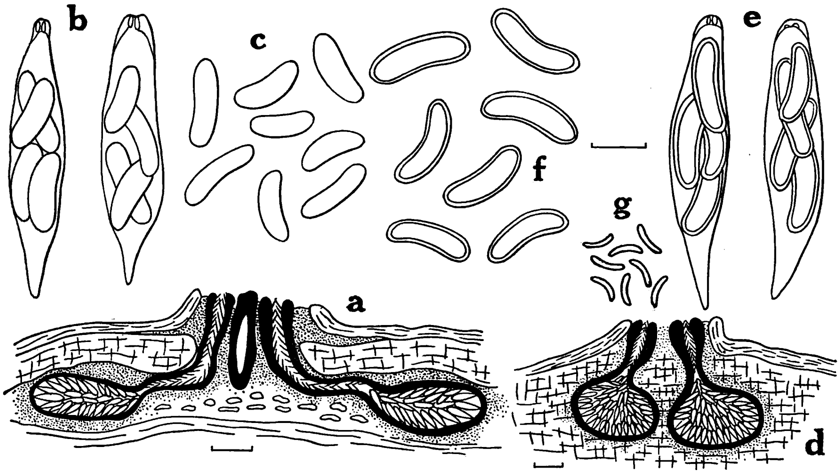

Figure 71. *Valsa salicina* (PERS. ex FR.) FR.
a, d: Perithecial pustules　b, e: Asci and ascospores
c, f: Ascospores　g: Conidia　a～c: On *Salix*
d～g: On *Pseudotsuga*　(⌴: a, d=100 μ; b, c, e～g=10 μ)

Valsa germanica NIT., inclusion of *V. salicina* to *V. ambiens* made by HUBBES (1960) is not accepted. *Valsa salicina* usually produces 4-spored ascus and circinately arranged perithecia, whereas *V. ambiens* usually produce atypical allantoid type of ascospore and massively aggregated perithecia. Among the records on the host plant *Valsa salicina*, coniferous plants were not found. As no differences between materials on broadleaved trees and those on *Pseudotsuga* were observed in any respect, *Valsa* on *Pseudotsuga* is deemed to be the same as *Valsa salicina* on broadleaved trees.

Ascospore of the fungus easily germinated and developed its colony on potato-sucrose agar. Growth of colony was relatively slow. First, white to pale yellowish and flat colony was formed, then it became thick with felty appearance and creamy white to dusty yellow in colour. About two or three months after isolation, isolate from ascospore on *Populus alba* formed small sphaeric bodies on the lower marginal part of colony. Examination of these bodies revealed that they were matured perithecia which were filled with luxuriant fresh ascospores. Ascus membrane is quite delicate and easily dissolves by mounting in water. Size of ascospore produced on culture, 18～23×4～5.5 μ in size and 21.3×4.6 μ in average, agrees with that on host plants. Isolates from *Pseudotsuga* showed similar characters to ascospore isolates from broadleaved trees.

Though no record of *Valsa salicina* is to be found in Japan, a species of *Valsa* recorded on *Morus* by MIYAKE (1916) as *V. ambiens* is probably considered to be *V. salicina*, judging from his brief note in which the *Valsa* was described as having white disc.

8) ***Valsa ambiens* (PERSOON ex FRIES) FRIES**, Sum. Veg. Scand. 412, 1849—(Figures 72 and 73; Plate XVIII: G～T)—SACCARDO, Syll. Fung. 1 : 131, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 729, 1887; ELLIS & EVERHART, N. Amer. Pyren. 476, 1892; MUNK, Dsk. Bot. Ark. 15(2) : 79, 1953; 17(1) : 224, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 31 : 629, 1957; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 28, 1958; DENNIS, Brit. cup fungi, 186, 1960; HUBBES, Phytop. Zeits. 39 : 66, 1960

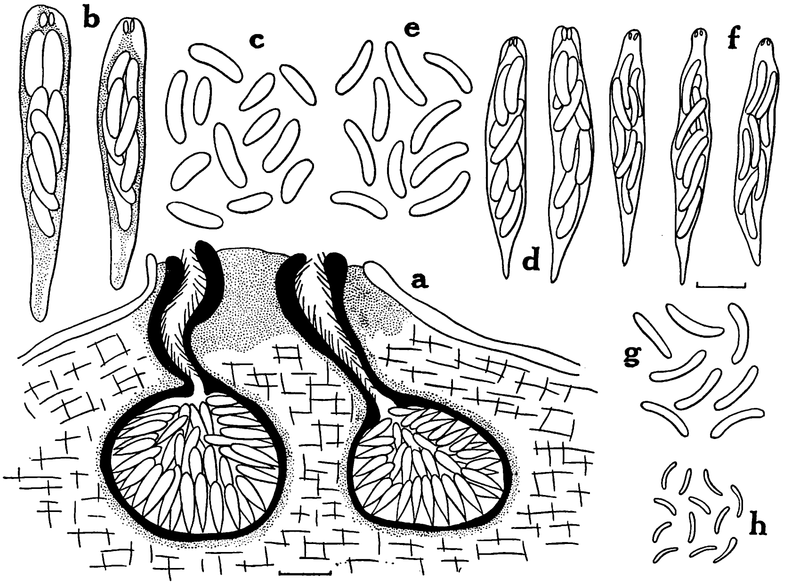

Figure 72. *Valsa ambiens* (PERS. ex FR.) FR.

a: Perithecial pustule b, d, f: Asci and ascospores c, e, g: Ascospores
h: Conidia produced on culture a~c: On *Morus* d, e: On *Betula*
f~h: On *Acer* (⌴: a=100 μ; b~h=10 μ)

Synonym: *Sphaeria ambiens* PERS., Syn. Meth. Fung. 44, 1801

Sphaeria ambiens PERS. ex FR., Syst. Myc. 2 : 403, 1823

Sphaeria calvula WAHL., Fl. Lapp. 519, 1812

Valsa pustulata AUERSW. ap. NIT., Pyren. Germ. 211, 1867; SACCARDO, Syll. Fung. 1 : 135, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 727, 1887; ELLIS & EVERHART, N. Amer. Pyren. 429, 1892

Valsa intermedia NIT., Pyren. Germ. 199, 1867; SACCARDO, Syll. Fung. 1 : 119, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 719, 1887

Valsa coenobitica f. *parvula* SACC., Ann. Myc. 12 : 288, 1914; Syll. Fung. 24 : 712, 1928

Valsa platanoides OTTH, Mitt. Natur. Ges. Bern, 97, 1868; SACCARDO, Syll. Fung. 14 : 483, 1899

Sphaeria sphinctrina FR., Syst. Myc. 2 : 400, 1823

Valsa sphinctrina FR., Sum. Veg. Scand. 412, 1849

Valsa japonica MIYABE et HEMMI, in HEMMI, Jour. Coll. Agr. Tohoku Imp. Univ. 7(4) : 1916; SACCARDO, Syll. Fung. 24 : 714, 1928; TOGASHI, Bull. Morioka Imp. Coll. Agr. & For. 14 : 30, 1930

Valsa moricola YENDO, Diseases of mulberry trees, 198, 1929

Conidial state: *Cytospora ambiens* SACC., Michelia 1 : 519, 1879; Syll. Fung. 3 : 268, 1884; GROVE, Coel. I : 256, 1935 (=*Cytospora pustulata* B. et C., *C. pseudoplatani* SACC.)

Pustules on bark of cankered or dead stems and twigs, scattered or gregarious, elevated hemisphaeric or conic to truncate conic, 0.5~3 mm in diam.; ectostroma usually conspicuous, prosenchymatous or pseudoparenchymatous, immersed within bark periderm, then erumpent and broken through the bark epiderm exposing prominent disc; discs gray to yellowish brown, becoming blackish in later stage. Perithecia embedded within bark tissue, arranged circinately or clustered

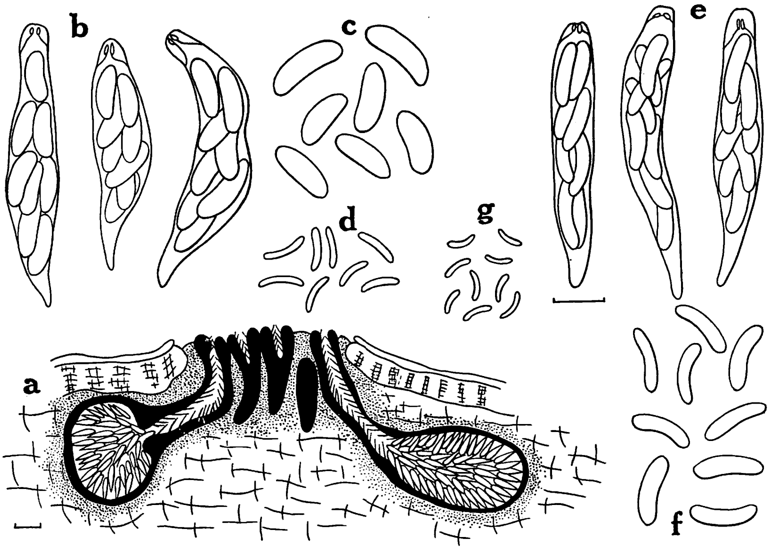

Figure 73. *Valsa ambiens* (Pers. ex Fr.) Fr.
a: Perithecial pustule b, e: Asci and ascospores c, f: Ascospores
d: Conidia produced on host plant g: Conidia produced on culture
a～d: On *Weigela* e～g: On *Alnus* (⌴: a=100 μ b～g=10 μ)

in one to two layers beneath the ectostroma, 250～800 μ in diam., globular or depressed at the bottom, with neck at the top; wall of perithecia dark brown to black, membranaceous, composed of flattened, blackish, thick-walled cells, innermost cells being hyaline and thin-walled. Necks cylindric, collectively erumpent through ectostroma, 600～1,300 μ in length, composed of vertically elongated, dark brown to blackish, plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses. Asci clavate to cylindric-clavate, tapered toward the base, with thin-membrane, furnished apical ring at thickened tip, usually 8-, rarely 4- or 6-spored, loosed irregularly in perithecium, 43～83×6.5～14 μ in size and 57.8×11.7 μ in average. Ascospores irregularly bi- to pluriseriate, allantoid or inaequilateral to sometimes nearly elliptic, rounded at both ends, unicellular, hyaline, 11.5～25×2.5～6.5 μ in size, mostly 12.5～18×2.5～5 μ and 15.5×3.7 μ in average.

Development of conidial state usually precedes to the perithecial formation, but sometimes conidial locule develops simultaneously with the perithecia in one stroma. Pycnidial stroma first immerses within bark periderm, and is prosenchymatous or pseudoparenchymatous, then erumpent and breaks through the bark epiderm, elevates hemisphaeric to truncate-conic, and forms multilocules with a central pore; locules often coalesce into a large chamber in later stage; wall of locules is only distinguishable from the surrounding stromatic tissue by the layer composed of flattened, brown to greenish brown cells. Conidiophores arise from innermost cells of locule and are simple or branched, hyaline, 8～28 μ in length, and conglutinate in later stage. Conidia produced on the tip of conidiophore are allantoid, hyaline, unicellular, 4～9×0.8～2 μ in size and 7.1×1.2 μ in average, often exude from the pore of locule as orange sticky horns under moist conditions.

Host and Material: *Acer* sp.—Nippara, Tokyo, XI-9, 1963, by T. K. (FPH-2334). *Alnus incana* Willd. — Koshunai, Hokkaido, IX-23, 1964, by T. K. (FPH-2405). *Alnus glutinosa* Gaertn. (Ōshu-kurohannoki)—Morioka, Iwate, X-9, 1962, by T. K. (FPH-693). *Betula lenta* L.—Koshunai, Hokkaido, IX-23, 1964, by T.K. *Betula maximowicziana* Reg. (Udai-kanba)—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2417). *Weigela hortensis* (SIEB. et ZUCC.) KOCH (Tani-utsugi)—Wada, Nagano, IX-22, 1960, by T. K. (FPH-1581). *Morus alba* L. (Kuwa)—Komoro, Nagano, IX-20, 1967, by T. K. (FPH-3291). *Prunus yedoensis* MATSUM. (Somei-yoshino)—Sapporo, Hokkaido, I-1, 1914, by T. HEMMI (HUH-Type of *Valsa japonica* MIY. et HEM.); III-30, 1914, by T. HEMMI (HUH-paratype of *V. japonica*); V-10, 1914, by T. HEMMI (HUH-paratype of *V. japonica*); XI-, 1914, by T. HEMMI (HUH-paratype of *V. japonica*); Koshunai, Hokkaido, IX-23, 1964, by T. K. (FPH-2471, 2477).

Distribution: Asia (Japan), Europe and North America.

Note: *Valsa ambiens* is one of the polyxenic species in the genus *Valsa* (URBAN 1958, HUBBES 1960). It is distinguishable from *Valsa salicina* by the gray to brown or blackish disc, more massively aggregated perithecia, and larger ascus usually containing 8 spores. HUBBES' treatment to include *Valsa salicina, V. sordida* and *V. germanica* in this species is not accepted.

Asci and ascospores of the materials examined by the author showed wide range in their size. For instance, ascospores of a collection on *Acer* were measured to be 11.5～15×2.5～3 μ in size and 13.9×2.7 μ in average, whereas those of a specimen on *Prunus* were 18～25×4～5 μ in average. Dimensions for the other materials distribute continuously between these extreme sizes. In some specimens, such as on *Morus* and one of *Prunus*, size of ascospores showed great variance and mostly overlapped between both extremes mentioned above. A large similarity in the morphology of conidial state was found among them. Therefore, it is impossible to separate them clearly into two or more groups. Similar case was also pointed out by URBAN (1958) who critically reexamined many materials of *Valsa* in Czechoslovakia.

In some cases, ascospores of the fungus were quite variable in their shape, from allantoid to inaequilateral to elliptic. These varied shapes usually occurred in one perithecium. Such inaequilateral to elliptic ascospores of *Valsa ambiens* are quite similar to those of *Diaporthopsis* which has *Phomopsis* type in its imperfect state. Therefore, this similarity indicates the affinity of *Valsa* to *Diaporthopsis* and to *Diaporthe*.

In Japan, a species of *Valsa* having large ascospore was described by HEMMI (1916) as *V. japonica* MIYABE et HEMMI. It has been well known as the causal agent of the canker disease of *Prunus* spp., especially of flowering cherry. Morphological characteristics of *Valsa japonica* given by HEMMI (1916) and TOGASHI (1930a) are quite identical with those of *V. ambiens* restudied by DÉFAGO (1935) and URBAN (1958). *Prunus* spp. were listed to be common host of *Valsa ambiens* by them and also by GILMAN et al. (1957). General characters of *Valsa japonica* on potato-sucrose agar (HEMMI 1916, TOGASHI 1930b) accord with those of *V. ambiens* (DÉFAGO 1935) and of isolates obtained by the author not only from *Prunus* but also from the other host plants. Temperature relation for the mycelial growth of *Valsa japonica* reported by TOGASHI (1930b) also agrees with that of *V. ambiens* studied by DÉFAGO. When HEMMI described *Valsa japonica*, he compared it with *V. ambiens* and conclusively stated that *V. japonica* differs from *V. ambiens* by the more abundant perithecia, more developed entostroma, and larger size of conidia, though these two fungi seemed to be nearly allied to each other. TOGASHI (1930a) who also compared *Valsa japonica* with *V. ambiens* reached the same conclusion as HEMMI. Two out of three points distinguishing these two species, namely number of perithecia in one pustule and extent of entostroma, depend upon the condition of the bark, for instance thickness, age, kinds of host plant, etc., and are considered to be rather minor criteria to divide species. Size of conidia in *Valsa japonica* was given as 3.5～15×1～2.5 μ by HEMMI and 5～10.5×1～2 μ by TOGASHI. In *Valsa ambiens*, size of conidia was reported to be 5～7×1 μ by SACCARDO (1884), 4～7.5×0.8～1.2 μ by DÉFAGO (1935) and 4.5～8×0.5～1.5 μ by URBAN (1958). The author's dimensions on the materials listed above including the type and paratype specimens of *Valsa japonica* are 4～9×0.5～2 μ. So far as can be judged from these dimensions and other characters, no difference is found between the conidial states of *Valsa japonica* and *V. ambiens*. From the foregoing facts, *Valsa japonica* MIYABE et HEMMI is treated as a synonym of *Valsa ambiens* (PERS. ex FR.) FR.

In 1916, MIYAKE reported three Valsae on *Morus* from Japan, namely *Valsa ambiens*, *V. pusio* BERK. et CURT. and *V. ceratophora* TUL. Judged from his brief note, his *Valsa* having clear white disc is not *V. ambiens* but probably belongs to *V. salicina*.

Later, *Valsa moricola* YENDO was added as a new inhabitant of *Morus* in Japan (ENDO 1929). Its available specimen was not found, unfortunately. One specimen labelled as *Valsa moricola* was found among HARA's collection in the National Science Museum; however, it was not *Valsa moricola* but *V. ceratosperma* as mentioned already. Size of ascus and ascospore of *Valsa moricola* measured by ENDO is identical with that of *V. ambiens*, though ENDO considered it to be smaller than *V. ambiens*. Hence, the author treats *Valsa moricola* YENDO as a synonym of *V. ambiens*.

Ascospore and conidium sowed on agar plate were much swelled prior to producing germ-tube, especially in conidium. Growth of germ-tube was relatively slow and germinated spore developed visible colony about ten to fourteen days after transplantation to potato-sucrose agar. Colony was first flat and white to pale yellowish, then formed thick felty mat and turned to yellowish brown to "Benzo Brown" or "Cinnamon Drab" with pale brownish ("Vinaceous Cinnamon") aerial mycelia at the marginal area. On two- to three-months-old culture, several sphaeric bodies were produced on the colony, then orange to reddish mucous masses of conidia oozed out from them. Conidia produced on culture, 5～7.5×0.5～1 μ in size 6.3×0.7 μ in average, were not different from those on host plants.

Physiology and parasitism of the present species were discussed in detail by HEMMI (1916) and TOGASHI (1930b, 1931). According to TOGASHI (1930b) the fungus grew well at 20～25°C with the maximum at 32°C and the minimum at 5°C. HEMMI proved experimentally that the fungus was a wound parasite. DÉFAGO (1955) confirmed HEMMI's result through his inoculation experiment and stated that pathogenicity of the fungus was usually not markedly virulent. TOGASHI (1931) conclusively stated through his detailed experimental data that the fungus was able to grow in the bark tissue during autumn to the following spring, excepting mid-winter, when the ability of host to resist development of the fungus decreases, so that the fungus would be able to give mortal damage to host plant.

9) ***Valsa friesii* (DUBY) FUCKEL**, Symb. Myc. 198, 1869; SACCARDO, Syll. Fung. 1 : 118, 1882; ELLIS & EVERHART, N. Amer. Pyren. 464, 1892; MUNK, Dsk. Bot. Ark. 17(1) : 225, 1957; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 25, 1958

Synonym: *Sphaeria friesii* DUBY, Bot. Gall. 2 : 690, 1830
Valsa juniperina CKE., Grev. 6 : 144, 1878; SACCARDO, Syll. Fung. 1 : 126, 1882; ELLIS & EVERHART, N. Amer. Pyren. 464, 1892
Valsa cephalotaxi SAWADA, Bull. Gov. For. Exp. Sta. 46 : 118, 1950

Conidial state: *Cytospora pinastri* FR., Syst. Myc. 2 : 544, 1823; SACCARDO, Syll. Fung. 3 : 725, 1884; GROVE, Coel. I : 264, 1935; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 27, 1958
(=*Cytopora friesii* SACC., *C. dubyi* SACC., *Sclerotiopsis piceana* (KARST.) DIED.)

As mentioned in the note of *Valsa abietis* FR., *Valsa cephalotaxi* SAWADA on *Cephalotaxus* (SAWADA 1950) is not considered to be an independent species but to be synonymous with *V. friesii* (DUBY) FUCK., so far as can be judged from his description, figure and notes. Hence, *Valsa* *cephalotaxi* is treated as a synonym of *Valsa friesii* and the following description was translated from that of SAWADA.

"Pustules on stems and needles, scattered; perithecia embedded within bark or needle tissue, clustered, subglobular, black, 255～275 μ in diam., with long neck at the top; necks 432 μ in length and 55 μ in width, surrounded by brown to dark stromatic tissue; asci ovo-clavate, with short stalk at the base, hyaline, 28～33×5～7 μ in size, 8-spored; ascospores biseriate, allantoid, round at the ends, unicellular, hyaline, 9～12×2 μ in size. On *Cephalotaxus nana* NAKAI (Hai-inugaya)—Ohata, Aomori, X-4, 1949, by K. SAWADA & S. MURAI."

Size of ascus and ascospore described by SAWADA is quite accordant with those of *Valsa friesii* given by many foreign workers (e.g. ELLIS & EVERHART 1892, MUNK 1957, URBAN 1958).

10) Notes on some doubtful species of *Valsa* recorded in Japan

As mentioned already, *Valsa mori* SAWADA (SAWADA 1952, 1959) would be excluded from the genus *Valsa* by its brown ascospore and formation of hymenial layer along perithecial wall.

Distribution of *Valsa pusio* BERK. et CURT. in Japan is quite doubtful, so far as can be judged from the note by MIYAKE (1916).

Valsa oxystoma REHM was noted by KITAJIMA (1933), but it may be a direct translation from a foreign book.

8. ***Leucostoma*** (NITSCHKE) **HÖHNEL**, NIT., Pyren. Germ. 221, 1867 (subgenus); HÖHN., Ber. Deut. Bot. Ges. 35 : 637, 1917; WEHMEYER, Amer. Jour. Bot. 13 : 640, 1926; MUNK, Dsk. Bot. Ark. 15(2) : 79, 1953; KERN, Phytop. Zeits. 30 : 151, 1957; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 66, 1958; DENNIS, Brit. cup fungi, 187, 1960.

Type species: *Leucostoma massariana* (DE NOT.) HÖHN.

Conidial state: *Leucocytospora* HÖHNEL

Pustules on bark or needle; development of ecto- and entostroma quite well, usually continuously fused and unseparable sharply; stroma immersed within bark tissue, then erumpent through bark epiderm exposing distinct discs, sharply delimited from the bark tissue by brown to black zone (conceptacle) circumscribing stroma, upper half of stroma being compact, plectenchymatous or pseudoparenchymatous, hyaline to pale brown, only constituted from fungal tissue, lower half being loose, prosenchymatous, containing many, small, brown to reddish-coloured fragments of host tissue among the fungal element. Conceptacle entirely circumscribed stroma excepting the disc surface, usually constructed from several layers of thick-walled, black and isodiametric cells, rarely from brown fungous cells and brown-stained decomposed tissue of substrata. Perithecia embedded within stroma, few to many, lined circinately or in a layer, sometimes with pycnidial locule simultaneously among them, subglobular or strongly depressed, with relatively short neck at the top; wall of perithecia apparently distinguished from the surrounding stromatic tissue, pale brown to dark brown, composed of flattened, thick-walled cells, innermost cells being hyaline and thin-walled. Necks cylindric, broader at the tip, elevated at the disc surface as papillae, composed of elongated plectenchymatous cells, pierced by a pore furnishing hyaline periphyses. Asci clavate to cylindric-clavate, tapered to the base, with thin-membrane, furnished apical ring at thickened tip, usually 8-, rarely 4-spored, loosed irregularly in perithecium. Ascospores allantoid, rounded at both ends, hyaline, unicellular.

Conidial state usually develops separately from the perithecial state, but sometimes pycnidial locule is formed within perithecial stroma simultaneously. Locule is usually multilocular, often coalesces into a large irregular locule with a central pore; wall of locule is indistinct, distinguishable from the surrounding stroma only by a thin layer of hyaline cells lined parallel. Conidiophores arise from these hyaline cells, and are usually simple, rarely branched, then conglutinate to each other in later stage. Conidia are allantoid, hyaline, unicellular, often ooze out as sticky orange to yellowish tendrils from the pore of pycnidial locule under moist conditions. Conceptacle usually present.

Historical review of the present genus and basis to separate it from *Valsa* are mentioned in the note of the genus *Valsa* (page 100). For the conidial state of *Leucostoma*, HÖHNEL (1918) established a form-genus *Leucocytospora* as having black conceptacle around the stroma. Separation of *Leucocytospora* from the genus *Cytospora* was not accepted by MUNK (1957), GILMAN et al. (1957), who considered *Leucostoma*, the perfect state of *Leucocytospora*, to be a synonym of *Valsa*, whereas URBAN (1958), who accepted the genus *Leucostoma* to be an independent genus, supported HÖHNEL's opinion. The author also accepts the genus *Leucocytospora* for the conidial state of *Leucostoma* for the reason mentioned in the note of *Valsa*.

In Japan *Leucostoma persoonii* (NIT.) TOGASHI (TOGASHI 1930 a, 1931) has been known as a causal pathogen of the peach canker. In the following part, four species of *Leucostoma* are described and they are distinguished from each other by the following key and Figure 74.

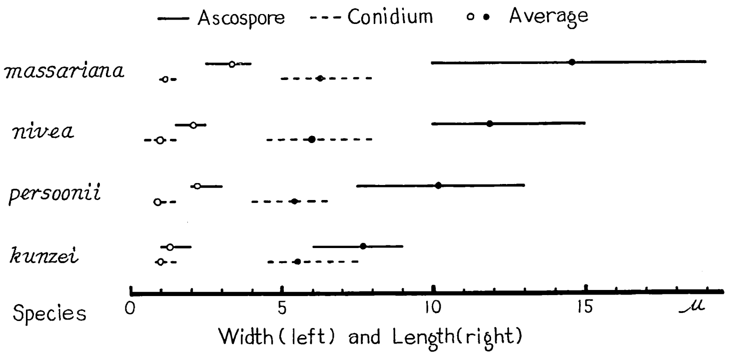

Figure 74. Size of ascospore and conidium of *Leucostoma* in Japan.

Key to Japanese species of *Leucostoma*

A_1: Disc white to cream
  B_1: On Salicaceae, ascospore 10～15×1.5～2.5 μ ········· *L. nivea* (p. 127)
  B_2: On broad-leaved trees, ascospore 7.5～13×2～3 μ ········· *L. persoonii* (p. 130)
A_2: Disc gray to blackish
  B_1: On conifers, ascospore 6～9×1～2 μ ········· *L. kunzei* (p. 125)
  B_2: On *Sorbus*, ascospore 10～19×2.5～4 μ ········· *L. massariana* (p. 129)

1) ***Leucostoma kunzei*** **(FRIES) MUNK**, Dsk. Bot. Ark. 15(2) : 80, 1953—(Figure 75; Plate XIX: A～D)—KERN, Pap. Michig. Acad. Sci. 40 : 19, 1955; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 73, 1958

Synonym: *Sphaeria kunzei* FRIES, Syst. Myc. 2 : 388, 1823
Valsa kunzei FRIES, Sum. Veg. Scand. 411, 1849; SACCARDO, Syll. Fung. 1 : 139, 1882;

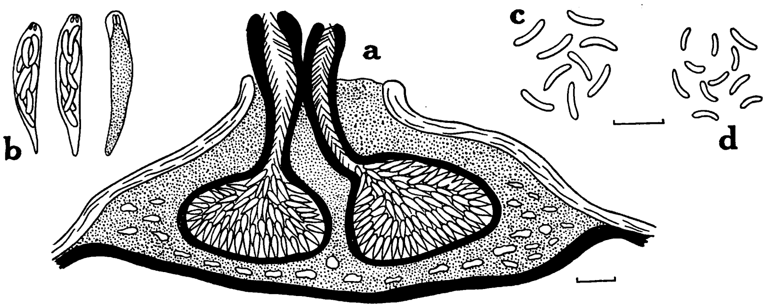

Figure 75. *Leucostoma kunzei* (Fr.) Munk
a: Perithecial stroma　b: Asci and ascospores　c: Ascospores
d: Conidia produced on culture　(⊔: a=100μ; b∼d=10 μ)

Winter, Rabh. Kryptgfl. I, 2 : 738, 1887; Munk, Dsk. Bot. Ark. 17(1) : 229, 1957
Conidial state: *Leucocytospora kunzei* (Sacc.) Urban, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 74, 1958 (=*Cytospora kunzei* Sacc.)

Pustules on bark of dead stems and twigs, 1∼2 mm in diam.; stroma immersed within bark tissue, then erumpent through bark epiderm exposing gray to blackish disc, upper half being compact plectenchymatous, lower half being loose prosenchymatous containing decomposed tissue of substrata, circumscribed by black conceptacle, inner tissue of stroma being pale brown or grayish. Conceptacle 30∼50 μ in thickness, constituted from several layers of isodiametric and blackish cells. Perithecia embedded in a layer within lower part of stroma, subglobular or strongly depressed at the bottom, 250∼480 μ in diam., with neck at the top. Necks cylindric, erumpent through disc, 300∼350 μ in length, penetrated by a pore furnishing hyaline periphyses. Asci clavate to cylindric-clavate, thin-walled with thickened tip furnishing apical ring, 23∼30×4∼5 μ in size and 26.7×4.6 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores allantoid, rounded at the ends, unicellular, hyaline, 6∼9×1∼2 μ in size and 7.7×1.3 μ in average.

Pycnidial stroma is much like the perithecial one excepting the formation of conidial locule instead of perithecia. Locules are multilocular, irregular, often coalesce into one to two large cavities in later stage, with a pore at the centre part of stroma; wall of locule is indistinct. Conidiophores arise from innermost cells of locule, and are simple, hyaline, conglutinate in later stage. Conidia are allantoid, minute, hyaline, unicellular, 4∼7×0.5∼1 μ in size and 5.2×0.8 μ in average.

Host and Material: *Cryptomeria japonica* D. Don (Sugi)—Asakawa, Tokyo, III-20, 1960, by T. U. (FPH-1600); Kuroiso, Tochigi, VI-, 1961 (FPH-866). *Pinus densiflora* Sieb. et Zucc. (Akamatsu)—Karuisawa, Nagano, IX-25, 1960, by T. U. (FPH-1501, 1510, 1511, 1529, 1604); Wada, Nagano, IX-18, 1963, by T. U. (FPH-2228, 2230).
Conidial state only: *Larix leptolepis* Gord. (Karamatsu)—Daimon, Nagano, VI-15, 1961, by T. K. (FPH-1450, 1468). *Pinus densiflora*—Karuisawa, Nagano, IX-28, 1960, by T. U. (FPH-1586); Miyota, Nagano, IX-25, 1960, by T. U. (FPH-1591).

Distribution: Asia (Japan), Europe and North America.

Note: On conifers two species of *Leucostoma* have been well known. *Leucostoma kunzei* is distinguishable from *L. curreyi* (Nit.) Défago by its apparent smaller ascospore which is not over 10 μ in length. Morphological characteristics of Japanese materials are quite identical with those of *Leucostoma kunzei* reported by Kern (1955) and Urban (1958) not only in the perfect state but also in the imperfect state.

Ascospore and conidium usually swelled prior to producing germ-tube. White and flat colony developed within a week after transplanting the germinated spore. Colony became thick and turned gray to grayish brown ("Light Drab" to "Drab") in colour. Scanty aerial mycelia were formed. One to two months after isolation, several large pycnidial stroma were produced on the colony. Then mucous drops of conidia oozed out from them. Conidia produced on culture, 4.5～7.5×0.8～1.3 μ in size and 5.4×0.9 μ in average, were not different from those on host plant.

The present fungus was often reported as a causal agent of the canker disease of certain conifers in foreign countries (e.g. DÉFAGO 1942, WATERMAN 1955, LAVALLÉE 1964). In Japan, there is no record of any case in which it causes severe dieback or canker on conifers. All materials obtained were found on twigs or stems killed by certain other causes, for instance winter injury, root disease, etc.

2) ***Leucostoma nivea*** (**HOFFMAN ex FRIES**) **HÖHNEL**, Mitt. Bot. Inst. Tech. Hochs. Wien, 5 : 58, 1928—(Figure 76; Plate XIX: E～H)—KERN, Pap. Michig. Acad. Sci. 40 : 16, 1955; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 75, 1958; HUBBES, Phytop. Zeits. 39 : 79; 1960

Synonym: *Sphaeria nivea* HOFFM., Veget. Crypt. 1 : 26, 1787

Sphaeria nivea PERS., Synop. Fung. 38, 1801

Sphaeria nivea HOFFM. ex FR., Syst. Myc. 2 : 386, 1823

Valsa nivea (HOFFM. ex FR.) FR., Sum. Veg. Scand. 411, 1849; SACCARDO, Syll. Fung. 1 : 137, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 734, 1887; ELLIS & EVERHART, N. Amer. Pyren. 484, 1892; SCHREINER, Amer. Jour. Bot. 18 : 6, 1931; BUTIN, Mitt. Biol. Bund. Land-u. Forstw. Berl. Darl. 91 : 32, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 31 : 627, 1957; MUNK, Dsk. Bot. Ark. 17(1) : 230, 1957

Leucostoma nivea (PERS.) DÉFAGO, Beit. Kryptgfl. Schw. 8(3) : 48, 1935; DENNIS, Brit. cup fungi, 187, 1960

Leucostoma nivea (PERS.) MUNK, Dsk. Bot. Ark. 15(2) : 80, 1953

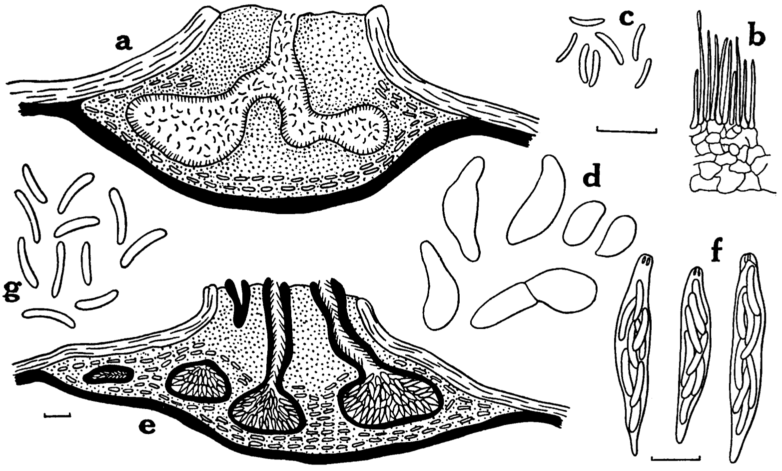

Figure 76. *Leucostoma nivea* (HOFFM. ex FR.) HÖHN.

a: Pycnidial stroma　　b: A part of locule　　c: Conidia
d: Germinating conidia　　e: Perithecial stroma　　f: Asci and ascospores
g: Ascospores　　(⌴ : a, e=100μ; b～d, f, g=10 μ)

Conidial state: *Leucocytospora nivea* (HOFFM.) comb. nov. (=*Cytospora nivea* (HOFFM.) FR.).

Pustules on bark of cankered or dead stems and twigs, scattered or gregarious; stroma immersed within bark tissue then erumpent through the bark epiderm exposing white disc, 0.5〜1 mm in height and 1〜2 mm in width, upper half being compact plectenchymatous or prosenchymatous, lower half being loose prosenchymatous containing small fragments of host tissue, with distinct conceptacle. Conceptacle 20〜60 μ in thickness, black, constituted from several layers of blackish and isodiametric cells. Perithecia embedded within lower part of stroma, subglobular, strongly depressed at the bottom, 140〜500 μ in diam., with neck at the top. Necks cylindric, erumpent through disc, 250〜400 μ in length, broader near the tip, penetrated by a pore furnishing hyaline periphyses. Asci clavate to cylindric-clavate, furnished apical ring at the swollen tip, tapered toward the base, 25〜45×5〜7.5 μ in size and 35.2×6.2 μ in average, usually 8-, rarely 4-spored, loosed irregularly in perithecium. Ascospores irregularly bi- to multiseriate, allantoid, rounded at both ends, unicellular, hyaline, 10〜15×1.5〜2.5 μ in size and 12×2.1 μ in average.

Pycnidial stroma is similar to the perithecial one excepting the formation of conidial locules instead of perithecia; sometimes pycnidial locule and perithecia are simultaneously formed in one stroma. Locules are irregularly multi-locular without distinct wall, often coalesce into one to two large chambers, open through a central pore. Conidiophores arise from the innermost layer of locule and are simple, hyaline, 6〜25 μ in length, produce conidia acrogeneously and conglutinate in later stage. Conidia are allantoid, unicellular, hyaline, 4.5〜8×0.5〜1.5 μ in size and 6.4×1 μ in average, often ooze out as sticky tendrils from the central pore of stroma under moist conditions.

Host and Material: *Populus euramericana* I-77—Koshunai, Hokkaido, IX-23, 1964, by T. K. (FPH-2435). *Populus alba*×*P. tacamahaca*—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2618). *Populus davidiana*×*P. alba*—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2613, 2620, 2629). *Populus maximowiczii* HENRY (Doronoki)—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2426). *Populus alba*×*P. davidiana*—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2449, 2455, 2615). *Populus maximowiczii*×*P. berolinensis* (Oxford)—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2450).

Conidial state only: *Populus maximowiczii*—Soehi, Nagano, IX-24, 1958, by T. U. & T. K. (FPH-939); Koshunai, Hokkaido, IX-23, 1964, by T. K. (FPH-2411, 2451). *Populus strathglas*—Kuriyama, Hokkaido, VII-24, 1959, by S. CHIBA (FPH-955). *Populus maximowiczii*×*P. berolinensis*—Makubetsu, Hokkaido, VII-28, 1960, by H. YOKOYAMA (FPH-1573); Rubeshibe, Hokkaido, VII-28, 1960, by H. YOKOYAMA (FPH-937). *Populus euramericana* I-214—Rubeshibe, Hokkaido, VII-28, 1960, by H. YOKOYAMA (FPH-951). *Populus maximowiczii*×*P. nigra* (Kamabuchi-1)—Kitagami, Iwate, X-5, 1962, by T.K. (FPH-673). *Populus euramericana* I-476—Makubetsu, Hokkaido, VII-28, 1960, by H. YOKOYAMA (FPH-1575). *Populus marilandica*—Kamabuchi, Yamagata, IX-28, 1963, by T. K. (FPH-2342). *Populus alba* L. (Gindoro)—Yamabe, Hokkaido, IX-25, 1964, by T. K. (FPH-2451, 2452); Kamikamo, Kyoto, IX-9, 1965, by T. K. (FPH-3269, 3274). *Populus euramericana* I-154—Imagane, Hokkaido, VIII-, 1966, by O. CHIBA (FPH-2918); Atsusawabe, Hokkaido, X-, 1966, by O. CHIBA (FPH-2917).

Distribution: Asia (Japan), Europe and North America.

Note: Among the certain species of *Leucostoma* described on Salicaceae, *L. nivea* is a quite cosmopolitan species on *Populus*. As pointed out by KERN (1955, 1957), it is difficult to distinguish *Leucostoma translucens* (CES. et DE NOT.) HÖHN. on *Salix* from *L. nivea*, though many mycologists considered them to be separable species one from the other. In the case of Japanese materials, ascospore is, as a rule, somewhat shorter than that of *Leucostoma nivea* reported by foreign workers. However, their dimensions are completely overlapped by the size of ascospore of *Leucostoma nivea*. Discs of Japanese fungus are pure white, and stroma sometimes contain conidial locule together with perithecia. From these bases, the fungus on ***Populus*** in Japan is identified as *Leucostoma nivea* (HOFFM. ex FR.) HÖHN.

Leucocytospora state of the fungus was recently reported from Japan (CHIBA & KOBAYASHI 1959, KOBAYASHI & CHIBA 1961), and the perfect state of *Leucostoma nivea* in our country is first recorded in this paper. The fungus widely distributes throughout eastern Japan, but the perfect state was collected only from Hokkaido.

Ascospore and conidium swelled remarkably before germination. Germ-tube repeatedly branched and visible colony developed within a week after isolation on potato-sucrose agar. Colony was first white and flat, then became grayish brown to dark gray ("Fuscous" to "Chaetura Drab" or "Dark Grayish Brown") with sparse cottony aerial mycelia at the marginal area. Large sphaeric bodies, sometimes many small ones, were produced on one- to two-months-old culture, then orange coloured conidial masses oozed out from these bodies. Conidia produced on culture, 5∼7.5×0.8∼1.5 μ in size and 6.4×1 μ in average, were quite accordant with those on host plants.

According to SCHREINER (1931), the fungus grew well at 25°C with the maximum at 35°C and the minimum at 4°C. *Leucostoma nivea* has been generally considered to be rather minor pathogen among the fungi causing poplar canker in foreign countries. A case was reported by PERSSON (1955) that it caused "Kronenmykose" of hybrid aspen in Germany. In Japan, it was often observed that the fungus caused a canker disease of young poplars, especially on exotic hybrid poplars (ITO 1961).

3) ***Leucostoma massariana*** **(DE NOTARIS) HÖHNEL**, Ber. Deut. Bot. Ges. 35 : 637, 1917.—(Figure 77; Plate XX: F, G)—HÖHNEL, Mitt. Bot. Inst. Tech. Hochs. Wien, 5 : 78, 1928; MUNK, Dsk. Bot. Ark. 15(2) : 80, 1953; KERN, Phytop. Zeits. 30 : 172, 1957; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 71, 1958

Synonym: *Valsa massariana* DE NOT., Sfer. Ital. 34, 1863; SACCARDO, Syll. Fung. 1 : 138, 1882;

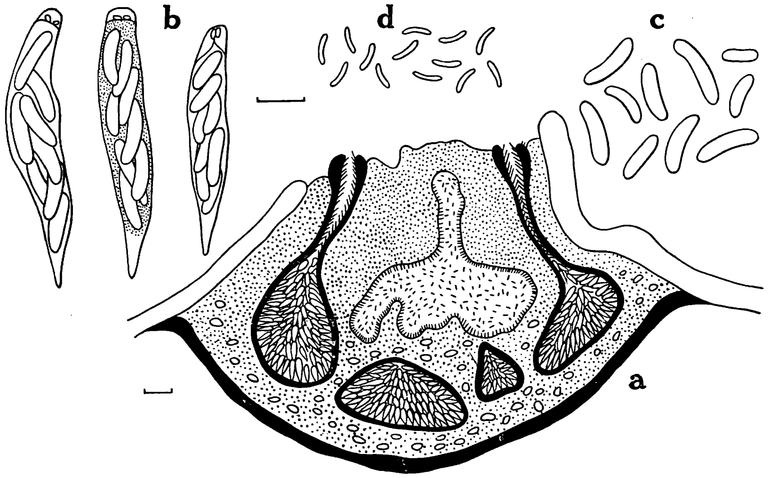

Figure 77. *Leucostoma massariana* (DE NOT.) HÖHN.

a: Stroma having perithecia and conidial locule b: Asci and ascospores
c: Ascospores d: Conidia (└─┘: a=100 μ; b∼c=10 μ)

WINTER, Rabh. Kryptgfl. I, 2 : 733, 1887; MUNK, Dsk. Bot. Ark. 17(1) : 233, 1957

Conidial state: *Leucocytospora massariana* (SACC.) URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 72, 1958 (=*Cytospora massariana* SACC.).

Pustules on bark of dead branches or stems, scattered or gregarious, 1～5 mm in diam., stroma immersed within bark tissue, then erumpent through epiderm exposing gray to dark gray disc, sometimes strongly prominent as conic to truncate-conic disc on bark surface, upper half composed of compact plectenchymatous tissue, lower half prosenchymatous, about 1.5 mm in height and 1.5～3 mm in width, perfectly circumscribed by black conceptacle; conceptacle composed of several layers of black, thick-walled, isodiametric cells, 30～50 μ in thickness. Perithecia embedded in a layer at the lower part of stroma, sometimes with conidial locule simultaneously at the centre part of perithecial layer, globular or strongly depressed at the bottom, 300～500 μ in diam., with long neck at the top; wall of perithecia distinct, dark brown to black, composed of flattened, thick-walled cells. Necks cylindric, 600～1,000 μ in length, erumpent through ectostroma dotting as black papillae on the disc surface. Asci clavate to oblong-clavate, tapered to the base, thin-walled with thickened tip furnishing apical ring, 40～58×8～10 μ in size and 49.9×9.3 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly uni- to pluriseriate, allantoid or inaequitateral, rounded at both ends, unicellular, hyaline, 10～19×2.5～4 μ in size and 14.6×3.4 μ in average.

Conidial stroma usually develops separately from perithecial one, sometimes conidial locule is formed simultaneously with perithecia in one stroma. Structure of conidial stroma is similar to that of perithecial one excepting the formation of conidial locules instead of perithecia. Locules are multilocular, often coalesce into one to two large locules in later stage, with the confluent ostiole at the centre part of ectostromatic disc, wall of locule being indistinct. Conidiophores are simple or branched, hyaline, conglutinated in later stage, 10～28 μ in length. Conidia are produced acrogeneously on conidiophore, and are allantoid, hyaline, unicellular, 5～8×1～1.5 μ in size and 6.3×1.2 μ in average.

Host and Material: *Sorbus commixta* HEDL. (Nanakamado)—Mt. Fuji, Narusawa, Yamanashi, IX-1, 1960, by Y. MAMIYA (FPH-1524, 1536, 1537); VII-11, 1967, by T. U. (FPH-3289).

Conidial state only: *Sorbus commixta*—Sapporo, Hokkaido, VIII-13, 1965, by T. U. (FPH-2656, 2657, 2658); Koshunai, Hokkaido, V-, 1965, by T. OGUCHI (FPH-2821, 2822); Mt. Fuji, Narusawa, Yamanashi, VI-22, 1966, by T. K. (FPH-2845).

Distribution: Asia (Japan) and Europe.

Note: This large-spored species of the genus *Leucostoma* is characterized by its large prominent stroma, gray to dark gray disc, and conidial locule produced simultaneously in perithecial stroma. *Leucostoma cincta* (FR.) HÖHN. mainly formed on *Prunus* spp. is different from the present species by its whitish disc. Cultural study was not conducted on this species.

4) ***Leucostoma persoonii*** **(NITSCHKE) HÖHNEL,** Mitt. Bot. Inst. Tech. Hochs. Wien, 5 : 60, 1928—(Figure 78; Plate XX: A～E)—DÉEAGO, Phytop. Zeits. 14 : 140, 1942; KERN, Pap. Michig. Acad. Sci. 40 : 12, 1955; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 81, 1958

Synonym: *Sphaeria leucostoma* PERS., Ust. Ann. Bot. 2 : 23, 1795; Syn. Meth. Fung. 39, 1801

Sphaeria leucostoma PERS. ex FRIES, Syst. Myc. 2 : 387, 1823

Valsa leucostoma (PERS). FR., Sum. Veg. Scand. 2 : 411, 1849; SACCARDO, Syll. Fung. 1 : 139, 1882; ELLIS & EVERHART, N. Amer. Pyren. 485, 1892; MUNK, Dsk. Bot. Ark. 17(1) : 232, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 31 : 627, 1957

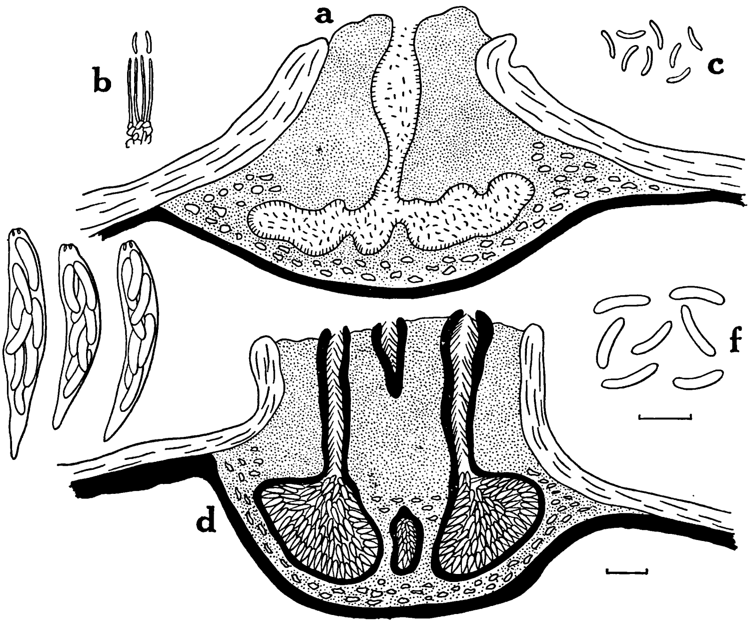

Figure 78. *Leucostoma persoonii* (Nit.) Höhn.
a: Pycnidial stroma b: Conidiophores c: Conidia d: Perithecial stroma
e: Asci and ascospores f: Ascospores (⊢—⊣: a, d=100 μ, b, c, e, f=10 μ)

Valsa leucostoma var. *rosarum* Sacc., Ann. Myc. 11 : 558, 1913; Syll. Fung. 24 : 714, 1928
Leucostoma leucostoma (Pers.) Togashi, Bull. Morioka Imp. Coll. Agr. & For. 14:29, 1930
Leucostoma leucostoma (Pers. ex Fr.) Munk, Dsk. Bot. Ark. 15(2) : 80, 1953
Valsa persooni Nit., Pyren. Germ. 222, 1867; Winter, Rabh. Kryptgfl. I, 2 : 733, 1887
Leucostoma persoonii (Nit.) Togashi, Bull. Morioka Imp. Coll. Agr. & For. 16 : 2, 1931; Défago, Beit. Kryptgfl. Schw. 8(3) : 11, 1935

Conidial state: *Leucocytospora leucostoma* (Pers.) Höhn., Ber. Deut. Bot. Ges. 35 : 352, 1917 (= *Cytospora leucostoma* (Pers.) Sacc., *Cytospora rubescens* Fr.)

Pustules on bark of cankered or dead stems and twigs, scattered or gregarious; stroma immersed within bark tissue, then erumpent through epiderm exposing whitish discs, sometimes prominent, upper half being compact plectenchymatous, lower half loose prosenchymatous containing small fragments of host tissue, 750~1,000 μ in height and 900~1,200 μ in width, entirely surrounded by black, rarely brown conceptacle; conceptacle constituted from thick-walled, isodiametric cells and disintegrating small fragments of substrata, 20~70 μ in thickness. Perithecia embedded circinately or in a layer at the lower part of stroma, globular to depressed at the bottom, 250~400 μ in diam., with black neck at the top; wall of perithecia distinct, dark brown to black, composed of flattened and thick-walled cells. Necks cylindric, broader near the tip, 350~500 μ in length, erumpent through ectostroma dotting as black papillae on the disc surface. Asci clavate to oblong-clavate, tapered to the base, thin-walled, furnished apical ring at the thickened tip, 30~43×5~10 μ in size and 36.8×6.6 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, allantoid, rounded at the ends, unicellular, hyaline, 7.5~13×2~3 μ in size and 10.2×2.2 μ in average.

Pycnidial stroma develops separately from the perithecial stroma; structure of pycnidial stroma is the same as that of perithecial one excepting the formation of conidial locules instead of perithecia. Pycnidial locule is usually multilocular with confluent ostiole at the central part of disc, often coalesce into a large locule in fully matured stage, wall of locule being indistinct. Conidiophores arise from innermost cells of locule, and are usually simple, hyaline, 10～18 μ in length, conglutinate in later stage. Conidia are allantoid, small, unicellular, hyaline, 4～6.5×0.8～1.5 in size and 5.4×1 μ in average.

Host and Material: *Alnus* sp.—Koshunai, Hokkaido, IX-24, 1964, by T. K. (FPH-2433). *Aleurites cordata* MUELL. ARG. (Abura-giri)—Akanuma, Saitama, X-18, 1965, by T. K. (FPH-2824, 2837). *Sorbus commixta* HEDL. (Nanakamado)—Sapporo, Hokkaido, V-8, 1965, by K. ONO (FPH-2475).

Conidial state only: *Alnus incana* WILLD.—Koshunai, Hokkaido, IX-23, 1964, by T. K. (FPH-2440). *Prunus persica* (LINN.) BATSCH. (Momo)—Suzukawa, Shizuoka, VI-23, 1921, by K. HARA (NSM-HARA's 210441); Sapporo, Hokkaido, XI-3, 1927, by K. TOGASHI (HUH).

Distribution: Asia (Japan), Europe and North America.

Note: The present fungus has been well known as a causal agent of peach canker in Japan, and its morphology, physiology and parasitism were studied in detail by TOGASHI (1930a, b, 1931). The author has had no opportunity to examine the perithecial state found on *Prunus*. Only conidial state was found on two specimens of *Leucostoma persoonii* preserved at the National Science Museum and Hokkaido University. The fungus on *Sorbus* and *Alnus* is quite identical with *Leucostoma persoonii* described by TOGASHI (1930a) and URBAN (1958) in their morphological characteristics. Hence, it is identified as *Leucostoma persoonii*. Although it is somewhat doubtful why a fungus on *Aleurites* should be treated the same as *Leucostoma persoonii* on other host plants by its atypical brown conceptacle, the fungus is tentatively included here as a primitive from of *L. persoonii*. No differences in the other characteristics were found between the *Leucostoma* on *Aleurites* and *L. persoonii*.

Cultural characters of the isolates obtained from the materials listed above on potato-sucrose agar were accordant with those reported by TOGASHI (1930b). On the one-month-old culture, several sphaeric bodies were produced, then mucous conidial masses, orange in colour, oozed out from them. Conidia produced on culture, 2.5～7.5×0.8～1.3 μ in size and 4.6×0.9 μ in average, agreed with those on host plants.

According to TOGASHI (1930b, 1949), the present species grew well at 28～30°C with the minimum at 5°C and the maximum at 37～39°C.

TOGASHI confirmed the pathogenicity of *Leucostoma persoonii* to be rather weak, the fungus being able to develop only through the burned wound. He explained why such a weak parasite caused severe damage to peach trees in the northern regions of Japan. According to his conclusion based on detailed experimental data, the fungus can grow in the bark tissue during cold season when ability of host plant to prevent the spread of the pathogen decreases, and it is then that the fungus is able to do mortal damage to the host plant. DÉFAGO (1935) also carried out inoculation experiments with *Leucostoma persoonii* and confirmed the degree of susceptibility of various *Prunus* species to the fungus.

9. ***Endothia*** **FRIES**, Sum. Veg. Scand. 385, 1849; SACCARDO, Syll. Fung. 1 : 600, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 803, 1887; ELLIS & EVERHART, N. Amer. Pyren. 552, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 487, 1897; SHEAR et al., Bull. U. S. Dept. Agr. 380 : 3, 1917; KOBAYASHI & ITO,

Bull. Gov. For. Exp. Sta. 92 : 81, 1956; Gilman et al., Ia. St. Coll. Jour. Sci. 31 : 631, 1957; Dennis, Brit. cup fungi, 204, 1960; Müller & Arx, Beit. Kryptgfl. Schw. 11(2) : 769, 1962

Type species: *Endothia gyrosa* (Schw.) Fr.

Synonym: *Cryphonectria* Sacc., Syll. Fung. 17 : 784, 1905

Conidial state: *Endothiella* Sacc. (=*Calopactis* Syd.)

Pustules on cankered or dead bark, scattered or gregarious, sometimes lined in several rows, size being variable depending on bark conditions such as smooth or rough, thick or thin; stroma developing quite well, immersed within bark tissue then erumpent through epiderm exposing yellowish to reddish disc at the bark surface, elevated hemisphaeric to prominent truncate-conic, dotted by a blackish papillae of the tip of necks, campact plectenchymatous at upper part and prosenchymatous containing decomposed tissue of substrata at lower part. Perithecia and/or pycnidial locules embedded entirely in stroma, perithecia globular or slightly depressed, with long neck at the top; wall of perithecia distinct, membranaceous, brown to dark brown, composed of flattened and thick-walled cells, innermost cells being hyaline and thin-walled. Necks long cylindric, composed of elongated plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses, erumpent through stroma. Asci clavate or oblong-clavate, furnished apical ring at the thickened tip, usually 8-, rarely 4-spored, loosed irregularly in perithecium. Paraphyses absent. Ascospores unicellular or 2-celled; in one-celled species ascospores allantoid or curved, sometimes with a pseudoseptum, rounded at both ends, hyaline, or elliptic to fusoid; in two-celled species ascospores elliptic to oblong-fusoid, straight or inaequilateral, constricted at the septum or not, hyaline or pale yellowish brown to pale brown in full maturity.

Conidial stroma is separately formed from the perithecial stroma, sometimes conidial locules develop simultaneously with the formation of perithecia. Pycnidial locules are usually irregularly multi-locular or labyrinthiform, and coalesce into a large locule in later stage, confluent to central pore; wall of locules indistinct. When pycnidial stromata are produced on bare wood, they are closely similar to pycnidia in their structure with distinct wall and simple locule. Conidiophores arise from innermost layer of locule, simple of branched, hyaline. Conidia are minute, allantoid or rod-shaped, unicellular, hyaline, often exude out from the central pore of locule as yellowish to orange brown tendrils under moist conditions.

The genus *Endothia* established by Fries (1849) was included in a member of Melogrammataceae in the classic mycology. The family Melogrammataceae was distinguished from Valsaceae and Melanconidaceae by its compact stroma only constituted from fungal tissue, and from Diatrypaceae by its larger septate ascospore (Winter 1887, Lindau 1897). Later, the family Melogrammataceae was dissolved because of its heterogeneous construction and each member belonging to this family was separately transferred to the other valid families, based on its fundamental characteristics. The genus *Endothia* was transferred to the family Diaporthaceae by its structure of perithecial centrum (Höhnel 1917a). Wehmeyer (1926a) supported Höhnel's opinion and discussed its relation to the other general of Diaporthaceae. Gilman et al. (1957), Dennis (1960), Müller and Arx (1962) accepted the treatment of Höhnel and Wehmeyer.

Cryphonectria established previously as a subgenus of *Nectria* was segregated from it and given the genus rank by Saccardo (1905). According to Höhnel (1909), *Cryphonectria gyrosa* (Berk. et Br.) Sacc., the type species of the genus, was considered to be a member of the genus *Endothia*. Several other species of *Cryphonectria* were transferred by Höhnel to the other genera of Hypocreaceae such as *Myrmaecium* and *Hypocreopsis*. Therefore, the genus *Cryphonectria* became worthless and it was treated as a synonym of *Endothia* by him.

The genus *Endothia* is apparently divided into three groups, the first being composed of the species having allantoid type of ascospore, the second being composed of the species having one-celled and elliptic to fusoid ascospore, and the third being composed of the species having didymosporous type of ascospore. If we follow SACCARDO's system, a particular genus is provided for each of the three groups. However, no differences are found among the species belonging to these three groups in their essential morphologic and cultural characters, other than the type and size of ascospore. Therefore, treatment by SHEAR et al. (1917), who included these species in one genus *Endothia*, was supported (KOBAYASHI & ITO 1956a, MÜLLER & ARX 1962). Type species of genus, *Endothia gyrosa* (SCHW. ex FR.) FR., has allantoid and one-celled ascospore, so the genus *Endothia* has been contained in the subfamily Valseae of Diaporthaceae (HÖHNEL 1917, WEHMEYER 1926, GILMAN et al. 1957). On the other hand, some species of *Endothia* have didymosporous type of ascospore and apparently accord with the species belonging to the subfamily Diaportheae in their chief nature. Therefore, it may be said that the genus *Endothia* has both representatives of Valseae and of Diaportheae. This is one of the reasons for rejecting subfamilies Valseae and Diaportheae in Diaporthaceae.

KOBAYASHI and ITO (1956a, b) examined many materials of *Endothia* collected from various localities of Japan and identified them as being of seven species. Thereafter, a new *Endothia* was added by KOBAYASHI (1965). In the following part, some revisions will be given to these species and the differentiating points of seven Japanese species of *Endothia* are presented in the following key and in Figure 79.

Key to Japanese species of *Endothia*

A_1: Ascospore one-celled
  B_1: Ascospore allantoid, small, ascus 8-spored ……………………………… *E. singularis* (p. 135)
  B_2: Ascospore elliptic to fusoid, large, ascus 4-spored …………………… *E. tetraspora* (p. 146)
A_2: Ascospore 2-celled
  B_1: Ascus less than 40 μ in length, ascospore less than 10 μ in length…… *E. radicalis* (p. 136)
  B_2: Ascus more than 40 μ and ascospore more than 10 μ in length
    C_1: Ascospore less than 4 μ in width, 8～12.5 μ in length …………… *E. havanensis* (p. 139)
    C_2: Ascospore 3～5 μ in width

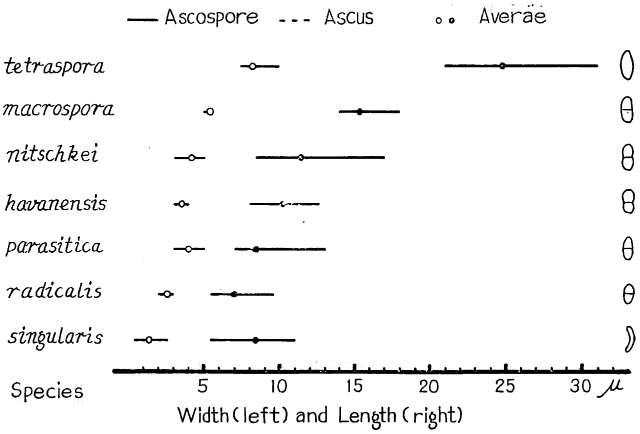

Figure 79. Shape and size of ascospore of *Endothia* in Japan.

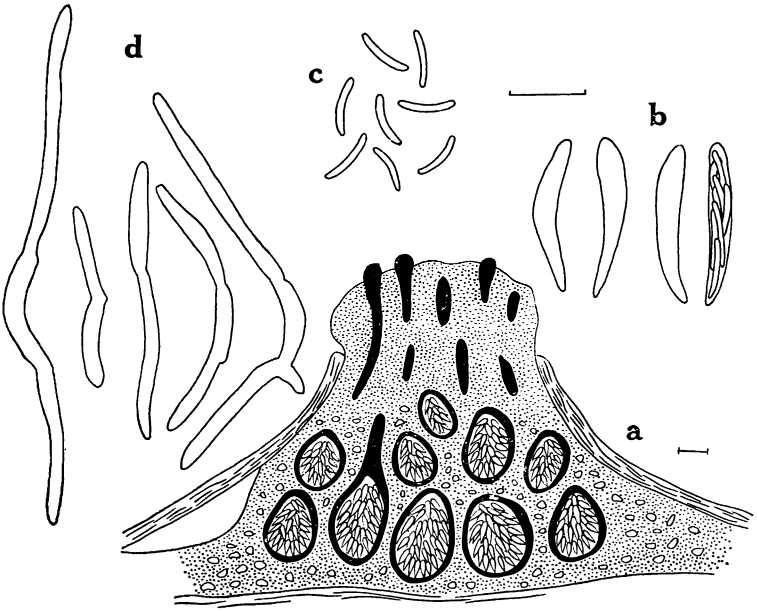

Figure 80. *Endothia singularis* SHEAR et STEV.

a: Perithecial stroma　　b: Asci and ascospores
c: Ascospores　　d: Germinating ascospores
(⊢—⊣ : a=100 μ; b∼d=10 μ)

D_1: Pathogenic to *Castanea*, distributed in lowland area, ascospore 7∼13×3∼5 μ, mycelial fan present within bark ······················*E. parasitica* (p. 141)

D_2: Not pathogenic to *Castanea*, distributed in mountain region, ascospore usually 10∼13×4∼4.5 μ, mycelial fan absent ············*E. nitschkei* (p. 143)

C_3: Ascospore more than 5 μ in width, 14∼18 μ in length···············*E. macrospora* (p. 145)

1) ***Endothia singularis*** **SHEAR et STEVENS**, Bull. U. S. Dept. Agr. 380 : 15, 1917—(Figure 80; Plate XXI: A, B)—KOBAYASHI, Y. et al., ASAHINA's Kryptgfl. Jap. 271, 1939; KOBAYASHI, T. & ITO, Bull. Gov. For. Exp. Sta. 92 : 88, 1956; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 771, 1962

Conidial state: *Endothiella singularis* (H. et P. SYD.) SHEAR et STEV. nom. seminud. (=*Calopactis singularis* H. et P. SYDOW)

Pustules on bark of dead twigs and branches; stromata scattered or gregarious, immersed within bark tissue, then erumpent through epiderm, large, prominent, 1∼3 mm in height and 3∼5 mm in width, reddish orange to reddish brown, dotted many black papillae on the surface of stroma, upper half being compact plectenchymatous, lower half loose prosenchymatous often containing disintegrated tissue of substrata, not sharply delimited by special fungous tissue such as conceptacle. Perithecia usually 100 or more, irregularly arranged in several layers at lower half of stroma, globular to depressed, 150∼350 μ in diam., with long neck at the top; wall of perithecia distinct, composed of flattened, dark brown to blackish, thick-walled cells, innermost cells being hyaline and thin-walled. Necks cylindric, 250∼1,000 μ in length, erumpent through stroma, pierced by a pore furnishing hyaline periphyses. Asci clavate or oblong-fusoid, with thickened tip, apical ring being hardly visible, 16.5∼31×3∼5.5 μ in size and 23.1×4.3 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly uni- to pluriseriate, allantoid, unicellular, hyaline, 5.5～11×0.7～2.5 μ in size and 8.4×1.4 μ in average.

Host and Material: *Castanea crenata* SIEB. et ZUCC. (Kuri)—Chiyoda, Ibaraki, X-24, 1960, by H. KONDO (FPH-1207, 1208); I-10, 1964, by H. KONDO (FPH-2486); Dejima, Ibaraki, XI-29, 1960, by H. KONDO (FPH-962). *Quercus serrata* THUNB. (Konara)—Inagi, Tokyo, V-31, 1953, by T. K. (FPH-1199); Machida, Tokyo, IV-19, 1954, by T. K. (FPH-1050); Misawa, Saitama, V-4, 1956, by T. K.; Takai, Nagano, VI-4, 1956, by T. K.; Akanuma, Saitama, X-18, 1965, by T. K. (FPH-2913). *Quercus accutissima* CARR. (Kunugi)—Takai, Nagano, VI-4, 1956, by T. K. *Castanopsis cuspidata* var. *sieboldii* (MAKINO) NAKAI (Sudajii)—Meguro, Tokyo, X-9, 1953, by T. K. (FPH-1201).

Distribution: Asia (Japan) and North America.

Note: The present fungus is distinguishable from the other species of *Endothia* by its large stroma having more than a hundred perithecia in several layers, and by allantoid ascospore. WEHMEYER (1936) reported a species of *Endothia* showing similar characters to *E. singularis*. According to him, this new species *Endothia viridistroma* WEHM. was differentiated from *E. singularis* by the greenish colour of stroma and smaller ascospore. *Endothia gyrosa* (SCHW.) FR. was also differentiated from *E. singularis* in the inaequilateral and broader ascospore and smaller stroma containing 20～50 perithecia (SHEAR et al. 1917).

Ascospore of the fungus swelled remarkably before germination. Colony developed on potato-sucrose agar was first yellowish and flat, then became felty and yellowish orange ("Mikado Orange") in colour. On one-month-old culture, several large masses covered with orange aerial mycelia were produced, then mucous conidial masses of orange to reddish orange ("Salmon Orange" to "Brazil Red") colour oozed out from them. Conidia produced on culture, 3～5×0.5～1 μ in size, were accordant with those obtained by SHEAR et al. (1917) on host plant. They could not obtain conidia on white corn meal agar.

2) ***Endothia radicalis*** **(SCHWEINITZ ex FRIES) CESATI et DE NOTARIS**, Comm. Soc. Critt. Ital. 1 : 240, 1863—(Figure 81; Plate XXI: C～E)—MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 771, 1962

Synonym: *Sphaeria radicalis* SCHW. ex FR., Elench. Fung. 2 : 73, 1828
Valsa radicalis (SCHW.) CES. et DE NOT., Comm. Soc. Critt. Ital. 1 : 207, 1863
Melogramma gyrosum TUL., Sel. Fung. Carp. 2 : 261, 1863
Endothia virginiana P. J. et H. W. ANDERS., Phytop. 2 : 261, 1912
Endothia pseudoradicalis PETRI, Att. R. Acad. Lin. Rend. Cl. Sci. Fis. Mat. e Nat. V, 22 : 654, 1913
Endothia radicalis var. *mississippiensis* SHEAR et STEV., U. S. Dept. Agr. Bur. Pl. Indust. Circ. 131 : 4, 1913
Endothia fluens var. *mississippiensis* SHEAR et STEV., Bull. U. S. Dept. Agr. 380 : 19, 1917
Endothia longilostris EARLE, Muhlenb. 1(1) : 14, 1900; SACCARDO, Syll. Fung. 17 : 675, 1905; SHEAR et al., Bull. U. S. Dept. Agr. 380 : 19, 1917
Endothia fluens (SOW.) SHEAR et STEV., Bull. U. S. Dept. Agr. 380 : 16, 1917; KOBAYASHI & ITO, Bull. Gov. For. Exp. Sta. 92 : 89, 1956

Conidial state: *Endothiella fluens* (SOW.) comb. nov. (=*Sphaeria fluens* SOW.).

Pustules on bark of cut end or dead twigs and stems; stroma relatively small, scattered or gregarious, first immersed within bark tissue, then erumpent through bark epiderm, prominent,

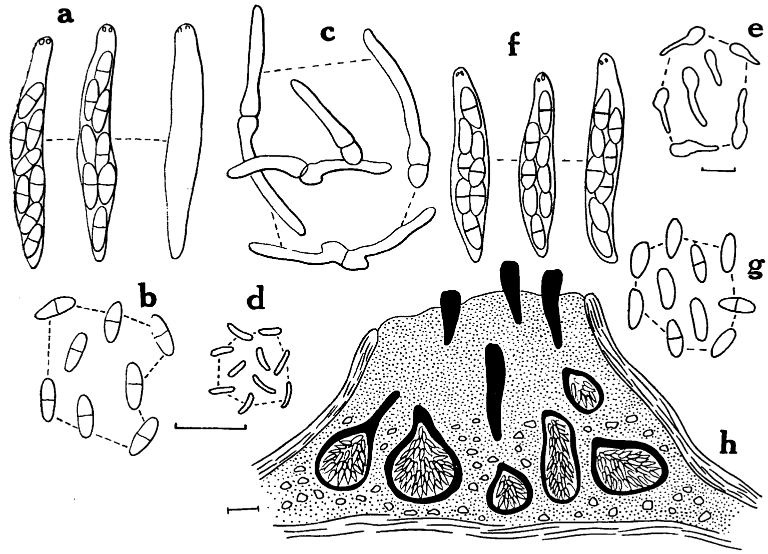

Figure 81. *Endothia radicalis* (SCHW. ex FR.) CES. et DE NOT.

a, f: Asci and ascospores b, g: Ascospores c: Germinating ascospores
d: Conidia e: Germinating conidia h: Perithecial stroma
a∼e: On *Quercus serrata* f, g: On *Quercus salicina* h: On *Carpinus*
(⊢⊣: h=100 μ; a∼g=10 μ)

0.5∼1 mm in height and 0.5∼2 mm in width, pale yellowish to yellowish orange ("Cadmium Yellow" to "Cadmium Orange"), dotted black papillae on the surface, upper half being compact plectenchymatous, lower half loose prosenchymatous containing fragments of bark tissue. Perithecia embedded at lower part of stroma in a layer, usually 10 to 20, globular or depressed, 180∼410 μ in diam., with black slender neck at the top; wall of perithecia composed of flattened, dark, thick-walled cells. Necks cylindric, 180∼730 μ in length, composed of dark, elongated plectenchymatous cells, penetrated by a pore furnishing hyaline periphyses. Asci clavate to oblong-clavate, thin-walled, with thickened tip furnishing apical ring, 25∼40×4∼7 μ in size and 33×6 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic, straight or inaequilateral, 2-celled, not constricted at the septum, hyaline, 5.5∼9.5×2∼3 μ in size and 7.1×2.5 μ in average.

Pycnidial stroma is somewhat smaller than those of perithecial one, and is irregularly multilocular with a central confluent ostiole; locules often coalesce into a large chamber; simple small pycnidia are produced on exposed wood without stroma. Conidiophores arise from innermost layer of locule, and are simple or branched, hyaline. Conidia are allantoid or rod-shaped, minute, hyaline, unicellular, 3∼6.5×0.7∼1.5 μ in size and 4×1.1 μ in average, often exude out from the central pore of stroma as sticky pale yellowish tendrils under moist conditions.

Host and Material: *Alnus firma* var. *sieboldiana* WINKL. (Yashabushi)—Nishina, Shizuoka, VII-22, 1955, by T. K. (FPH-601). *Carpinus japonica* BL. (Kumashide)—Asakawa, Tokyo, IX-, 1962, by T. K. (FPH-652). *Fagus japonica* MAX. (Inu-buna)—Meguro, Tokyo, X-13, 1953, by T. K. (FPH-1202). *Quercus serrata* THUNB. (Ko-nara)—Machida, Tokyo, IV-19, 1954, by T. K. (FPH-354, 1072). *Quercus salicina* BL. (Urajiro-gashi)—Komayama, Kanagawa, V-31, 1959, by T. K. (FPH-2482, 2483).

Conidial state only: *Quercus variabilis* BL. (Abemaki)—Meguro, Tokyo, VIII-26, 1953, by T.K. (FPH-1200).

Distribution: Asia (Japan and China*), Europe and North America.

Note: The present species is the smallest-spored one in the 2-celled spore group of *Endothia*. In the monographic rearrangement of the genus *Endothia* by SHEAR et al. (1917), confusion on the concept of *E. gyrosa* and *E. radicalis* (=*E. fluens*) was cleared up completely. They determined the concept of type species, *Endothia gyrosa* (SCHW.) FR., to be a representative of the one-celled species through the examination of many fresh and authentic herbarial materials. New combination *Endothia fluens* (SOW.) SHEAR et STEV. was given to the fungus which had 2-celled elliptic ascospore and had been called various confused names by many earlier workers. KOBAYASHI and ITO (1956a) accepted this binomial for an *Endothia* found in Japan. Recently, MÜLLER and ARX (1962) pointed out the nomenclatural mistake in adopting this binomial for the *Endothia* and revived the binomial *Endothia radicalis* (SCHW. ex FR.) CES. et DE NOT. for it. Derivation of this alteration was that *Sphaeria fluens* SOW. described in 1814 was based on a specimen having conidial state only, in spite of the oldest name. Therefore, nomenclatural priority for the *Endothia* is of *Sphaeria radicalis* SCHW. ex FR. described in 1828 having perithecial state, and the oldest combination of *Endothia radicalis* (SCHW. ex FR.) CES. et DE NOT. in 1863 is authoritatively allocated to the *Endothia*.

In Japan. HARA (1915) noted an *Endothia* on *Castanea* and identified it as *E. gyrosa* (SCHW.) FUCK.=*E. radicalis* (SCHW.) FR. Later, (1927) he listed *Endothia radicalis* (SCHW.) FR. as a causal agent of chestnut wilt disease, besides the true canker fungus *E. parasitica* (MURR.) P. J. et H. W. AND. Judged from his description and the result of examination on the specimens preserved at the National Science Museum, his *Endothia* belongs neither to *Endothia gyrosa* (SCHW.) FR. nor *E. radicalis* (SCHW.) CES. et DE NOT. Specimens on *Castanea* of HARA's collection have only the conidial state and probably belong to *Endothia parasitica*. Specimens of *Endothia radicalis* sensu HARA on *Quercus* have perithecial state, and they are not *E. radicalis* (SCHW.) CES. et DE NOT. but *E. havanesis* BRUNER (see the note on the next species).

In 1900, EARLE described *Endothia longirostris* based on its protruded necks from the surface of substrata. SHEAR et al. (1917) also treated it as a separate species from the other *Endothia* by the more acute ascospore and long slender neck. Shape and size of ascospore in *Endothia longirostris* are not different from *E. radicalis*, so far as can be judged from the description (SACCARDO 1905, SHEAR et al. 1917) and photograph (SHEAR et al. 1917). Whether neck protrudes from the surface of stroma or not is considered to be a minor criterion as pointed out by RANKIN (1914). Neck of *Endothia parasitica* usually appears to be papillae on the surface of stroma and sometimes long protrudes from the surface of the stroma, about 2 mm or more, under mois conditions. Hence, *Endothia longirostris* EARLE is treated here as a synonym of *E. radicalis* (SCHW. ex FR.) CES. et DE NOT.

Ascospore and conidium of the fungus easily germinated. Conidia swelled before germination. Colony was first pale yellowish orange and thin, then became thick and darker in colour with white to yellowish cottony aerial mycelia. Several small bodies were produced on one- to two-months-old culture, then mucous conidial masses oozed out from them. Conidia produced on culture, $3\sim4\times0.5\sim1\,\mu$ in size, are somewhat smaller than those on host plants. SHEAR et al. (1917) obtained conidia of the fungus on white corn meal agar.

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* TENG, S.C.; Sinensia 4: 390, 1934, as *Endothia radicalis* (SCHW.) DE NOT.

3) ***Endothia havanensis*** **BRUNER**, Mycol. 8 : 241, 1916—(Figure 82; Plate XXI: F～I)—SACCARDO, Syll. Fung. 24 : 762, 1928; KOBAYASHI & Ito, Bull. Gov. For. Exp. Sta. 92 : 90, 1956

Synonym: *Diatrype gyrosa* BERK. et BR., Jour. Linn. Soc. Lond. 14 : 124, 1875
Nectria gyrosa BERK. et BR., Jour. Linn. Soc. Lond. 15 : 86, 1877
Cryphonectria gyrosa (BERK. et BR.) SACC., Syll. Fung. 17 : 784, 1905
Endothia gyrosa (BERK. et BR.) HÖHN. (non *E. gyrosa* (SCHW.) FR.), Sitzb. Kais. Akad. Wiss. Wien, Math. naturw. Kl. 118 : 1480, 1909
Endothia tropicalis SHEAR et STEV., Bull. U. S. Dept. Agr. 380 : 20, 1917; KOBAYASHI & ITO, Bull. Gov. For. Exp. Sta. 92 : 90, 1956

Conidial state: *Endothiella havanensis* BRUNER, nom. seminud.

Pustules on bark of cut end or dead stems and twigs and exposed roots; stroma scattered or gregarious, yellowish orange to dark orange ("Apricot Yellow" to "Cadmium Orange" or "Zinc Orange"), 0.5～1 mm in height and 1～2 mm in width, first immersed within bark tissue, then erumpent through bark epiderm, elevated conic to truncate conic, upper half being compact, plectenchymatous, lower part loose prosenchymatous containing fragments of host tissue. Perithecia embedded in the lower part of stroma, usually 20 or more, 260～540 μ in diam., with black neck at the top; wall of perithecia membranaceous, 30～50 μ in thickness, composed from flattened, dark brown to blackish, thick-walled cells. Necks cylindric, 290～1,400 μ in length, erumpent through stroma opening papillate ostiole at the surface of stroma, penetrated by a pore furnishing

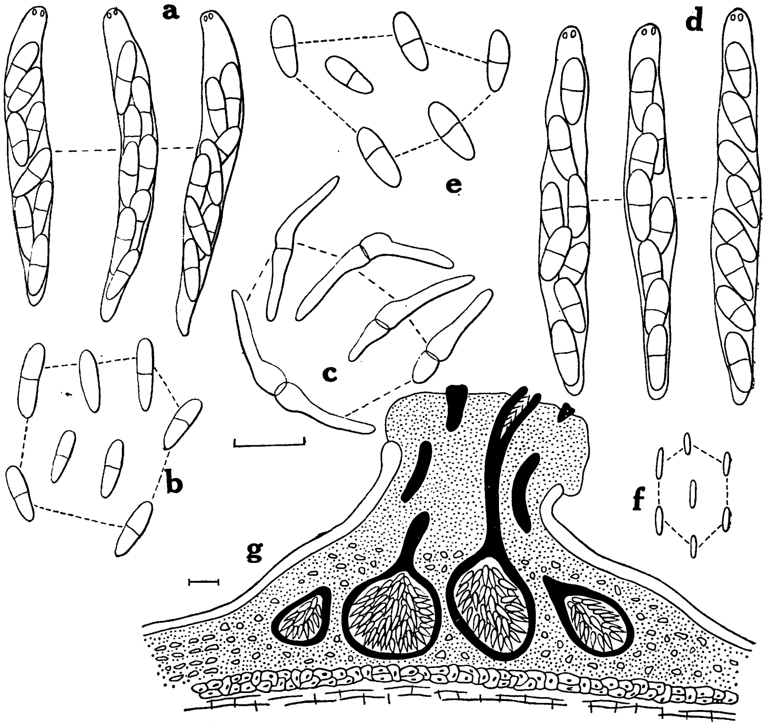

Figure 82. *Endothia havanensis* BRUNER

a, d: Asci and ascospores　b, e: Ascospores　c: Germinating ascospores
f: Conidia　g: Perithecial stroma　a～c: On *Eucalyptus*　d～f: On *Quercus*
g: On *Betula*　(└─┘: g=100 μ; a～f=10 μ)

hyaline periphyses. Asci clavate to oblong-clavate, furnished apical ring at the thickened tip, 39～53×5.5～10.5 μ in size and 47.5×7.3 μ in average, 8-spored, loosed irregulary in perithecium. Ascospores irregularly biseriate, elliptic, rounded at both ends, straight or inaequilateral, 2-celled, slightly constricted in full maturity, hyaline, 8～12.5×3～4 μ in size and 10.2×3.6 μ in average.

Conidial stroma smaller than those of perithecial one, irregularly multilocular with a central and confluent pore, and coalesces into a large locule in later stage; wall of locule being indistinct. Conidiophores arise from innermost cells of locule, and are simple, hyaline. Conidia are allantoid or rod-shaped, hyaline, unicellular, 3.5～4.2×0.5～1 μ in size and 4×0.8 μ in average, often ooze out from the central pore of locule as sticky yellowish tendrils under moist conditions.

Host and Material: *Eucalyptus globulus* LAB.—Meguro, Tokyo, XII-, 1954, by T. K. (FPH-633). *Pyrus pyrifolia* var. *culta* (MAKINO) NAKAI (Nashi)—Inagi, Tokyo, II-2, 1960, by T. K. (FPH-1270). *Quercus variabilis* BL. (Abemaki)—Seto, Aichi, X-22, 1953, by T. K. (FPH-1203). *Quercus serrata* THUNB. (Ko-nara)—Nakakawane, Shizuoka, II-, 1927, by K. HARA (NSM-HARA's 209592, as *Endothia radicalis*); Kawakami, Gifu, X-, 1916, by K. HARA (NSM-HARA's 209591, as *E. radicalis*); Tokyo, IV-28, 1926, by S. KUSANO (NSM-HARA's 209586, as *E. radicalis*); Ueno, Chiba, VI-14, 1954, by T. K. (FPH-47); Gotenba, Shizuoka, V-14, 1956, by T. K. *Quercus dentata* THUNB. (Kashiwa)—Minamimaki, Nagano, X-16, 1955, by T. K. (FPH-638). *Castanopsis cuspidata* var. *sieboldii* (MAK.) NAKAI (Suda-jii)—Inagi, Tokyo, XII-2, 1953, by T. K. *Betula ermanii* CHAM. (Dake-kanba)—Yoshiwara, Shizuoka, XI-12, 1963, by ZINNO (FPH-2300).

Distribution: Asia (Japan and Ceylon) and Tropic America.

Note: The present fungus was first found in Ceylon and described by BERKELEY and BROOME as *Diatrype gyrosa*, who later transferred it to *Nectria*. SACCARDO (1905) established a new genus *Cryphonectria* based on *Nectria gyrosa* BERK. et BR. Several years later, HÖHNEL (1909) reexamined the authentic material of *Cryphonectria gyrosa* and transferred it to the genus *Endothia*. SHEAR et al. (1917) also examined the authentic material of the fungus and confirmed HÖHNEL's opinion that it belonged to *Endothia*. However, its specific epithet *gyrosa* was denied under the genus *Endothia* due to the oldest species *E. gyrosa* (SCHW.) FR. SHEAR et al. gave a new epithet *tropicalis* for it. Since that time, *Endothia tropicalis* SHEAR et STEV. has been recognized to be an independent species of *Endothia* (KOBAYASHI & ITO 1956a, MÜLLER & ARX 1962).

On the other hand, BRUNER (1916) described a new *Endothia* on *Eucalyptus*, namely *E. havanensis* BRUN., from Havana and Cuba, prior to SHEAR et al.'s publication. It is quite similar to *Endothia tropicalis* excepting the constricted ascospore. KOBAYASHI and ITO (1956a) previously considered these two species as separate species from each other based on the type of ascospore constricted at the septum or not. However, the difference in constriction of ascospore at the septum seems to be a minor criterion on which to separate species. In the case of Japanese materials of *Endothia tropicalis*, ascospores jutting out or those freed from the ascus in perithecium were inaequilateral and apparently constricted. In this stage, no difference is observed between *Endothia tropicalis* and *E. havanensis*. Hence, as suggested by MÜLLER and ARX (1962), both species are united and BRUNER's epithet *havanensis* is maintained by its nomenclatural priority.

As mentioned in the note of *Endothia radicalis* (SCHW.) CES. et DE NOT., *E. radicalis* sensu HARA is nothing but the present *Endothia*, *E. havanensis*. In Japan the fungus was commonly collected in lowland regions, though two exceptional specimens were collected in a high mountain area.

Ascospore and conidium germinated within 24 hours at 25°C. Conidium swelled remarkably before germination. On potato-sucrose agar the fungus developed a flat and pale yellowish colony, then colony thickened with sparse aerial mycelia and became orange ("Mikado Orange" to

"Deep Orange") in colour. On one-month-old culture, small pycnidial stromata were densely produced on the surface of colony. From these bodies small sticky masses of conidia, yellowish orange in colour, oozed out, and ultimately the whole surface of colony was covered with a mucous film of conidia. Conidia produced on culture, 3～4×0.5～1 μ in size, were quite accordant with those on host plants.

4) ***Endothia parasitica*** (MURRILL) **P. J. et H. W. ANDERSON**, Phytop. 2 : 262, 1912—(Figure 82; Plate XXII: A～G)—SHAER et al., Bull. U. S. Dept. Agr. 380 : 21, 1917; TSUJI, Rept. Pl. Quarant. 1 : 95, 1926; KITAJIMA, Bull. Gov. For. Exp. Sta. 27 : 32, 1927; AOYAGI, Tokushima Agr. Exp. Sta. Spec. Rept. 1 : 8, 1936; KOBAYASHI, Y. et al, Asahina's Kryptgfl. Japan, 271, 1939; KOBAYASHI, T. & ITO, Bull. Gov. For. Exp. Sta. 92 : 92, 1956; GILMAN et al., Ia. Sta. Coll. Jour. Sci. 31 : 632, 1957; DENNIS, Brit. cup fungi, 205, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 772, 1962

Synonym: *Diaporthe parasitica* MURR., Torreya 6 : 189, 1909
Valsonectria parasitica (MURR.) REHM, Ann. Myc. 5 : 210, 1907
Endothia gyrosa var. *parasitica* CLINTON, Science, n. s. 36 : 913, 1912

Conidial state: *Endothiella parasitica* AND., nom. seminud.

Pustules on bark of cankered or dead stems, twigs and exposed roots; stroma scattered on smooth bark and often confluent or in rows on old rough bark, first immersed within bark periderm, then erumpent through epiderm, prominent as truncate conic pustules, yellowish to brownish orange ("Cadmium Yellow" to "Cadmium Orange"), 1～2 mm in height and 1.5～2 mm in width, upper half being compact plectenchymatous and lower half loose prosenchymatous containing small fragments of host tissue. Perithecia irregularly embedded in lower part of stroma,

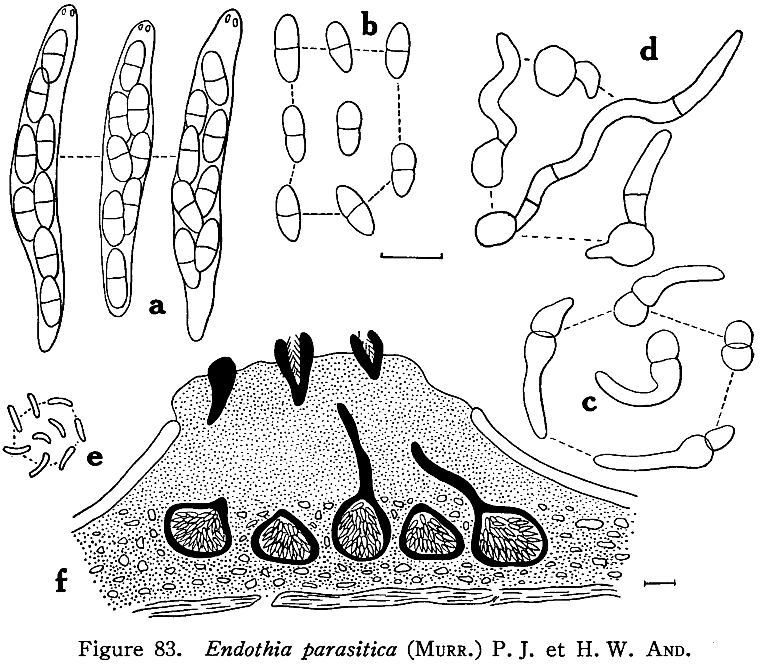

Figure 83. *Endothia parasitica* (MURR.) P. J. et H. W. AND.

a: Asci and ascospores　b: Ascospores　c: Germinating ascospores
d: Germinating conidia　e: Conidia　f: Perithecial stroma
(⌴; f=100 μ; a～e=10 μ)

usually 20 to 50, globular or depressed, 210～460 μ in diam., with black neck at the top; wall composed of flattened, dark brown, thick-walled cells. Necks cylindric, 360～1,100 μ in length, erumpent through stroma exposing dark papillae at the surface, penetrated by a pore furnishing hyaline periphyses, composed of vertically elongated cells. Asci clavate or cylindric-clavate, thin-walled with thickened tip furnishing apical ring, 36～54×5～8.5 μ in size, mostly 40～50×6～7 μ and 45.6×6.3 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic, rounded at the ends, straight or somewhat inaequilateral, 2-celled, constricted at the septum when matured, hyaline or pale brown in fully matured stage, 7～13×3～5 μ in size, mostly 8～9×3.5～4 μ and 8.4×2.9 μ in average.

Pycnidial stroma is smaller in size and paler in colour than those of perithecial one, usually precedes to the perithecial formation, and is irregularly multi-locular; locules often coalesce into a large cavity with a central and confluent pore; wall of locule is indistinct. Conidiophores arise from innermost layer of locule, and are simple or branched, hyaline, 8～25 μ in length. Conidia are produced on each branched tip of conidiophore, and are minute, allantoid or rod-shaped, hyaline, unicellular, 3～5.5×0.5～1.5 μ in size and 4.2×1.1 μ in average, exude out from central pore of stroma as sticky yellowish tendrils under moist conditions.

Host and Material: *Castanea crenata* SIEB. et ZUCC. (Kuri)—Akanuma, Saitama, XII-2, 1948, by K. ITO (FPH-580); X-25, 1951, by S. KONTANI; X-16, 1953, by T. K. (FPH-577, 595, 596, 622, 624, 627, 1237, 1470); Inagi, Tokyo, V-31, 1953, by T. K. (FPH-351, 3091); Minakami, Shizuoka, VI-4, 1953, by T. K. (FPH-602); Meguro, Tokyo, VI-23, 1953, by T. K. (FPH-964); Matsudo, Chiba, VII-9, 1953, by T. K. (FPH-608); Koganei, Tokyo, IX-2, 1953, by T. K. (FPH-606, 629, 2488); Asakawa, Tokyo, IX-16, 1953, by T. K. (FPH-571, 1236); Tsurukawa, Tokyo, IX-28, 1953, by T. K. (FPH-616, 626, 135, 1326); Yokohama, Kanagawa, IX-28, 1953, by T. K. (FPH-591, 594, 611, 625); Kawasaki, Kanagawa, IX-28, 1953, by T. K. (FPH-623); Seto, Aichi, X-21, 1953, by T. K. (FPH-569, 593); Seki, Gifu, X-23, 1953, by T. K. (FPH-572, 574, 576, 600, 605); Machida, Tokyo, IV-19, 1954, by T. K. (FPH-585); Ueno, Chiba, VI-14, 1954, by T. K. (FPH-568); Higashine, Yamagata, VIII-7, 1954, by T. K.; Kawada, Kagawa, X-, 1959 (FPH-1321); Hiratsuka, Kanagawa, VIII-, 1960, by N. SUZUKI (FPH-1238); Chiyoda, Ibaraki, IX-24, 1960, by H. KONDO (FPH-963); Yasato, Ibaraki, IX-26, 1960, by H. KONDO (FPH-634). *Castanea mollissima* BL. (Shina-guri)—Yamazaki, Hyogo, I-10, 1950; Minakami, Shizuoka, VI-4, 1954, by T. K.; Akanuma, Saitama, X-16, 1953, by T. K. (FPH-573, 637); Seto, Aichi, X-21, 1953, by T. K. (FPH-575); Seki, Gifu, X-25, 1953, by T. K. (FPH-356); Nagasaka, Yamanashi, IV-19, 1955, by T. K. (FPH-584); Dejima, Ibaraki, IX-8, 1960, by H. KONDO (FPH-979). *Castanea dentata* BORKH. (Amerika-guri)—Ami, Ibaraki, IX-5, 1967, by T. K. (FPH-3341).

Distribution: Asia (Japan and China), North America and Europe.

Note: The present species has been well known as a causal agent of chestnut blight. Many reports about the disease and the causal fungus were published in the field of mycology and plant pathology. *Endothia parasitica* is similar to *E. radicalis* and also to *E. havanensis*. Size of ascus and ascospore of *Endothia parasitica* mostly overlap those of these two species; more specifically stated, smaller part is overlapped by *E. radicalis* and larger part by *E. havanensis*. However, it is usually distinguishable from them by its wider obtuse ascospore and parasitic nature on chestnut trees forming characteristic mycelial fans within phloem and cambium.

Since the distribution of *Endothia parasitica* in Japan was precisely confirmed by SHEAR (1916), etiological and ecological studies of the fungus were also carried out by many Japanese workers. Pathogenicity of the fungus on Japanese chestnut was confirmed by TSUJI (1926), KITAJIMA (1927), Aoyagi (1936) and recently by Morimoto (1966). Ito (1955) noted preliminarily the results of field observation on the susceptibility of chestnut variety to the blight disease. Recently Nisikado et al. (1963) published the results of their extensive survey concerning susceptibility of chestnut variety to the blight disease and relation between disease development and various environmental factors. Aoyagi (1936) and Morimoto (1966) experimentally tested the susceptibility of several varieties of *Castanea* to *Endothia parasitica* and Uchida (1964, 1965) studied the influence of nutritional and soil conditions on the development of the chestnut blight disease. According to unpublished data of Ito and Kobayashi, the fungus can establish more often on chestnut trees during August to September and in April. Cases were noticed in which artificial wounds at inoculated part once healed over in macroscopic appearance by forming the callus, developed canker again two years after inoculation. Judged from the foregoing studies by many workers, it seems probable that the fungus needs certain predisposing factors to estalish and develop the canker on Japanese and Chinese chestnut trees, and that many cultivated varieties of these tree species possess different degrees of susceptibility to the chestnut blight fungus.

Cultural study utilizing Japanese isolate of *Endothia parasitica* was conducted by Tsuji (1926), Kitajima (1927) and Aoyagi (1936). Cultural characters of many isolates of the fungus observed by the author are accordant with those reported by these earlier workers.

Ascospore and conidium developed colony on potato-sucrose agar within one to two weeks after isolation. Conidium swelled remarkably before germination. Colony developed was first flat and pale yellowish, then became thick, wavy and yellowish-orange ("Cadmium Orange" to "Zinc Orange") in colour. On one-month-old culture numerous small sphaeric masses were produced. Then small mucous drops were pushed out from them and ultimately the whole surface of mycelial colony was covered with orange to brownish-orange mucous film of conidia. Conidia produced on culture, 4∼5×0.5∼1 μ in size, were quite accordant with those obtained from host plants.

5) ***Endothia nitschkei*** **Otth**, Mitt. Nat. Ges. Bern, 1868 : 8—(Figure 84; Plate XXIII: A, B) —Saccardo, Syll. Fung. 14 : 550, 1895

Synonym: *Endothia japonica* Kobayashi et Ito, Ann. Phytop. Soc. Jap. 21 : 15, 1956; Bull. Gov. For. Exp. Sta. 92 : 94, 1956

Conidial state: *Endothiella nitschkei* Kobayashi nom. nov.

Pustules on bark of cut end or dead twigs and stems; stromata scattered or gregarious, often in row on rough thick bark, yellowish-orange or brownish-orange ("Deep Chrome" to "Cadmium Yellow" or "Ferruginous"), first immersed within bark tissue, then erumpent through bark epiderm, prominent, conic to truncate-conic, 1∼2 mm in height and 2∼3 mm in width, compact plectenchymatous, with loose prosenchymatous at lower portion. Perithecia irregularly embedded at lower part of stroma, usually 50 or more, globular or depressed at the bottom, 280∼610 μ in diam., with long neck; wall composed of flattened, dark brown to blackish, thick-walled cells, innermost cells being hyaline and thin-walled. Necks cylindric, 310∼1,210 μ in length, erumpent through stroma protruding black papillae at the surface, composed of plectenchymatous cells, pierced by a pore furnishing hyaline periphyses. Asci clavate to oblong-clavate, with thin-membrane furnished apical ring at thickened tip, 40∼68×5.5∼11 μ in size and 53.3×8.3 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic, rounded at both ends, straight or inaequilateral, 2-celled, constricted at the septum, hyaline to pale brown at full maturity, 8.5∼17×3∼5.5 μ in size, mostly 10∼13×4∼4.5 μ and 11.4×4.2 μ in average.

Conidial stroma smaller in size and paler in colour than those of perithecial one, multilocular

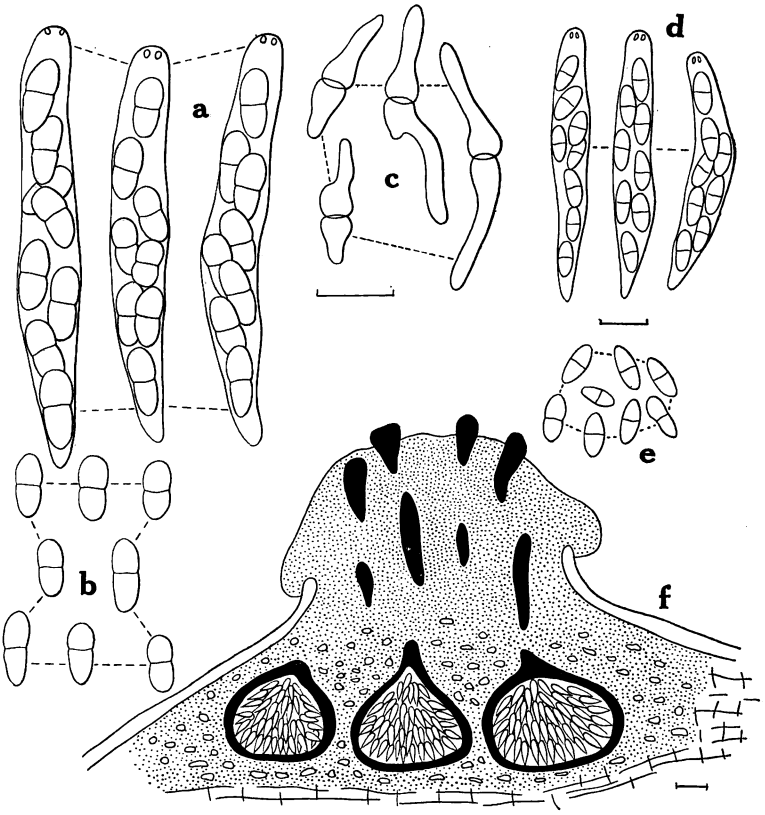

Figure 84. *Endothia nitschkei* Otth

a, d: Asci and ascospores　b, e: Ascospores　c: Germinating ascospores
f: Perithecial stroma　a～c: On *Quercus*　d, e: On *Rhus*　f: On *Prunus*
(└─┘: f=100 μ; a～e=10 μ)

and coalesce in a large cavity in later stage. Conidiophores arise from innermost layer of locule, and are simple or branched, hyaline. Conidia are minute, hyaline, unicellular, allantoid or rod-shaped, 3～4×0.8～1 μ in size and 3.6×0.9 μ in average, exude out from the central pore of stroma as sticky yellowish tendrils under moist conditions.

Host and Material: *Carpinus tschonoskii* Max. (Inu-shide)—Misakubo, Shizuoka, XI-17, 1957, by R. Imazeki (FPH-2490). *Larix leptolepis* Gord. (Karamatsu)—Nobeyama, Nagano, VI-8, 1956, by T. K. *Prunus* sp. (Sakura)—Komaba, Tokyo, IV-26, 1926, by S. Kusano (NSM-Kusano). *Quercus serrata* Thunb. (Ko-nara)—Kano, Nagano, X-23, 1954, by T. K. (FPH-1064); Nagasaka, Yamanashi, IV-18, 1955, by T. K. (FPH-1322). *Quercus mongolica* var. *grosseserrata* (Bl.) Rehd. et Wils. (Mizu-nara)—Meguro, Tokyo, V-19, 1954, by T. K. (FPH-1045, Type of *Endothia japonica* Kob. et Ito); Mt. Ôtake, Tokyo, V-23, 1954, by T. K. (FPH-1049); Mt. Togakushi, Nagano, VII-18, 1954, by T. K. (FPH-1066, 2480); Higashine, Yamagata, VIII-7, 1954, by T. K. (FPH-1048); Mt. Zawo, Yamagata, VIII-8, 1954, by T. K. (FPH-1067); Mt. Fuji, Narusawa, Yamanashi, IX-23, 1954, by T. K. (FPH-1046); Agematsu, Nagano, X-11, 1955, by T. K. (FPH-632); Wada, Nagano, X-14, 1955, by T. K. (FPH-586); IX-17, 1963, by T. K. & T. U. (FPH-2309); Nagato, Nagano, X-13, 1955, by T. K. (FPH-570); Achi, Nagano, II-, 1965 (FPH-2907). *Quercus acutissima* Carr. (Kunugi)—Takai, Nagano, VI-4, 1956, by T. K. *Rhus javanica* L. (Nurude)—Hanawa, Fukushima, X-3, 1963, by Y. ZINNO (FPH-2225).

Distribution: Asia (Japan) and Europe.

Note: *Endothia nitschkei* OTTH was described from Switzerland based on a fungus on *Tilia*. KOBAYASHI and ITO (1956b) described two new species of *Endothia* from Japan, namely *E. japonica* and *E. macrospora*. At that time, they overlooked the presence of this old species of *Endothia* and the omission was recently noted by them. Although the description of *Endothia nitschkei* (SACCARDO 1895) is very simple, its general characters are quite accordant with those of *Endothia japonica*. Size of ascospore and conidium of *Endothia nitschkei* is given as 12∼16×4∼5 μ and 5×1 μ respectively, and these dimensions are completely overlapped by those of Japanese materials previously identified as *E. japonica*. Hence, *Endothia japonica* KOB. et ITO is treated here to be the synonym of *E. nitschkei* OTTH. The present species was collected from high mountaineous regions. The only exception was the one specimen on *Quercus mongolica* var *grosseserrata* collected from Tokyo. However, the fungus on it was presumably brought from a mountaineous region together with its substratum which was supplied for the cultivation of mushrooms.

Ascospore and conidium easily developed their colony on potato-sucrose agar. Conidium swelled remarkably before germination. Colony was first flat and pale yellowish, then developed thick and wavy mycelial mat with yellowish-orange colour ("Orange" to "Cadmium Yellow"). Several large pycnidial stromata covered with brownish orange-coloured mycelia were produced on the one-to two-months-old colony. Then, large mucous drops of conidia, yellowish orange in colour, exuded out from them. Conidia produced on culture were quite accordant with those on host plants in their shape and size.

6) ***Endothia macrospora*** **KOBAYASHI et ITO**, Ann. Phytop. Soc. Jap. 21 : 152, 1956—(Figure 85; Plate XXII: H∼J)—Bull. Gov. For. Exp. Sta. 92 : 95, 1956

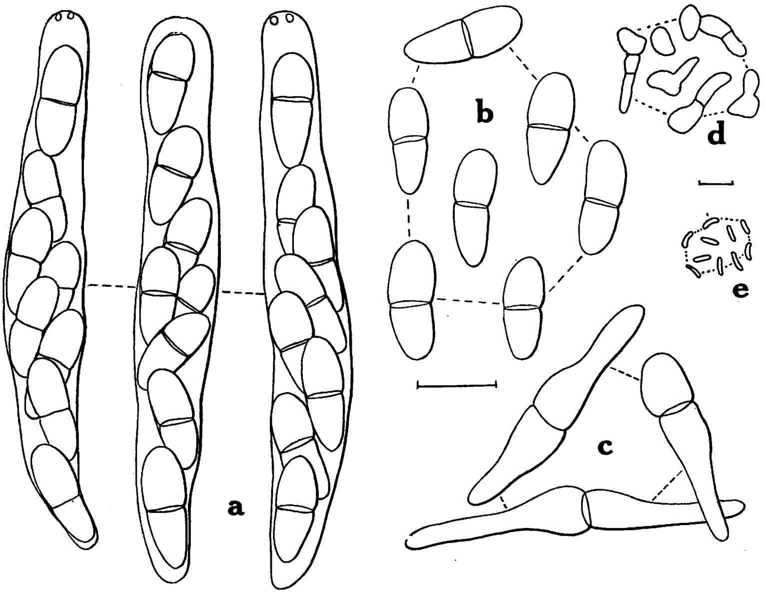

Figure 85. *Endothia macrospora* KOBAYASHI et ITO

a: Asci and ascospores b: Ascospores c: Germinating ascospores
e: Conidia d: Germinating conidia (⊔ =10 μ)

Conidial state: *Endothiella macrospora* nom. nov.

Pustules on bark of dead stems; stromata scattered or gregarious, orange in colour, first immersed within bark tissue, then erumpent through bark epiderm, 1∼2 mm in height and 1∼3 mm in diam., compact plectenchymatous with loose prosenchymatous structure at lower portion. Perithecia irregularly embedded in the lower part of stroma, usually 20 to 50 or more, globular or depressed, 340∼580 μ in diam., with black neck at the top. Necks cylindric, 790∼1,090 μ in length, erumpent through stroma protruding black papillae at the surface. Asci clavate to oblong-clavate, with thin-membrane, furnished apical ring at the thickened tip, 62∼73×10∼11 μ in size and 67.2×10.9 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate, elliptic, rounded at both ends, straight or inaequilateral, 2-celled, slightly constricted at the septum, hyaline, 14∼18×5∼5.5 μ in size and 15.6×5.4 μ in average.

Conidial stroma is not different in macroscopic appearance from the perithecial stroma excepting for the absence of black tip of necks scattered on the surface of stroma, and is irregularly multilocular with a central pore. Conidiophores arise from innermost layer of locule and are simple or branched, hyaline. Conidia are small, allantoid or rod-shaped, unicellular, hyaline, 4∼6.5× 0.5∼1.5 μ in size, exude out from the central pore of stroma as sticky yellowish tendrils under moist conditions.

Host and Material: *Castanopsis cuspidata* var. *sieboldii* (MAKINO) NAKAI (Suda-jii)—Shinagawa, Tokyo, VI-22, 1954, by T. K. (FPH-1057, Type; 1058, 1060, 1069, 1071, cotype).

Distribution: Asia (Japan).

Note: The present species is distinguishable from *Endothia nitschkei* by its longer and wider ascospore and ascus (KOBAYASHI & ITO 1956a, b).

Ascospore easily germinated and developed its colony on potato-sucrose agar. Colony was first flat and whitish, then became thicker with cottony aerial mycelia at the marginal part and pinkish-yellow ("Bittersweet" or "Salmon Orange") in colour. Large pycnidial stromata were produced on one-month-old culture, and mucous masses of conidia oozed out from them. Conidia produced on culture were quite accordant with those on host plant in their size and shape.

7) ***Endothia tetraspora*** KOBAYASHI, Trans. Myc. Soc. Japan 6 : 99, 1965—(Figure 86; Plate XXIII: C, D)

Conidial state: Unknown.

Pustules on bark of dead twigs; stromata small, 0.5∼1 mm in diam. and 0.5 mm in height, scattered; ectostroma plectenchymatous, disc-like, yellowish-orange to orange in colour; entostroma scanty, only visible as loose hyphae twisting the decomposed host tissue. Perithecia embedded beneath the disc-like ectostroma, single or in small group, globular or depressed at the bottom, 420∼520 μ in diam., with black neck at the top; wall membranaceous, composed of flattened, blackish and thick-walled cells. Necks cylindric, collectively erumpent through ectostroma, 290∼380 μ in length, composed of plectenchymatous cells, pierced by a pore furnishing hyaline periphyses. Asci clavate to oblong-clavate, sharply tapered at the base, thin-walled with thickened tip furnishing apical ring, 70∼88×10∼18 μ in size and 79.8×14.7 μ in average, 4-spored, loosed irregularly in perithecium. Ascospores uniseriate to irregularly biseriate, fusoid or elliptic, unicellular, hyaline, 21∼31×7.5∼10 μ in size and 24.8×8.1 μ in average.

Host and Material: *Carpinus tschonoskii* MAX. (Inu-shide)—Danto, Shidara, Aichi, V-26, 1964, by T. K. & T. U. (FPH-2481, Type).

Distribution: Asia (Japan).

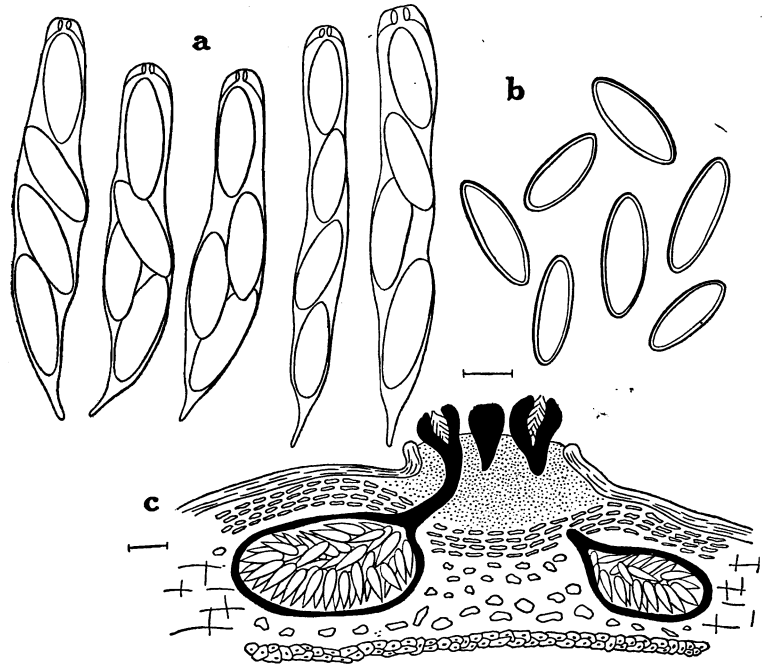

Figure 86. *Endothia tetraspora* Kobayashi

a: Asci and ascospores　b: Ascospores　c: Perithecial stroma

(├─┤: c=100 μ; a, b=10 μ)

Note: The present species is somewhat atypical in the development of stroma in the genus *Endothia*. Its small compact ectostroma is rather distinctly differentiated from loose hyphal net of entostroma. If the colour of stroma were gray to black instead of orange, it closely resembles the genus *Cryptosporella* Sacc. Among the species of *Cryptosporella*, *C. aurea* (Fuck.) Sacc. and *C. daldiniana* (de Not.) Sacc. are similar to the present species in their orange to red colour of discs, by which these two *Cryptosporella* may be considered to be members of genus *Endothia*. However, *Cryptosporella aurea* is different from the present species by its 8-spored and larger ascus (Saccardo 1882). *Cryptosporella daldiniana*, first being described as a four-spored species of *Endothia*, also differs from the present fungus by its quite smaller ascospore (Saccardo 1886). Among the species of *Endothia*, *E. parryi* (Farl.) Cke. described on *Agave* (Saccardo 1891) is similar to the fungus on *Carpinus* in its size of ascus and ascospore, but it differs from the latter in its 2-celled and narrower ascospore and eight-spored ascus.

Conidial state of the present species could not be confirmed due to the unsuccessful isolation.

10. ***Bagcheea* Müller et Menon**, Phytop. Zeits. 22 : 418, 1954; Katumoto, Bull. Fac. Agr. Yamaguchi Univ. 16 : 615, 1965

Type species: *Bagcheea albo-maculans* (Fukui) Hino et Katumoto

Conidial state: Unknown.

Spots on living leaves; perithecia embedded within leaf tissue, globular to subglobular, with short broad neck and effused hypostroma; wall constituted from several layers of cell, outer layer composed of brown, angular, thick-walled cells, inner one composed of flattened, hyaline, thin-walled cells. Neck bearing at the top of perithecium, slightly protruded from the under-leaf surface as black papilla, broader at the tip, penetrated by broad pore furnishing hyaline periphyses; wall darker than that of perithecium. Asci clavate, furnished apical plate or faint apical ring at the thickened tip, with short evanescent stalk, first lined in a layer along perithecial wall, then loosed irregularly in perithecium. Paraphyses absent. Ascospores elliptic, hyaline to pale yellowish brown, unicellular, but granular plasma divided into two parts with wide vacuous space between them, so-called polar diplastic by Müller and Menon (1954).

This monotypic genus based on a fungus from India was distinguishable from the hitherto known genera by its conspicuous character of ascospore. Recently, Katumoto (1965) published some critical notes on the host and districution of the type species in Japan. The genus *Bagcheea* would be placed in Diaporthaceae by its structure of perithecium as pointed out by Katumoto, though Mülldr and Menon related it to Cryptosporellaceae. As mentioned in the note of the genus *Ophiovalsa* and *Cryptosporella*, no reason to separate Cryptosporellaceae from Diaporthaceae is found.

1) ***Bagcheea albo-maculans* (Fukui) Hino et Katumoto**, Bull. Fac. Agr. Yamaguchi Univ. 16 : 621, 1965—(Figure 87; Plate XXIII: E∼H)

Synonym: *Gnomonia albo-maculans* Fukui, Bull. Mie Imp. Coll. Agr. & For. 3 : 16, 1933
Bagcheea castaneae Müller et Menon, Phytop. Zeits. 22 : 418, 1954

Conidial state: Unknown.

Spots on living leaves, white to grayish white, limited by brown zone, circular or irregular, 0.5∼1.5 cm in diam., indistinct from under-leaf surface. Perithecia scattered as black pin-head points along marginal zone of spot, separately embedded within leaf tissue, globular to subglobular, 250∼300 μ in diam., with short neck and with hypostroma filling compactly the space between bottom of perithecium and upper leaf epiderm. Perithecial wall divided into two layers, outer layer composed of brown, angular, thick-walled cells, inner one composed of flattened, hyaline, thin-

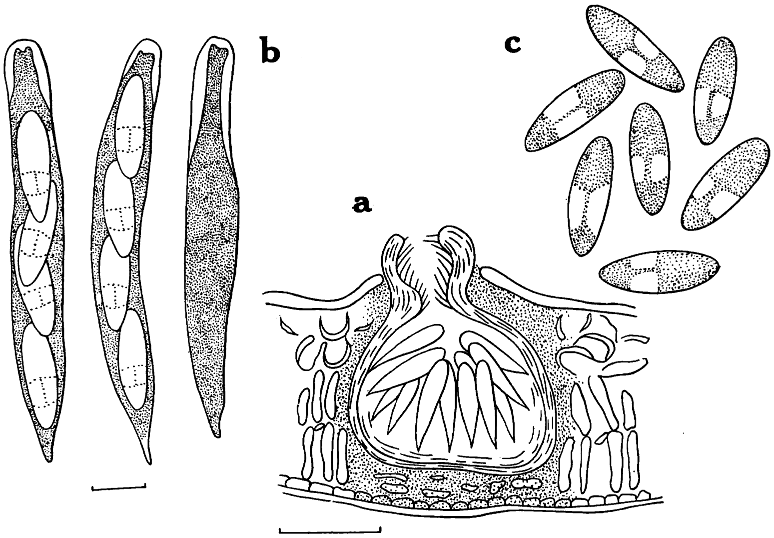

Figure 87. *Bagcheea albo-maculans* (Fukui) Hino et Katum.
a: Perithecium b: Asci and ascospores c: Ascospores
(⊔: a=100 μ; b, c=10 μ)

walled cells. Neck bearing at the top of perithecium, short, broad, elevated as papilla at the under-leaf surface, 90～100 μ in length and 80～90 μ in width, broader near the tip, with a pore furnishing hyaline periphyses; wall plectenchymatous, darker than perithecial wall. Asci clavate with thin-membrane, furnished apical plate or faint apical ring at the thickened tip, with short evanescent stalk, 70～83×9～10 μ in size and 74.3×9.5 μ in average, 4-spored, first lined in a layer along the perithecial wall, then loosed irregularly in perithecium. Paraphyses absent. Ascospores irregularly uniseriate, elliptic, hyaline to pale yellowish brown, 20～23×5～7.5 μ in size and 21.5×6.3 μ in average, unicellular but granular plasma divided into two parts with broad vacuous space between them, larger plasmatic part occupies upper half of cell, smaller one at lower one-third or one-fourth, inserting hyaline vacuole between them, fine plasmatic band joins both upper and lower plasmatic parts through the vacuolate area.

Host and Material: *Castanopsis cuspidata* var. *sieboldii* (Makino) Nakai (Suda-jii)—Kiyosumi, Chiba, X-24, 1967, by T. K. (FPH-3287).

Distribution: Asia (Japan and India).

Note: The present species was first described by Müller and Menon (1954) as the type species of genus *Bagcheea*. At that time, host plant of the fungus was recorded as a species of *Castanea*, a deciduous tree, but later Müller and Arx (1962) revised its host plant to be *Castanopsis tribuloides*, an ever-green tree, on grounds that *Castanea* would not be leaved in March, when the fungus was collected on living leaves, at about 2,000 m above the sea level. Katumoto (1965) found that the same fungus described by Müller and Menon distributed in Japan on *Castanopsis cuspidata* and that it was already described by Fukui (1933) as *Gnomonia albo-maculans*. Although Fukui's specimen was not found, the original description and fine figure made by Fukui disposed him to recognise a complete identity between *Bagcheea castaneae* and *Gnomonia albo-maculans*. Then, a new combination, *Bagcheea albo-maculans* (Fukui) Hino et Katumoto, was proposed by him. Judged from the records of Japanese collection, the present fungus may distribute throughout warmer regions of Japan with its host *Castanopsis*.

Several attempts to isolate the fungus were unsuccessful. All ascospores sowed on sucrose agar failed to germinate. According to Fukui (1933), the fungus germinated from the upper larger plasmatic part of cell. Owing to the lack of further notes, detail of cultural character of the fungus remains unknown.

11. ***Stegophora* P. et H. SYDOW**, Ann. Myc. 14 : 364, 1916; Sydow, H., Ann. Myc. 34 : 417, 1936

Type species: *Stegophora ulmea* (Schw. ex Fr.) Sydow

Conidial state: *Cylindrosporella* Höhnel

Spots on living leaves; perithecia vertically or obliquely embedded within leaf tissue, globular to subglobular, with short neck and effused clypeus-like hypostroma; wall of perithecia membranaceous, light brown, constituted from several layers of cell; outer layer composed of brown, slightly flattened, thick-walled cells, inner one composed of hyaline, flattened, thin-walled cells. Necks bearing from the top or upperside of perithecium, slightly protruded from either upper or under leaf surface as blackish papillae, broader near the tip, penetrated by a broad pore furnishing hyaline periphyses; wall of neck composed of plectenchymatous and vertically elongated cells. Asci clavate, tapered towards the base, furnished apical ring at the thickened tip, loosed from adhering tissue aparaphyses. Ascospores elliptic to ovoid, tapered towards the lower end, hyaline, unequally 2-celled, septated near the lower end; lower cell much smaller than upper cell.

Conidial state is formed in subepidermal layer with flat, blackish, stroma-like cover; these layers are gregarious on spots, and are circular to elliptic or irregular; the cover breaks out in matured stage exposing conidial layer at the leaf surface. Conidiophores are simple, short or obscure. Conidia are hyaline, small, unicellular, clavate or fusoid, straight or curved.

The present genus was established by P. and H. SYDOW (1914) based on *Sphaeria ulmea* SCHW. ex FR. and was included in their new family Stegosphaeriaceae together with the other new genus *Stegasphaeria*. Later, H. SYDOW (1936) dissolved this family for the reason that the ground to establish the particular family with these two genera was based on the superficial characters as shown in the family Clypeosphaeriaceae, such as presence of clypeus or hypostroma. Each genus constituting the families Stegasphaeriaceae and Clypeosphaeriaceae would be replaced to its proper position by the more fundamental characters. Two species of *Stegophora* treated by SYDOW, *S. ulmea* (SCHW. ex FR.) SYD. and *S. aenula* SYD, doubtlessly belong to the family Diaporthaceae by their structure of perithecial centrum and ascus membrane. The genus *Stegophora* is similar to *Gnomonia* and related genera inhabiting leaves, but it differs from them by its perithecium which is grouped two or more and has clypeus or hypostroma. It also differs from *Phylloporthe* and *Lambro* by the type of stroma. The latter genera form well developed and pseudoparenchymatous stroma entirely enveloping perithecia, while *Stegophora* forms only thin-layer of subepidermal clypeus or hypostroma. Although MÜLLER and ARX (1962) treated *Stegophora* to be synonymous with *Lambro* RACIB., the present author retained it as an independent genus in Diaporthaceae. In *Lambro insignis* RAC., the type species of the genus, well developed stroma completely envelopes one group of perithecia, and structure of stroma is distinctly pseudoparenchymatous. On the other hand, *Stegophora ulmea* has only subepidermal hypostroma, and even in the case of *S. oharana* (NISIK. et MAT.) PETR. formation of the clypeus and hypostroma is limited only in epidermal layer of leaves.

Conidial state of *Stegophora ulmea* was transferred to the form-genus *Cylindrosporella* HÖHN. from *Gloeosporium* by ARX (1957). The genus *Stegophora* may closely relate to *Bagcheea* MÜLLER et MENON by its structure of stroma and perithecium.

1) ***Stegophora oharana*** (**NISIKADO et MATSUMOTO**) **PETRAK**, Ann. Myc. 38 : 267, 1940—(Figure 88; Plate XXIV: A～C)

Synonym: *Gnomonia oharana* NISIK. et MATSUM., Ber. Ohara Inst. Landw. Fors. 4 : 286, 1929; TAI, Nank. Jour. 2: 171, 1932

Lambro oharana (NISIK. et MATSUM.) MÜLLER, Beit. Kryptgfl. Schw. 11(2) : 778, 1962

Stegophora aenula SYDOW, Ann. Myc. 34 : 414, 1936

Conidial state: *Cylindrosporella oharana* NISIK. et MAT., nom. seminud.

Spots on living leaves, yellowish, without distinct marginal zone, aggregated small black phyllachoroid scab which is the cover of conidial layer. Perithecia entirely embedded within leaf tissue, usually jointed two in pair, brown to light brown, globular to subglobular, 370～480 μ in diam., bearing short neck from the upperside or lateral part of perithecium, with hypostroma beneath perithecium filling epidermal layer. Necks slightly elevated from the upper leaf surface as papilla, usually parallely stand between paired two perithecia, 120～180 μ in length and 100～110 μ in width, broader near the tip, with a pore furnishing hyaline periphyses, surrounded by clypeus in epidermal layer; wall plectenchymatous, light brown. Asci clavate, tapered toward the base, thin-membrane, furnished faintly visible apical ring at the thickened tip, 43～56×7.5～10 μ

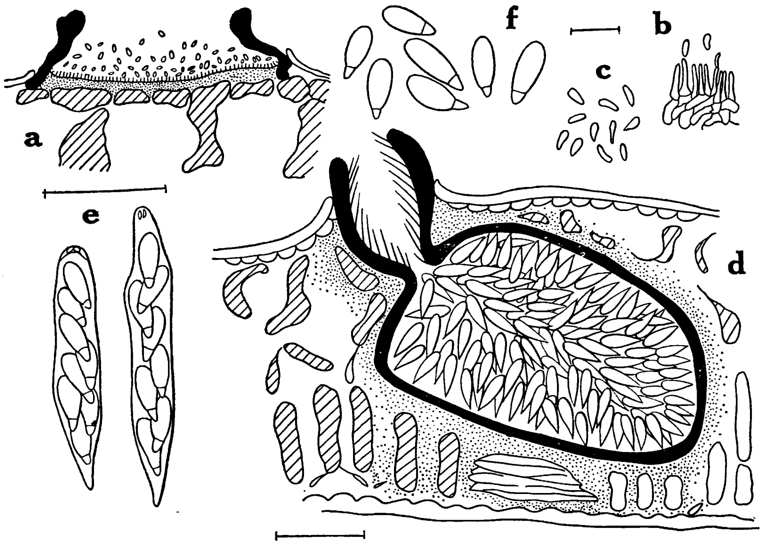

Figure 88. *Stegophora oharana* (NISIK. et MATSUM.) PETR.
a: Acervulus　b: A part of acervulus　c: Conidia　d: Perithecium
e: Asci and ascospores　f: Ascospores　(⊢—⊣: a, d=100μ; b, c, e, f=10μ)

in size and 48.8×8.8μ in average, 8-spored, loosed irregularly in perithecium. Ascospore irregularly biseriate, elliptic to ovoid, unequally 2-celled, lower cell much smaller than upper cell, hyaline, 12.5~15×5~6.5μ in size and 13.4×5.5μ in average.

Conidial state is formed on the upper leaf surface; acervuli are subepidermide, first with thick black cover, flat, round to elliptic in shape, 0.5mm in diam., then the cover breaks up and exposes conidial layer. Conidiophores are obscure. Conidia are clavate or oblong-ovoid, straight or curved, hyaline, unicellular, 4.5~8×1.5~2.5μ in size and 5.4×1.5μ in average.

Host and Material: *Ulmus parvifolia* JACQ. (Aki-nire)—Kurashiki, Okayama, X-15, 1928, by Y. NISHIKADO (NSM-HARA's 209659, paratype of *Gnomonia oharana* NIS. et MAT).

Distrition: Asia (Japan, Manchuria and China).

Note: The present author has not seen any fresh material of the present species. Specimen examined was found in HARA's collection preserved at the National Science Museum. Dimensions given above are quite identical with those of NISIKADO and MATSUMOTO (1929), excepting the narrower size of ascus. This difference might be permitted in view of the difficulty in measuring precisely the size of ascus. As noted by NISIKADO and MATSUMOTO, membrane of ascus is very thin and easily dissolves or deforms in liquid solution. At the same time, they noted that ascus tip was blue-stained by iodine. In the authors's test, ascus tip did not react to MELZER reagent. It is necessary to confirm this reaction for fresh materials, since no species stained blue by iodine was found among the hitherto known Diaporthaceous fungi.

The present species was first described as a species of *Gnomonia*, but it apparently does not belong to *Gnomonia* sensu stricto which has ascospore septated at median part and has no stroma. Hence, it was transferred to the genus *Stegophora* SYD. by PETRAK (1940). The present fungus is distinguishable from the type species of *Stegophora*, *S. ulmea* (SCHW. ex FR.) SYD., by the following characteristics; namely, the larger ascospore, neck of perithecium always erumpent from upper leaf surface, clypeus effused in upper leaf epiderm, and time of the formation of perithecial state.

In *Stegophora ulmea*, size of ascospore is 7～10×3～4 μ, its neck without clypeus is always erumpent from the under-leaf surface, and the formation of perithecium is observed in spring on the fallen over-wintered leaves. In the case of the present fungus, on the other hand, its ascospore measures 10～16×4～6 μ, neck of perithecium always appears from the upper-leaf surface, and perithecia are produced through summer to autumn on the living leaves.

In 1936, SYDOW described a species of *Stegophora*, *S. aenula* SYD., on *Ulmus davidiana* from China. This species is apparently identical with *Stegophora oharana* in its morphology and biology, as pointed out by MÜLLER and ARX (1962). As mentioned above, combination of *Stegophora oharana* would be maintained for the name of the present fungus, though recently MÜLLER and ARX transferred it to the genus *Lambro* as *L. oharana*. Judged from the records of collection (NISIKADO & MATSUMOTO 1929, TAI 1932, SYDOW 1936), the present species probably widely distributes throughout the Far East on the oriental elm species.

According to NISIKADO and MATSUMOTO, the fungus germinated only from the upper large cell of ascospore, but no further notes were made on the cultural characters. Their attempts to obtain germinating conidia were unsuccessful.

12. ***Sphaerognomonia*** **POTEBNIA**, Ann. Myc. 8 : 53, 1910; HÖHNEL, Ann. Myc. 16 : 51, 1918; ARX, Anton. Leauwenh. 17 : 267, 1951; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 367, 1954

Type species: *Sphaerognomonia carpinea* (FRIES) POTEB.

Synonym: *Apiosporopsis* (TRAV.) MARIANI, Att. Soc. Ital. Sci. Nat. 50 : 165, 1911; SACCARDO, Syll. Fung. 22 : 78, 1913

Conidial state: Undetermined.

Pustules on leaf or needle, scattered, white or brown, first immersed, then erumpent through epiderm exposing small papillar disc composed of ostiole and clypeus surrounding it. Perithecia embedded within leaf or needle tissue, globular, with short ostiole at the top. Ostioles erumpent through epiderm as hill-like or papillar protuberance, never protruded, surrounded by clypeus effusing in epidermal layer, penetrated by a pore furnishing hyaline periphyses; clypeus composed of thick-walled parenchymatous cells. Asci clavate or cylindric-clavate, with apical ring at the thickened tip, 8-spored, loosed irregularly in perithecium. Ascospores elliptic to fusoid, unicellular, hyaline.

The present genus first erected by POTEBNIA (1910) based on *Sphaeria carpinea* FRIES and placed in Gnomoniaceae. HÖHNEL (1917a, 1918) transferred it to Diaporthaceae together with the other genera of Gnomoniaceae. KLEBAHN (1918) did not accept *Sphaerognomonia* POTEB. and included it synonymously in *Gnomonia*. Later, ARX (1951) critically studied the genera of Gnomoniaceae and recognized *Sphaerognomonia* to be an independent genus. ARX and MÜLLER included it in Diaporthaceae followed by HÖHNEL's sense together with the other genera of Gnomoniaceae previously studied by ARX.

The genus *Sphaerognomonia* is distinguishable from *Gnomoniella* by the neck of perithecia not projecting from the leaf surface, and the clypeus surrounding neck and effused in epidermal layer. The genus *Apiosporopsis* (TRAV.) MARIANI was based on the mis-finding of SCHROETER that ascospore of *Sphaeria carpinea* formed ultimately a septum near the lower end, so that this illusive genus was deemed to be a synonym of *Sphaerognomonia* by HÖHNEL (1918).

KLEBAHN (1918) conducted cultural study of *Gnomonia carpinea* (=*Sphaerognomonia carpinea*) and noted the formation of conidial state on culture. He considered this conidial state to be the same form as the fungus found often on host leaves in autumn, namely a species of *Leptothyrium*. However, it is quite doubtful that his conidial state belongs to *Leptothyrium*. There were no cases in literature that *Leptothyrium* was proved to be the imperfect state of Diaporthaceous fungi. *Leptothyrium* often connected with bitunicate ascomycetes (Loculoascomycetes). POTEBNIA (1910) also obtained conidial state in culture of *Sphaerognomonia carpinea* and considered it to be *Gloeosporium robergei* DESM. This *Gleosporium* was transferred to the genus *Monostichella* as *M. robergeri* (DESM.) HÖHN. and is usually considered to be the imperfect state of Discomycetous genus *Drepanopeziza* (HÖHNEL 1916, ARX 1957). Therefore, it is still necessary to confirm the precise position of the conidial state of the genus *Sphaerognomonia* through further cultural and ecological studies.

Two collections belonging to the present genus were found among the herbarial materials. Fungus on them is described here as a new species of *Sphaerognomonia*, to which the species name *haraeana* is dedicated to the memory of the first collector HARA, an eminent pioneer in Japanese mycology.

1) ***Sphaerognomonia haraeana*** **KOBAYASHI**, sp. nov.—(Figure 89; Plate XXIV: D~F)
Synonym: *Gnomoniella* (?) sp., in ITO et al., Bull. Gov. For. Exp. Sta. 52 : 82, 1952
Conidial state: Unknown.

Pustulae foliicola et caulicola, sparsa, primo immersa, dein erumpens; disc albida vel lactea, constituto de collis et clypeus; perithecia solitalia, immersis profunda, 200~350 μ diam., paries membranacea, ostiolata; ostiola brevis et crassiuscula, brunnea, 250~360 μ longa, 50~100 μ lata, circumtexta per clypeus; clypeus albida, subepidermide. Asci clavata vel cylindraceo-clavata, 85~113×15~20 μ, apice incrassata donatus annula, libero a paries in maturitatis, aparaphysatis. Ascosporae irregulariter vel obliqua uni- ad biseriata, ellipsoidea vel fusoides, utrinque rotundata, continua, hyalina, granulosa, 17.5~25×6.5~10 μ.

Hab. on dead needles or small stems of *Cryptomeria japonica* D. DON (Sugi)—Kawakami, Gifu, XII-, 1914, by K. HARA (NSM-HARA's 210455, as *Valsa sugifolia* HARA) (Type); Oneyama, Gumma, VIII-28, 1949, by K. ITO (FPH-146).

Distribution: Asia (Japan).

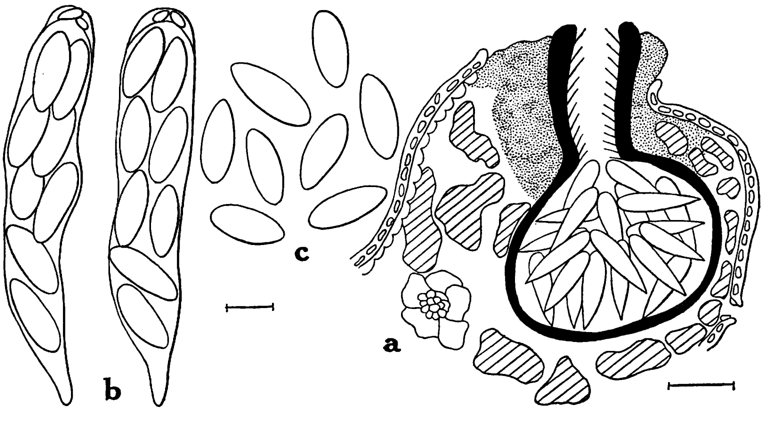

Figure 89. *Sphaerognomonia haraeana* sp. nov.
a: Perithecium b: Asci and ascospores c: Ascospores
(⊢⊣: a=100 μ; b, c=10 μ)

Note: The present species was briefly described by ITO et al. (1952) and tentatively placed in *Gnomoniella*. On the specimen of HARA's collection preserved in the National Science Museum and labelled as *Valsa sugifolia* HARA, no fungus belonging to the genus *Valsa* was found. Fungus on it quite agreed with that on a specimen collected by ITO which was described as *Gnomoniella* (?) sp. in its macroscopic and microscopic aspects. The present fungus is placed in the genus *Sphaerognomonia* because of the lack of long beak projecting from the leaf surface and the presence of clypeus surrounding ostiole, though some aspects suggest that the present fungus is an intermediate form between the genus *Sphaerognomonia* and *Gnomoniella*.

In the unpublished note on the cultural characters of the fungus filed by ITO et al., behaviour of the fungus on agar was noted as follows: "Ascospore of the fungus developed germ-tube from the end within 12 hours. Germ-tube soon branched and vigorously developed. White colony with cottony aerial mycelia was produced within a week. It grew fast and covered the whole surface of agar slant. Aerial mycelia became creamy white later. No fruiting bodies of any type were produced after all."

On *Cryptomeria*, *Sphaeropsis cryptomeriae* SAWADA has often been observed and it was also characterized by the white disc (SAWADA 1950, ITO et al. 1952). In macroscopic appearance, it is difficult to distinguish the disc of both fungi. However, cultural characters of *Sphaeropsis cryptomeriae* distinctly differ from those of the present fungus. On potato-sucrose agar, *Sphaeropsis cryptomeriae* developed slowly the flat colony, creamy white to pale brownish in colour, and produced black conidial masses within two months after isolation. Judged from these cultural experiments, presumption of genetic connection between this *Sphaerognomonia* and *Sphaeropsis cryptomeriae* was denied. Generally, perfect state of the species of *Sphaeropsis* was proved to be *Botryosphaeria* and related genera having bitunicate ascus.

13. ***Mazzantia*** MONTAGNE, Syll. Pla. Crypy. Gen. 245, 1856; SACCARDO, Syll. Fung. 2 : 591, 1883: WINTER, Rabh. Kryptgfl. I, 2 : 913, 1887; ELLIS & EVERHART, N. Amer. Pyren. 617, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 376, 1897; THEISSDN & SYDOW, Ann. Myc. 13 : 190, 1915; HÖHNEL, Ann. Myc. 16 : 109, 1918; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 362, 1954

Type species: *Mazzantia galii* (FRIES) MONT.

Synonym: *Clypeocarpus* KIRSCHSTEIN, Hedwigia 80 : 126, 1941

Conidial state: *Mazzantiella* HÖHNEL

Stroma on leaf or stem, appearing as a spot surrounded by a black zone or a crust consisting of fungous tissue, flat, circular or somewhat irregular, sclerotioid, subhyaline, cartilaginous. Perithecia one to several, immersed within stroma, globular or depressed at the bottom, with a neck at the tip; wall of perithecia composed of several layers of the flattened, dark-brown outer-cells, and of hyaline, thin-walled inner-cells. Necks short-cylindric, penetrated by a pore furnishing hyaline periphyses, erumpent through the central part of stroma. Asci clavate to oblong-clavate, thin-walled, with apical ring at the thickened tip, 8-spored, loosed irregularly in perithecium, without paraphyses. Ascospores hyaline, unicellular, elliptic to fusoid.

Conidial state belongs to the form-genus *Mazzantiella* HÖHN. Pycnidial locule produces within the stroma which is constituted at that having perithecium. *Mazzantiella* HÖHN. is quite similar to *Phomopsis* SACC. in its morphology, excepting the lack of beta conidium in the former and the lack of sclerotioid stroma in the latter.

The genus *Mazzantia* had been considered to be a dothideoid genus (SACCARDO 1883; WINTER 1887; ELLIS & EVERHART 1892; LINDAU 1897), and then it was transferred to Diaporthaceae by HÖHNEL (1917a, 1918) based on the structure of perithecial centrum and conidial state, to which he established a new genus *Mazzantiella* and noted its similarity to *Phomopsis*. The genus *Mamianiella* HÖHNEL is somewhat similar to *Mazzantia* in its sclerotioid stroma. However, structure of the stroma and crust is quite different between these two genera. *Mamianiella* has long neck protruded from the leaf surface, whereas neck of *Mazzantia* is short and never protrudes from the surface of substratum.

As the description of *Clypeocarpus* KIRSCHST. was quite identical with *Mazzantia*, ARX and MÜLLER (1954) treated it as a synonym of the latter. Though original description by KIRSCHSTEIN (1941) is quite brief, this treatment is deemed to be valid.

No species of *Mazzantia* has been recorded from Japan. Recently, examination of the type material of *Phomatospora yukawana* HINO et KATUM. revealed that the fungus does not belong to *Phomatospora* SACC. but to *Mazzantia* MONT. Hence, the following new combination is given to this fungus.

1) ***Mazzantia yukawana* (HINO et KATUMOTO) KOBAYASHI**, comb. nov.—(Figure 90; Plate XXV: A~C)

Synonym: *Phomatospora yukawana* HINO et KATUMOTO, Bull. Fac. Agr. Yamaguchi Univ. 10 : 1190, 1959; HINO, Icon. Fung. Bamb. Jap. 185, 1961

Conidial state: *Mazzantiella yukawana* KOBAYASHI, nom, nov.

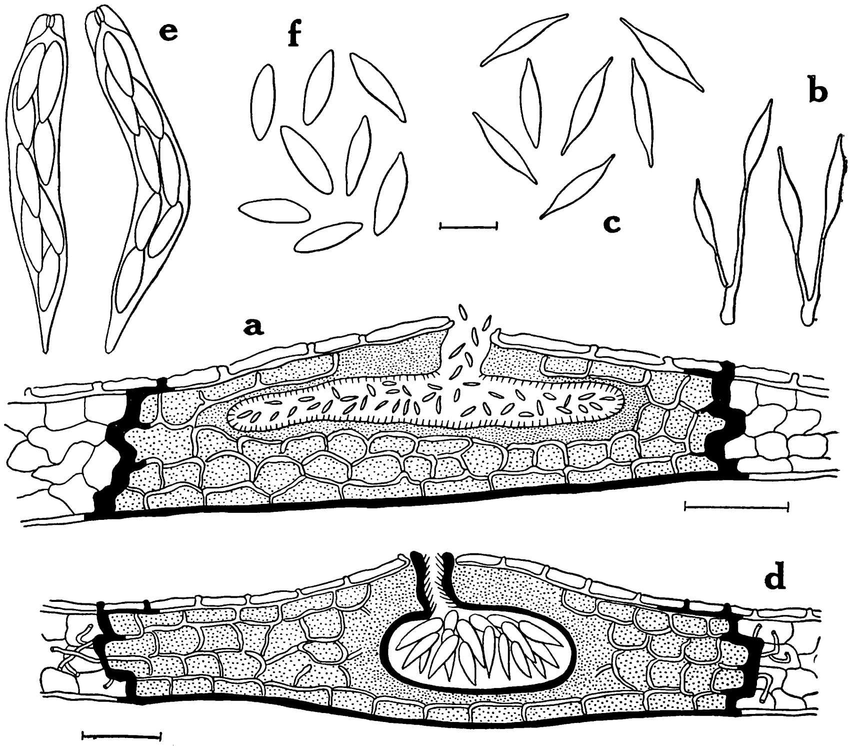

Figure 90. *Mazzantia yukawana* (HINO et KATUM.) comb. nov.
a: Pycnidial stroma　b: Conidiophores and conidia　c: Conidia　d: Perithecial stroma
e: Asci and ascospores　f: Ascospores　(⊢⊣: a, d=100 μ; b, c, e, f=10 μ)

Spot of stroma on leaf sheath, surrounded by black zone, circular or somewhat irregular, 1～2 mm in diam., with one to several black pin points at the central part; stroma subhyaline, cartilaginous, sclerotioid, surrounded by black zone and of black crust consisting of fungous tissue; black zone about 10 μ in width. Perithecia one to several in one stroma, globular or depressed at the bottom, 250～300 μ in diam., with a short and broad neck at the top; wall of perithecia 10～20 μ in thickness, composed of two layers; outer wall consisting of several layers of black and thick-walled cells; inner layer consisting of hyaline, flattened and thin-walled cells. Necks 40～50 μ in height and 80～90 μ in width, composed of vertical plectenchymatous cells, penetrated by a wide pore furnishing hyaline periphyses, erumpent through the central part of stroma. Asci clavate, thin-walled furnished apical ring at the thickened tip, 8-spored, 45～60×6～9 μ in size and 54.5×7.7 μ in average, loosed irregularly in perithecium, without paraphyses. Ascospores irregularly biseriate, hyaline, fusoid, unicellular, 12.5～15×4～4.5 μ in size and 14.2×4 μ in average.

Pycnidial locules are produced in a separate stroma from one having perithecium. Macroscopic appearance and structure of stroma of the imperfect state are not different from the stroma of the perfect state excepting the formation of pycnidial locule instead of perithecium. Usually a stroma has one pycnidial locule. Pycnidial locule first immersed within stroma, then breaks through the upper part of the stroma and erumpent by a central pore, mouth-like, 300～500 μ in diam., 100～150 μ in height. Conidiophores arising from the inner layer of the locule which is distinguishable from the surrounding sclerotioid stroma by the several layers consisting of the flattened and hyaline cells, simple or branched, hyaline, 15～25×0.8 μ in size, bearing conidia acrogeneously. Conidia hyaline, unicellular, fusoid, somewhat acute at the ends, 15～19×2.5～3 μ in size and 16.5×2.8 μ in average, with hyaline and short appendages at both ends.

Host and Material: *Sasa hirtella* NAKAI (Shikoku-zasa)—Mt. Tsurugi, Tokushima, V-11, 1959, by Y. YUKAWA (HYU-Type of *Phomatospora yukawana*).

Distribution: Asia (Japan).

Note: It is clear from the description and fine figure by HINO and KATUMOTO (1959, 1961) that *Phomatospora yukawana* does not belong to *Phomatospora*. Though they did not mention the imperfect state of the fungus, many pycnidial stroma having mature locule were found on the type specimen of *Phomatospora yukawana*. From the morphologic characteristics of the perfect and imperfect states, the fungus was identified as an independent species of the genus *Mazzantia*. No species of *Mazzantia* identical with the present fungus has been described, not only on bamboo but also on the other plants.

14. ***Ditopella*** **DE NOTARIS**, Sfer. Ital. 42, 1863; SACCARDO, Syll. Fung. 1 : 450, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 574, 1887; ELLIS & EVERHART, N. Amer. Pyren. 329, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 448, 1897; MUNK, Dsk. Bot. Ark. 15(2) : 78, 1953; 17(1) : 219, 1957; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 363, 1954; DENNIS, Brit. cup fungi, 199, 1960; REID & BOOTH, Can. Jour. Bot. 45 : 1484, 1967

Type species: *Ditopella ditopa* (FRIES) SCHROT.

Conidial state: Unknown.

Pustules on bark or leaf sheath, small; perithecium solitarily embedded within substratum, globular to broad conic, depressed at the bottom, with short neck at the top; wall membranaceous, consisting of several layers of cells which are dark-brown, thick-walled and somewhat flat, innermost layer composed of hyaline, flattened, and thin-walled cells. Necks cylindric or broad conic, surrounded by a clypeus-like stroma, erumpent through the epiderm, penetrated by a pore furnishing hyaline periphyses. Asci clavate, thin-walled with thickened tip furnishing small apical ring, 12∼16-spored, loosed irregularly in perithecium. Ascospores elliptic to fusoid, hyaline, unicellular, often septated in later stage.

The present genus is characterized by the multi-spored ascus and clypeus-like stroma above the perithecium. Many mycologists described the ascospore of the genus as being unicellular, but REID and BOOTH (1967) recognized a distinct median septum on ascospore obtained from many fresh and herbarial materials by mounting ascospore in Melzer reagent. It is closely similar to *Rehmiella* WINT., but differs from the latter in the development of stroma above the perithecium and non-projecting neck. No record of conidial state was found on this notable genus.

In Japan *Ditopella kajiana* HARA was described on rice plant (HARA 1920). The following description is grounded on the type specimen of *Ditopella kajiana* preserved in the National Science Museum.

1) ***Ditopella kajiana*** **HARA**, Trans. Agr. Soc. Shizuoka 260, 1920; Phytop. fungi in Jap. 215, 1936—(Figure 91; Plate XXIV: G∼I)
Conidial state: Unknown.

Pustules on leaf sheath, scattered, small, black, pinpoint-like; perithecia scattered solitarily within leaf sheath tissue, globular or depressed at the bottom, 500∼580 μ in diam. and 180∼280 μ in height, with short ostiole at the top; wall membranaceous, 20∼30 μ in thickness, composed of several layers of cells which are dark-brown, isodiametric and thick walled. Ostioles conic, about 20∼30 μ in height, surrounded by a clypeus-like fungous tissue which effuses within epidermal layer above the perithecium. Asci clavate to broad clavate, thin-walled, 30∼35×7.5∼9 μ in size and 32.3×8 μ in average, usually 12∼16-spored, rarely 8-spored, loosed irregularly in perithecium; apical ring indistinct; aparaphyses. Ascospores irregularly packed in each ascus, elliptic to obtuse-fusoid, hyaline, uni-to bicellular, 9∼12.5×2∼3 μ in size and 10.6×2.6 μ in average.

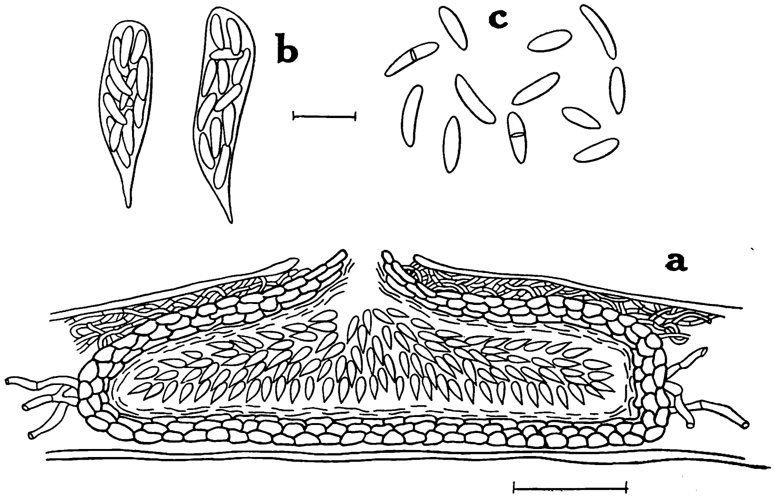

Figure 91. *Ditopella kajiana* HARA
a: Perithecium b: Asci and ascospores c: Ascospores
(⊢⊣: a=100 μ; b, c=10 μ)

Host and **Material:** *Oryza sativa* L. (Ine)—Mori, Shizuoka, X-, 1919, by K. HARA (NSM-Type).

Distribution: Asia (Japan).

Note: The present fungus has somewhat different stroma or clypeus from that of *Ditopella ditopa* (FR.) SCHROT. on *Alnus*. *Ditopella ditopa* has distinct neck and stroma around the neck, while in the fungus on *Oryza* neck is recognized only as papillar protrusion and stroma around the ostiole is quite indistinct. Sparse clypeus-like mycelial twines are recognized within the epidermal layer above the perithecium. On the other hand, the genus *Rehmiella* WINT. having multi-spored ascus is characterized by the long beak protruded from the surface of the substratum and the lack of stroma. It may be said from the morphologic characteristics of the present fungus that the fungus on *Oryza* is an intermediate form between *Ditopella* DE NOT. and *Rehmiella* WINT. However, it is considered to be a member of the genus *Ditopella* as identified by HARA (1920, 1936), based on the clypeus-like fungous tissue above the perithecium. Although REID and BOOTH (1967) recognized a distinct septum in ascospore of *Ditopella ditopa*, bicellular ascospore was rarely found in this fungus.

15. ***Linocarpon*** **SYDOW**, Ann. Myc. 15 : 210, 1917; SACCARDO, Syll. Fung. 24 : 1078, 1928; PETRAK, Sydowia 6 : 387, 1952; MUNK, Dsk. Bot. Ark. 17(1) : 207, 1957

Type species: *Linocarpon pandani* SYDOW.

Synonym: *Gaeumannomyces* ARX et OLIVIER, Trans. Brit. Myc. Soc. 35 : 32, 1951; MUNK, Dsk. Bot. Ark. 15(2) : 73, 1953; DENNIS, Brit. cup fungi, 202, 1960.

Conidial state: Unknown.

Pustules on leaf or stem, black, small; perithecia embedded beneath the epiderm, solitary or in small group, standing erectly or somewhat obliquely and not horizontally, globular to subglobular, with short neck at the top or the upper side of perithecium; wall of perithecium composed of two layers of cells, outer layer consisting of isodiametric, blackish and thick-walled cells, inner one consisting of flattened, hyaline and thin-walled cells. Necks papillar or conic, not-protruding from leaf surface, pierced by a pore furnishing hyaline periphyses, surrounded by a clypeus-like fungous tissue within epidermal layer above the perithecium. Asci relatively few, large, cylindric to oblong-clavate, thin-walled, furnished small apical ring at the thickened tip, short-stalked, 8-spored, loosed irregularly in perithecium at the later stage. Paraphysoides band-like or filiform, hyaline, dissolve and disappear in later stage. Ascospore fascicular, not twisted or tangled as *Ophiobolus* or *Cochliobolus*, filiform or long-cylindric, straight or somewhat curved, usually multi-septated.

The present genus was first placed in a heterogenerous family Clypeosphaerieceae by SYDOW (1917), who disintegrated the family some years later (SYDOW 1932). At that time, *Linocarpon* was characterized by the scolecosporous ascospore and formation of clypeus around the neck, and was differentiated from the genus *Linospora* FUCK. by the lack of white stroma with black crust and by erectly placed perithecium. SACCARDO (1928) included both closely related genera *Linospora* and *Linocarpon* in Ceratostomataceae. CLEMENTS and SHEAR (1931) treated *Linocarpon* SYD. as a synonym of *Linospora* FUCK. without any account. Later, PETRAK (1952a) critically studied the species belonging to *Linocarpon* and related genera. *Linospora* was differentiated from *Linocarpon* by him, based on its horizontally laid perithecium within leaf tissue, stroma delimited by a black zone, and long lateral neck strongly bent toward the leaf surface. At the same time, he treated the genus *Gaeumannomyces* ARX et OLIV. as a synonym of *Linocarpon*. The genus *Gaeumannomyces* was erected by ARX and OLIVIER (1951) based on the causal fungus of take-all disease of wheat, *Ophiobolus graminis* SACC. When they discussed the taxonomic position of the fungus, they compared it with some other scolecosporous genera of Diaporthaceae. *Linospora* FUCK. was compared with it and was distinguished from it, but they did not compare *Linocarpon* with it. Particular characters, by which *Gaeumannomyces* is differentiated from *Linospora* and other scolecosporous genera, are the same as those noted by PETRAK (1952a) for *Lincarpon.* PETRAK's treatment to include *Gaeumannomyces* as a synonym of *Linocarpon* is supported by the author through the examination of Japanese specimens of *Ophiobolus graminis* SACC. No conidial state has been reported on the species of *Linocarpon.*

In Japan two species belonging to this genus have been recorded, namely *Ophiobolus graminis* SACC. (HORI 1901, HARA 1925) on gramineae and *Linocarpon muroianum* HINO et KATUM. on bamboo (HINO & KATUMOTO 1966). Descriptions and figures of these species are grounded on the examination of the herbarial materials. Differentiating points for them are given in the following key and in Figure 92.

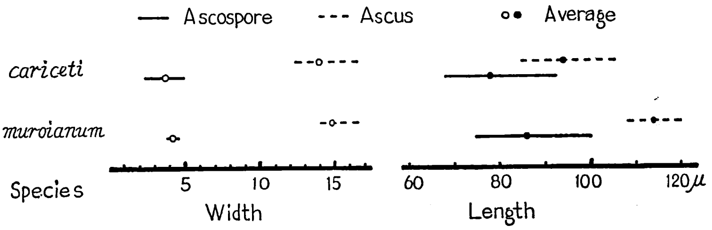

Figure 92. Size of ascus and ascospore in two Japanese species of *Linocarpon.*

Key to Japanese species of *Linocarpon*

A_1: On herbaceous Gramineae, ascus 85〜105×12.5〜16.5 μ,
ascospore 68〜93×2.5〜5 μ, 2〜5-septated .... *L. cariceti* (p. 159)
A_2: On bamboo, ascus 108〜120×14〜16.5 μ, ascospore
75〜100×4〜4.5 μ, septum many .... *L. muroianum* (p. 162)

1) ***Linocarpon cariceti*** (**BERKELEY et BROOME**) **PETRAK**, Sydowia 6 : 387, 1952—(Figure 93; XXV: F〜I)

Synonym: *Sphaeria cariceti* BERK. et BR., Ann. Mag. Nat. Hist. VII, 3 : 455, 1861
Ophiobolus cariceti SACC., Syll. Fung. 2 : 349, 1883; FITZPATRICK et al., Mycol. 14 : 36, 1922
Rhaphidophora graminis SACC., Nouv. Gnorn. Bot. Ital. 7 : 307, 1875
Ophiobolus graminis SACCARDO, Syll. Fung. 2 : 349, 1883; WINTER, Rabh. Kryptgfl. I, 2 : 523, 1887; HORI, Rept. Agr. Exp. Sta. (Jap.) 18 : 52, 1901
Ophiochaeta graminis (SACC.) HARA, Jour. Pl. Prot. 3(5) : 342, 1916; Diseases of cultiv. plants, 83, 1925; Phytop. fungi. in Jap. 207, 1936
Gaeumannomyces graminis (SACC.) ARX et OLIVIER, Trans. Brit. Myc. Soc. 35 : 32, 1951; DENNIS, Brit. cup fungi, 202, 1960

Conidial state: Unknown.

Pustules on leaf sheath and culm of dead stub, scattered, black; perithecium embedded solitarily or in pair beneath epidermal tissue of substratum, black, globular or subglobular, often

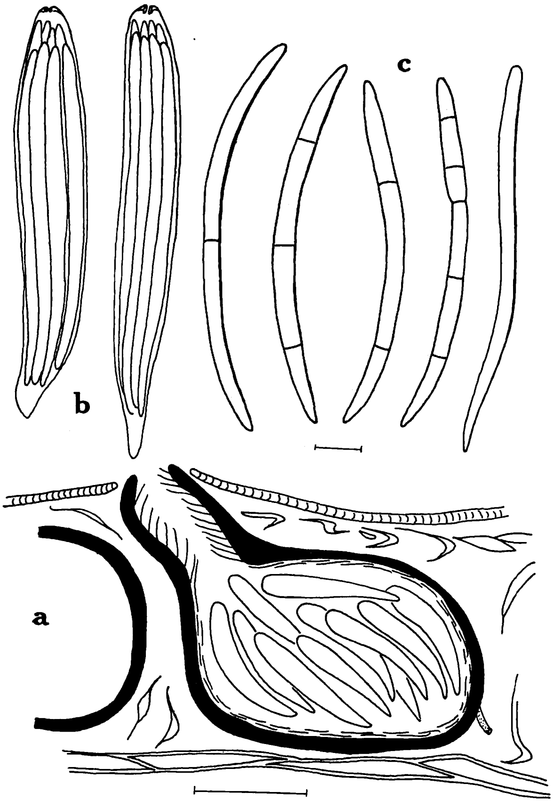

Figure 93. *Linocarpon cariceti* (Berk. et Br.) Petr.
a: Perithecium with a neck bearing at the upper side　b: Asci and ascospores　c: Ascospores
(⊢⊣: a=100 μ; b, c=10 μ)

depressed at the bottom, erumpent through the epiderm by the neck; wall of perithecium composed of black, angular and thick-walled cells, inner layer consisting of flattened, hyaline and thin-walled cells. Necks bearing obliquely at the upper side of perithecium, short, broad, elevated papilla at the surface of the substratum, 90～130 μ in height and 80～100 μ in width, pierced by a pore furnishing hyaline periphyses; wall plectenchymatous. Asci relatively few, clavate or cylindric-clavate, with thin-membrane, furnished small apical ring at the thickened tip, 8-spored, 85～105×12.5～16.5 μ in size and 93.8×14.1 μ in average, first lined in a layer along the bottom of perithecium, then loosed irregularly in perithecium. Paraphysoides few, irregular, band-like or thread-like, completely dissolved in later stage. Ascospores fascicular in parallel, never twisted or tangled, long-cylindric or filiform, broader at the middle and tapering gradually toward the ends, hyaline to pale yellowish, 68～93×2.5 μ in size and 77.9×3.8 μ in average, aseptated when young and 2～5-septated at maturity.

Host and **Material**: *Molinia japonica* Hack. (Numa-gaya)—Kawakami, Gifu, II-, 1916, by K. Hara (NSM-Hara's 210065). *Oryza sativa* L. (Ine)—Shizuoka-city, Shizuoka, XI-, 1925, by K. Hara (NSM-Hara's 210098).

Distribution: Asia (Japan), Europe and North America.

Note: Morphologic characteristics of the materials collected by Hara and preserved in the National Science Museum are quite identical with the descriptions and figures by the earlier workers (e.g. Hori 1901, Fitzpatrick et al. 1922, Jones 1926, Arx & Olivier 1951). The fungus has been known as the causal organism of take-all disease of many gramineae plants, and has been accepted as a member of the genus *Ophiobolus*. Recently, the fungus was transferred to the Diaporthaceous genera *Gaeumannomyces* by Arx and Olivier (1951) and *Linocarpon* Syd. by Petrak (1952a), based on its structure of perithecial centrum and of ascus as already suggested by Jones (1926). Basis of the inclusion of *Gaeumannomyces* to *Linocarpon* was explained in the note of the genus *Linocarpon*. Identity between *Sphaeria cariceti* Berk. et Br. and *Ophiobolus graminis* Sacc. was emphasized by Fitzpatrick et al. (1922) and by Petrak (1952a) through the result of examination of authentic specimens, though Arx and Olivier (1951) disagreed with their treatment, by which *Ophiobolus graminis* was included as a synonym of *Sphaeria cariceti.*

In Japan the fungus was found on many cultivated and wild gramineae (Hori 1901, Hara 1916, 1925, Nakata et al. 1957, Suzuki et al. 1957). Hori (1901) and Hara (1916) noted the germination of the fungus, but did not give further details on its culture. Later, many phytopathological works chiefly on the take-all disease of wheat and barley were reported from our country. According to Okamoto (1949), the fungus grew well at 15～25°C with the maximum at 35°C and the minimum at 5°C. This growth range and optimum temperature for the fungus quite agree with those obtained by Jones et al. (1926). Analysis of the damage, mode of dissemination of the disease and process of the disease development were studied by Higuchi (1947), Tominaga and Asuyama (1950), Chiku and Yokosawa (1953), and Suzuki et al. (1957). According to them, the fungus survives within dead host tissue during the summer. Optimum temperature for the infection ranges from 5 to 10°C of mean air temperature, so that wheat and barley have two dangerous periods to the disease in their growing season, namely one in autumn and the other in spring. The fungus that survives within the dead stubs or in soil loses its active infectivity after two to three years. Conidial state was not observed on host plants nor on agar media.

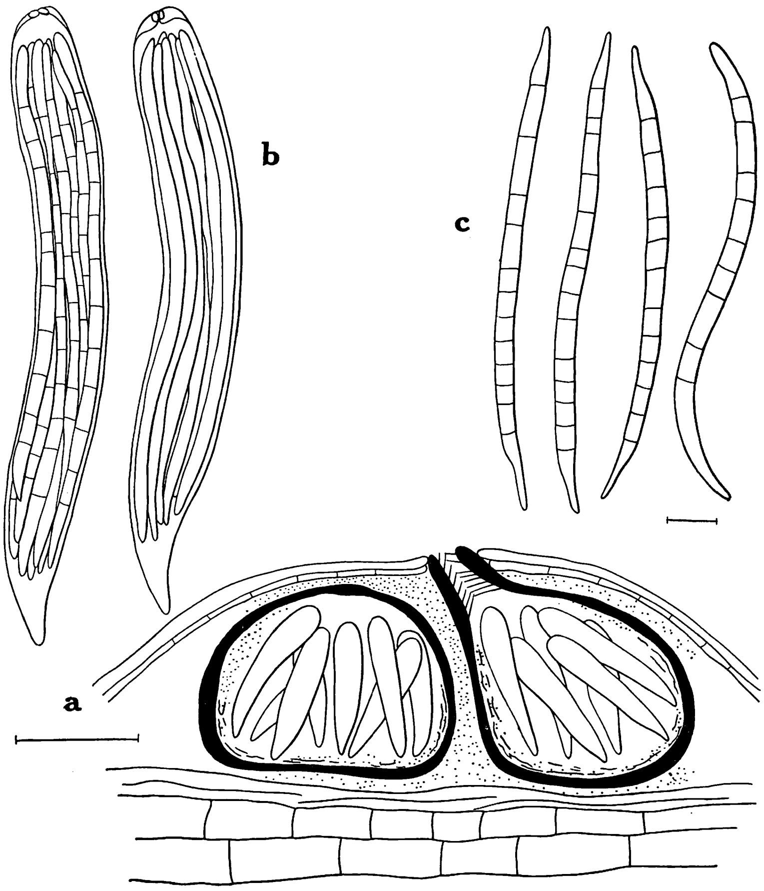

Figure 94. *Linocarpon muroianum* Hino et Katum.
a: Perithecia b: Asci and ascospores c: Ascospores
(⊢⊣: a=100 μ; b, c=10 μ)

2) ***Linocarpon muroianum*** **HINO et KATUMOTO**, Jour. Jap. Bot. 41 : 296, 1966—(Figure 94; Plate XXVI: A～D)

Conidial state: Unknown.

Pustules on dead culm, black, 1 mm in diam., thickly aggregated, first covered with epidermal layer, then erumpent through epiderm. Perithecia one to two or more, globular to subglobular, often depressed at the bottom, 220～380 μ in diam., with short neck at the top or the upper side of the perithecium; wall 15～20 μ in thickness, composed of thick-walled, black and flattened cells, inner layer hyaline, thin-walled and much flattened. Necks short, broad, 50 μ in height and 60～80 μ in diam., elevated papillae, composed of plectenchymatous cells, pierced by a pore furnishing hyaline periphyses. Asci clavate or cylindric-clavate, suddenly tapered at the base, thin-walled, furnished small apical ring at the thickened tip, 108～120×14～16.5 μ is size and 113.5×14.8 μ in average, 8-spored, loosed irregularly in perithecium, without paraphyses. Ascospores fascicular in parallel, never twisted or tangled, oblong-cylindric, curved, broader at the middle and tapered toward the ends, hyaline, 10～14-septated, 75～100×4～4.5 μ in size and 86.4×4.2 μ in average.

Host and Material: *Sasa kurilensis* MAKINO et SHIBATA (Nemagari-dake)—Mt. Nyuto, Akita, VII-4, 1957, by H. MUROI (HYU-Type).

Distribution: Asia (Japan).

Note: Many septa were recognized in ascospore of the present fungus, though no septation was noted by HINO and KATUMOTO (1966). Chief characters of the fungus are quite identical with the other species of *Linocarpon* described by SYDOW (1917) and by PETRAK (1952a). All the species of *Linocarpon* have been known on Monocotyledon plants. The present fungus is differentiated from the hitherto known species of *Linocarpon* by its multi-septated ascospore and by the different host plant.

16. ***Gnomonia*** **CESATI et DE NOTARIS**, Sfer. Ital. 57, 1863; SACCARDO, Syll. Fung. 1 : 561, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 576, 1887; ELLIS & EVERHART, N. Amer. Pyren. 322, 1892; LINDAU, Engl. Naturl. Pflfam, I, 1 : 449, 1897; MUNK, Dsk. Bot. Ark. 15(2) : 75, 1953; 17(1) : 209, 1957; DENNIS, Brit. cup fungi, 206, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 741, 1962

Type species: *Gnomonia setacea* (PERS. ex FR.) CES. et DE NOT.

Synonym: *Gnomoniopsis* BERL., Icon. Fung. 1 : 93, 1894
Melanopelta KIRSCHSTEIN, Ann. Myc. 37 : 113, 1939
Rostrocoronophora MUNK, Dsk. Bot. Ark. 15(2) : 98, 1953

Conidial state: *Gloeosporium* sensu lato, *Discula* SACC.

Perithecia occurring usually on overwintered leaves of herbaceous stems, scattered, solitary or rarely in small group, embedded within the tissue of substratum, globular to subglobular, with long neck at the top; wall membranaceous, composed of thick-walled, flattened and dark-brown cells, innermost layer hyaline, thin-walled and much flattened. Necks long protruded from the surface of substratum, composed of plectenchymatous cells, pierced by a pore furnishing hyaline periphyses. Asci many, clavate, with thin membrane, furnished small apical ring at the tip, 8-spored, loosed irregularly in perithecium. Ascospores irregularly biseriate to fascicular, hyaline, bicellular or sometimes 3-septated, oblong-fusoid to elliptic, straight or curved, often with appendage at both ends.

Conidial fungus of the species of *Gnomonia* belongs to the form-genus *Discula* SACC. or related melanconiaceous genera, and often causes leaf disease in growing season. Life-history and pathogenicity of certain species of *Gnomonia* were studied by KLEBAHN (1918).

The present genus is one of the main genus among the leaf inhabiting Diaporthaceae. Concept of *Gnomonia* in classic mycology was very variable. Sometimes, many genera were segregated from it, and at other times they were combined again with *Gnomonia*, chiefly based on its spore character and position of perithecium in leaf tissue with or without beak. When the genus *Gnomonia* was established, it contains species having one to many-celled ascospore and is characterized by the single perithecium embedded within leaf tissue without stroma and long beak protruding from leaf surface. At the same time, the genus *Mamiania* was established for the *Gnomonia*-like species having distinct stroma in leaf tissue. SACCARDO (1882) restricted the concept of *Gnomonia* as having 2-celled ascospore and did not accept the division of *Mamiania* as having stroma. Onto the one-celled species of *Gnomonia*, he established a new genus *Gnomoniella*. WINTER (1887) considered *Gnomonia* to be a wider concept than SACCARDO and divided it into four subgenera, namely, Gnomoniella having one-celled ascospore, Eugnomonia having 2-celled ascospore, Gnomoniopsis having 4-celled ascospore, and Rehmiella having many ascospores in each ascus. ELLIS and EVERHART (1892) accepted WINTER's concept. These subgenera were later separated to be independent genus respectively (LINDAU 1897). Recently, MUNK (1957) reunited four-celled genus *Gnomoniopsis* with the genus *Gnomonia* and treated it as a synonym of the latter. MÜLLER and ARX (1962) supported MUNK's concept of *Gnomonia* and noted that the pseudosepta were often formed in two-celled species at later matured stage. Similar phenomenon was also observed in *Pseudovalsella modonia* (TUL.) KOB. and in some other species studied by the author. Therefore, such septation is not deemed to be a useful criterion to separate genera, and the validity of MUNK's treatment is supported by the author.

The genus *Rehmiella* WINTER is characterized by the ascus containing many one-celled ascospores (WINTER 1883), but later it was reunited with *Gnomonia* (WINTER 1887). Even so, it closely relates to the genus *Ditopella* rather than to *Gnomonia*. In fact, HÖHNEL (1919) treated *Rehmiella* as a synonym of *Ditopella* based on the similarity between these two genera.

The genus *Melanopelta* KIRSCHST. was based on *Gnomonia tithymalina* var. *sanguisorbae* REHM. KIRSCHSTEIN (1939) considered it to be separable from *Gnomonia tithymalina* SACC. et BR. and from family Gnomoniaceae based on the slight development of clypeus around the fruiting bodies. However, formation of clypeus of the fungus is quite variable, sometimes being observed, and sometimes being completely absent (REHM 1905, MÜLLER & ARX 1962). *Melanopelta saxonica* KIRSCHST. (=*Gnomonia tithymalina* var. *sanguisorbae*) was, therefore, treated by MÜLLER to be a synonym of *Gnomonia sanguisorbae* (REHM) MÜLLER. Naturally, the genus *Melanopelta* lost its independency and was included in the synonym of the genus *Gnomonia*.

Rostrocoronophora MUNK was established as a member of Coronophoraceae (MUNK 1957). It was characterized by the long neck by which it was distinguished from the other genera of Coronophorales. At the same time, he noted that the type species of *Rostrocoronophora*, *R. geranii* MUNK, was "certainly very much like a *Gnomonia*". Later, MÜLLER and ARX (1962) treated *Rostrocoronophora geranii* MUNK as a synonym of *Gnomonia geranii* HOLLOS through their comparative studies with the type materials of both species. Therefore, *Rostrocoronophora* was included as a synonym of the genus *Gnomonia*.

Now the concept of the genus *Gnomonia* is applied to the species which have *Diaporthe*-type structure of perithecial centrum, solitary perithecium embedded within leaf tissue without stroma, long protruding neck from the leaf surface, and 2-celled ascospore sometimes with two pseudo-septa.

In Japan thirteen species of *Gnomonia* have been recorded on various plants (HARA 1954, Anonymous 1965). Among them, *Gnomonia albo-maculans* FUKUI and *G. oharana* NISIK. et MATSUM. were already transferred to the other genera and mentioned previously in this paper (pages 148 and 150). *Gnomonia quercina* KLEB. and *G. ulmea* (SACC.) THÜM. enumerated by KITAJIMA (1933) are probably the translations from foreign books, and it is quite doubtful whether these two species were collected in Japan or not. Both species have been transferred to the genus other than *Gnomonia* (HÖHNEL 1921, SYDOW 1916, MÜLLER & ARX 1962). Notes on *Gnomonia erythrostoma* (PERS.) AUERSW. by IDETA (1903) was also a direct translation from a foreign publication. And some doubt remains as to whether *Gnomonia leptostyla* (FR.) CES. et DE NOT. was collected in Japan because of the lack of original reference of Japanese literature in the list by SHIRAI and MIYAKE (1917). *Gnomonia araliae* HARA on *Aralia* was listed by SHIRAI and HARA (1927) without reference to the original literature. It seems certain that the description was unpublished by HARA, so far as the author is aware. *Gnomonia veneta* (SACC. et SPEG.) KLEB. in Japan was based on the imperfect state which was found on *Platanus* and was identified as *Gloeosporium nervisequum* (FUCK.) SACC. by NAMBU (1917). HINO and KATUMOTO (1958) described a new species of *Gnomonia* on bamboo, namely *G. hsienjenchang*, as being the perfect state of *Colletotrichum hsienjenchang* HINO et HIDAKA (HINO & HIDAKA 1934). They did not prove experimentally the relationship between perithecial and conidial states of the fungus. Examination of authentic materials* preserved in Yamaguchi University showed that it does not belong to *Gnomonia* but to Polystigmataceae, probably to *Glomerella*. Therefore, *Gnomonia hsienjenchang* HINO et KATUM. is excluded from the genus *Gnomonia* and from the family Diaporthaceae. It seems to be feasible from the examination of authentic materials and the jndgement of descriptions that the remaining four belong to the genus *Gnomonia*. They are distinguished from each other by the following key and Figure 95.

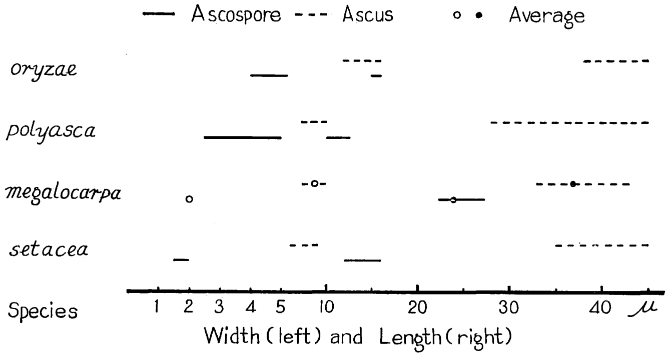

Figure 95. Size of ascus and ascospore in Japanese species of *Gnomonia*.

Key to Japanese species of *Gnomonia*

A₁: On woody plants

B₁: Ascospore small, 12～16×1.5～2 μ, on *Quercus* ································ *G. setacea* (p. 165)

B₂: Ascospore large, 22.5～26.5×2 μ, on *Castanea* ·························· *G. megalocarpa* (p. 165)

A₂: On herbaceous plants

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* On *Phyllostachys bambusoides* SIEB. et ZUCC. (Madake)—Tokuyama-city, Yamaguchi, VII-6, 1957, by I. HINO (HYU-Type), and on *Sinobambusa tootsik* MAKINO (Tōchiku)—Arashiyama, Kyoto, VIII-27, 1960, by H. MUROI & H. OKAMURA (HYU-paratype).

B₁: Ascospore 10〜12.5×2.5〜5 μ, on *Polygonum* ……………………………*G. polyasca* (p. 166)
B₂: Ascospore 15〜16×4〜5.5 μ, on *Oryza* ……………………………………*G. oryzae* (p. 167)

1) ***Gnomonia setacea*** (**PERSOON EX FRIES**) **CESATI et DE NOTARIS,** Sfer. Ital. 1 : 58, 1863; SACCARDO, Syll. Fung. 1 : 563, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 582, 1887; ELLIS & EVERHART, N. Amer. Pyren. 326, 1892; HARA, Bot. Mag. 27 : 226, 1913; MUNK, Dsk. Bot. Ark. 17(1) : 211, 1957; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 742, 1962

Synonym: *Sphaeria setacea* PERS., in USTERIS, Ann. d. Bot. St. 11 : 25, 1795
Sphaeria setacea PERS. ex FRIES, Syst. Myc. 2 : 518, 1823
Sphaeria gnomon TODE, Fung. Mecklenb. 2 : 50, 1791
Gnomonia gnomon (TODE) SCHR. ap. COHN., Krypt. Fl. Schles. III, 2 : 390, 1897
Sphaeria ischnostyla DESM., Ann. Sci. Nat. III, 11 : 357, 1849
Gnomonia ischnostyla (DESM.) AUERSW., Leipz. Bot. Tauscher. 4 : 1800; SACCARDO, Syll. Fung. 1 : 560, 1882
Gnomonia nervisequia FUCK., Symb. Myc. 122, 1863
Gnomonia vulgaris CES. et DE NOT., Sfer. Ital. 1 : 57, 1863; WINTER, Rabh. Kryptgfl. I, 2 : 583, 1887

Conidial state: Unknown.

"Perithecia on leaves, hypophyllous, scattered, chiefly on midrib and vein, globular about 250 μ in diam., embedded within leaf tissue, black, with long neck at the top. Necks slender, long, protruding 1 mm or more from the leaf surface. Asci fusoid, 35〜45×6〜9 μ, 8-spored. Ascospores fusoid, hyaline, granular, 12〜16×1.5〜2 μ, with hair-like appendage on both ends. On *Quercus serrata* THUNB. (Ko-nara) and *Q. acutissima* CARR. (Kunugi)."

Distribution: Asia (Japan), Europe and North America.

Note: As no fresh or herbarial materials of this species were found, the above description was translated from HARA's report (1913). His description is brief but quite accordant with those of European mycologists on *Gnomonia setacea*. KLEBAHN (1918) cultured a *Corylus* strain of this species on agar slants and obtained many perithecia, but not conidia.

2) ***Gnomonia megalocarpa*** (**HINO et KATUMOTO**) **KOBAYASHI,** comb. nov.—(Figure 96; Plate XXVI: E〜H)

Synonym: *Gnomonia setacea* var. *megalocarpa* HINO et KATUMOTO, Jour. Jap. Bot. 43 : 210, 1968

Conidial state: Unknown.

Perithecia on fallen and overwintered leaves, black, immersed within leaf tissue, globular or depressed at the bottom, 450〜600 μ in diam. and 250〜300 μ in height; wall of perithecium brown to dark-brown, 15〜20 μ in thickness, membranaceous, composed of flattened and thick-walled cells, innermost layer hyaline and thin-walled. Necks arising from the top of perithecium, cylindric or hair-like, long protruded from the leaf surface, 1〜5 mm in length, 70〜100 μ in diam., with a pore of 50 μ in width, furnishing hyaline periphyses; membrane composed of plectenchymatous cells. Asci abundant, clavate or fusoid, tapering toward the base or stalked slenderly, rounded at the tip furnishing apical ring, unitunicate, 33〜43×7.5〜10 μ in size and 37.3×8.6 μ in average, 8-spored, loosed irregularly in perithecium. Ascospores fascicular in parallel, long-fusoid, somewhat acute at the ends, straight or curved, hyaline, septated at the median part, not constricted at the septum, 22.5〜26.5×2 μ in average, without appendage.

Host and Material: *Castanea crenata* SIEB. et ZUCC. (Kuri)—Akiyoshidai, Yamaguchi, VI-12,

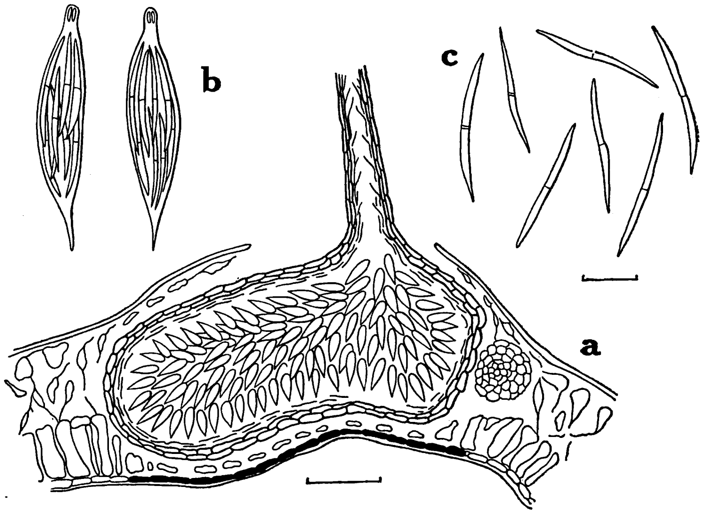

Figure 96. *Gnomonia megalocarpa* (Hino et Katum.) comb. nov.
a: Perithecium　b: Asci and ascospores　c: Ascospores
(⌴: a=100 μ; b, c=10 μ)

1967, by I. Hino (HYU-Type of *Gnomonia setacea* var. *megalocarpa*).

Distrubution: Asia (Japan).

Note: Hino and Katumoto established a new variety of *Gnomonia setacea* for a fungus on *Castanea* collected by Hino (Katumoto 1968). Basis, by which they considered the fungus as a variety but not a species, is quite accordant general features excepting larger size of fruiting bodies with *Gnomonia setacea*. However, the author accepts the fungus as an independent species. It is distinctly differentiated from *Gnomonia setacea* by its ascospore without appendage and definitely large ascospore, ascus, and perithecium.

3) ***Gnomonia polyasca*** **Tochinai et Yamagiwa**, Trans. Sapporo Nat. Hist. Soc. 13 : 146, 1934.
Conidial state: Unknown.

"Perithecia scattered, first immersed beneath epiderm, then erumpent through epiderm by the long neck, globular or depressed, membranaceous, black, 300～400 μ in diam.; neck cylindric, somewhat tapered toward the tip, tough, 100～160 μ in length; asci clavata tapering toward the short-stalked base, 8-spored, 27.5～45×7.5～10 μ; ascospores biseriate, oblong-cylindric, rounded at both ends, 1-septated at somewhat lower part from the middle, not constricted at the septum, 4-guttulate, 10～12.5×2.5～5 μ. On decaying stem of *Polygonum polymorphi* var. *ajanensis* f. *pilosi* Takeda (Hosoba-onitade)—Mt. Taisetsu, Hokkaido, VII-18, 1931, by S. Yamagiwa".

Distribution: Asia (Japan).

Note: As no type specimen was found in the Herbarium of Hokkaido University, the above description was copied from the original one. According to the note and figure on this fungus (Tochinai & Yamagiwa 1934), perithecium is filled with numerous free asci and ascus furnishes small apical ring at the thickened tip. In the description, ascospore was described as having a septum at about lower one-fourth without constriction, while the septum was drawn at about mid-part of ascospore in their figure. This fact suggests that the septation of the fungus is only a variation of normal type and not an apiosporous type. Perithecium is formed beneath epidermal layer and, in their photograph, laid somewhat obliquely. Neck is long protruded from the surface of substratum and it is suggested from the photograph that the length of neck is much longer in fact than that in description. They also noted that ascus tip was deeply stained by iodine potassium iodin. From the foregoing notes, it may be said that the fungus on *Polygonum* has somewhat peculiar characters as a member of *Gnomonia*. However, it is tentatively maintained here in the genus *Gnomonia*, because of the lack of type specimen. Exact taxonomic position of the fungus may be determined following further investigation.

4) ***Gnomonia oryzae*** **MIYAKE**, Jour. Imp. Coll. Agr. Tokyo 2 : 250, 1909

Conidial state: Unknown.

"Perithecia immersed within the tissue of diseased awn which turns to whitish and is scattered with small, black pin-points, flask-shaped, 76～95 μ in diam., protruded from the surface of substratum by long neck; wall of perithecium black, pseudoparenchymatous. Asci long-elliptic, tapering toward the base, 38～45×12～16 μ in size and usually 40×15 μ, with thin-membrane. Ascospores irregularly biseriate, fusoid, straight, bi-cellular, somewhat constricted at the septum, 15～16×4～5.5 μ. On awn of *Oryza sativa* L. (Ine)—Awaji Is., Hyogo."

Distribution: Asia (Japan).

Note: The above description was translated from MIYAKE's one (MIYAKE 1909). He did not give any further details on this fungus. From the description and figure, it is difficult to judge whether the present fungus precisely belongs to the genus *Gnomonia* or not. As no additional data and specimens were available for the author, the fungus is tentatively accepted here as a member of *Gnomonia*.

17. *Mamianiella* HÖHNEL, Ber. Deut. Bot. Ges. 35 : 635, 1917 (nom. nud.); Ann. Myc. 16 : 102, 1918; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 357, 1954

Type species: *Mamianiella coryli* (BATSCH) HÖHNEL

Conidial state: Unknown.

Spots on living leaves; stromata within leaf tissue, compact plectenchymatous, hyaline to pale brown, entirely surrounded by black, thick and clypeus-like crust. Perithecia embedded within stroma, single or in small group, globular, with long black neck at the top; wall of perithecia membranaceous, brown to dark brown, composed of flattened, blackish, thick-walled cells. Necks cylindric, slender, protruding 1～5 mm or more from the under leaf surface, composed of dark brown, prolonged, plectenchymatous cells, pierced by a pore furnishing hyaline periphyses. Asci clavate or cylindric-clavate, thin-walled, with thickened tip furnishing apical ring, 8-spored, loosed irregularly in perithecium. Ascospores elliptic to oblong-ovoid, unicellular, hyaline.

The present leaf inhabiting genus was established by HÖHNEL (1917 a, 1918) based on *Mamiania coryli* (BATSCH) CES. et DE NOT. Basis to segregate the genus *Mamianiella* from *Mamiania* is on the difference of septation in ascospore. Ascospore of *Mamiania fimbriata*, the type species of the genus, is septated at the lower end, namely apiosporous type, whereas *Mamianiella coryli* has one-celled ascospore without septum. Excepting this difference, no morphological difference is found between these two species in question. Presence or absence of septum seems to be not an important criterion to divide the genus in Diaporthaceous fungi, if other characteristics are completely accordant with each other and the imperfect state belongs to the same genus. In *Mamiania* *fimbriata* a record of an unsuccessful isolation was reported by KLEBAHN (1918) and an attempt to isolate the other species of *Mamiania* including *M. coryli* was not reported. Therefore, the genus *Mamianiella* HÖHNEL is retained here until more evidence to unite it again with *Mamiania* is obtained by further studies about their life-history.

In Japan, this monotypic genus was recorded as *Mamiania coryli* (BAT.) CES. et DE NOT. by HARA (1923) without any data and by KOBAYASHI et al. (1939) with fine figure and description. Among HARA's collection, no specimen of *Mamiania coryli* was found, but three specimens were found among KUSANO's collection preserved at the National Science Museum. The following description is based on these specimens in the absence of fresh material.

1) ***Mamianiella coryli*** **(BATSCH) HÖHNEL**, Ber. Deut. Bot. Ges. 35 : 637, 1917 (nom. nud.); Ann. Myc. 16 : 107, 1918—(Figure 97; Plate XXV: D, E)—ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 358, 1954

Synonym: *Sphaeria coryli* BATSCH, Elenchus Gen. 2 : 131, 1789

Mamiania coryli (BATSCH) CES. et DE NOT., Schema de Classif. 37, 1863; WINTER, Rabh. Kryptgfl. I, 2 : 670, 1887; KOBAYASHI et al., ASAHINA's Kryptgfl. Japan, 265, 1939; MUNK, Dsk. Bot. Ark. 17(1) : 219, 1957

Gnomonia coryli (BATSCH) AUERSW., Myc. Eur. V/VI : 23, 1869; ELLIS & EVERHART, N. Amer. Pyren. 327, 1892

Gnomoniella coryli (BATSCH) SACC., Syll. Fung. 1 : 419, 1882

Conidial state: Unknown.

Spots on living leaves, small, discoloured or yellowish, indistinctly delimited from green healthy part; stroma embedded within leaf tissue, compact plectenchymatous, hyaline to white or pale brownish, entirely packed between upper leaf epiderm and lower leaf epiderm, surrounded by black clypeus-like crust; crust 20～40 μ in thickness, constituted from thick-walled, isodiametric, black cells. Perithecia immersed within stroma, single or in small group, globular, 300～500 μ in diam., with long neck at the top. Necks cylindric, black, slender, protruding 1～5 mm or more from the under leaf surface, penetrated by a pore furnishing hyaline periphyses. Asci clavate to oblong-

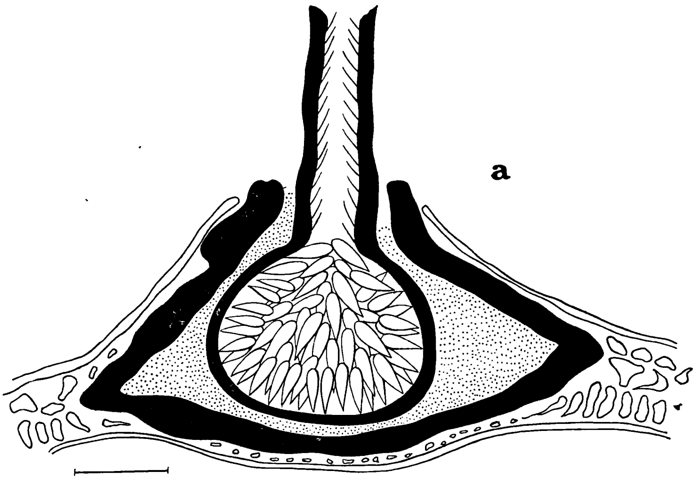

Figure 97. *Mamianiella coryli* (BATSCH) HÖHNEL
a: Perithecium embedded within a stroma (⊔ =100 μ)

clavate, 30～40×5～7 μ in size in young immatured stage. Ascospores were not formed in the examined materials. According to Kobayashi et al. (1939), size of ascospore is about 7×3 μ.

Host and Material: *Corylus sieboldiana* Bl. (Tsuno-hashibami)—Nikko, Tochigi, IX-1, 1904, by S. Kusano (NSM-Kusano); Mt. Fuji, Yamanashi, by Tamura (NSM-Kusano). *Corylus avellana* L. (Murasaki-hashibami)—Gobland, Vamlindbo, Sweden, VIII-3, 1898, by T. Vestergren (NSM-Kusano).

Distribution: Asia (Japan) and Europe.

Note: The fungus on Japanese materials is still immature but its general characteristics other than spore size are quite identical not only with the description of *Mamianiella coryli* but also with the European specimen of *Mamiania coryli* (=*Mamianiella coryli*). Hara (1923) recorded the present species also on *Castanea*, but it is doubtful whether the fungus is parasitic or not to chestnut. No record of the fungus on *Castanea* has been known.

18) ***Phomatospora*** **Saccardo**, Fung. Ven. 2 : 306, 1874; Syll. Fung. 1 : 432, 1882; Winter, Rabh. Kryptgfl. I, 2 : 573, 1887; Ellis & Everhart, N. Amer. Pyren. 310, 1892; Lindau, Engl. Naturl. Pflfam. I, 1 : 448, 1897; Höhnel, Ann. Myc. 16 : 90, 1918; Munk, Dsk. Bot. Ark. 15(2) : 74, 1953; 17(1) : 176, 1957; Arx & Müller, Beit. Kryptgfl. Schw. 11(1) : 351, 1954; Gilman et al., Ia. St. Coll. Jour. Sci. 33.331, 1959; Dennis, Brit. cup fungi, 201, 1960

Type species: *Phomatospora berkeleyi* Saccardo

Synonym: *Flageoletia* (Saccardo) Höhnel; Saccardo, Bull. Myc. Soc. Fr. 12 : 64, 1896 (subgenus);
Höhnel, Osterr. Bot. Zeits. 66 : 57, 1916; Ann. Myc. 16 : 125, 1918
Phomatosporopsis Petrak, Ann. Myc. 23 : 37, 1925

Conidial state: Unknown.

Pustules on leaf-sheath or stem, small, black; perithecium immersed within substratum, subepidernal, small, black, globular, with a papillar ostiole at the top; wall of peritheciam membranaceous, brown to black, composed of dark and thick-walled cells. Ostioles conic or papillar, not-protruded from the surface of substratum, furnished hyaline periphyses. Asci clavate, thin-walled, furnished small apical ring at the thickened tip, apical ring sometimes being quite invisible, 8-spored, first lined in a layer along wall or bottom of perithecium, later loosed irregularly in perithecium, with fine paraphysoides which evanesce in early stage. Ascospores unicellular, hyaline, fusoid or elliptic.

The present genus has similar character to Polystigmataceae on the one hand and on the other hand to Diaporthaceae in its arrangement of asci and paraphysoides in perithecium. Its ascus tip reacts negatively to iodine and furnishes small apical ring. Paraphysoid disappears in early stage. Though it is placed in Diaporthaceae by these characters, it is considered to be the intermediate or transitional form between both families Polystigmataceae and Diaporthaceae. Perhaps it is a primitive type of the family Diaporthaceae. No distinct proof on the imperfect state of *Phomatospora* is found. Comparaitve life-history study on this genus and *Physalospora* or other polystigmataceous genera is needed to clarify the correlation of both families.

Phomatosporopsis was established for the two-celled species of *Phomatospora* by Petrak (1925). It was again united with *Phomatospora* by Arx and Müller (1954) due to the lack of true septum in ascospore of Petrak's type material.

All members of the genus *Flageoletia* accepted by Höhnel (1916, 1918) were transferred to the genus *Phomatospora* by REID and BOOTH (1966) based on their critical reexamination of the authentic materials. For the remainder of *Flageoletia* described by SYDOW (1932), they established a new genus *Neoflageoletia* REID et BOOTH, a member of Polystigmataceae and not of Diaporthaceae. Consequently, the genus *Flageoletia* was included as a synonym of *Phomatospora* SACC.

In Japan four species of *Phomatospora* have been described. Among them, *Phomatospora yukawana* HINO et KATUM. was transferred to *Mazzantia* in the earlier part of this paper (page 155). An undetermined species of *Phomatospora* was recorded on *Metasequoia* needles by YASUMORI (1967). As its specimen having mature perithecia was not preserved, no further notes are added to this fungus. The other two *Phomatospora* are described in the following part with a key and a figure (Fig. 98) differentiating them.

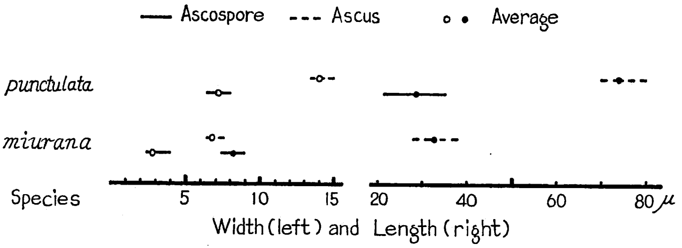

Figure 98. Size of ascus and ascospore in two Japanese species of *Phomatospora*.

Key to Japanese species of *Phomatospora*

A_1: On *Apios*, ascospore small, 7.5∼9×2.5∼4 μ………………………… *P. miurana* (p. 170)

A_2: On *Pseudosasa*, ascospore large, 23∼35×6.5∼8 μ……………………… *P. punctulata* (p. 171)

1) ***Phomatospora miurana*** **HINO et KATUMOTO**, Trans. Myc. Soc. Jap. 7 : 49, 1966—(Plate XXVI: J, K)

Conidial state: Unknown.

Perithecia scattered in irregular and grayish white blotches, epiphyllous, solitarily embedded within leaf tissue, globular, about 120 μ in diam., with a central papillar ostiole; wall of perithecium thin, about 10 μ in thickness, composed of dark-brown to black, flattened and thick-walled cells, innermost cells being hyaline and thin-walled. Ostiole papillar or narrow conic, appearing as a black puncture on the leaf surface, about 30 μ in height and 20 μ in diam. Asci clavate or cylindric-clavate, unitunicate, furnished small apical ring at the thickened tip, 8-spored, 28∼38×6.5∼7.5 μ in size and 33×6.9 μ in average, first lined in a layer on the bottom of perithecium, without paraphyses. Ascospore biseriate, elliptic, rounded at the ends, hyaline, unicellular, 7.5∼9×2.5∼4 μ in size and 8.2×2.8 μ in average.

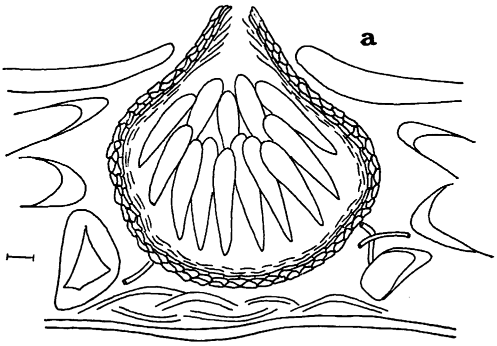

Figure 99. *Phomatospora miurana* HINO et KATUM.
a: Perithecium (—— = 10 μ)

Host and **Material**: *Apios fortunei* MAX. (Hodo)—Rokugo, Akita, IX-29, 1953, by M.

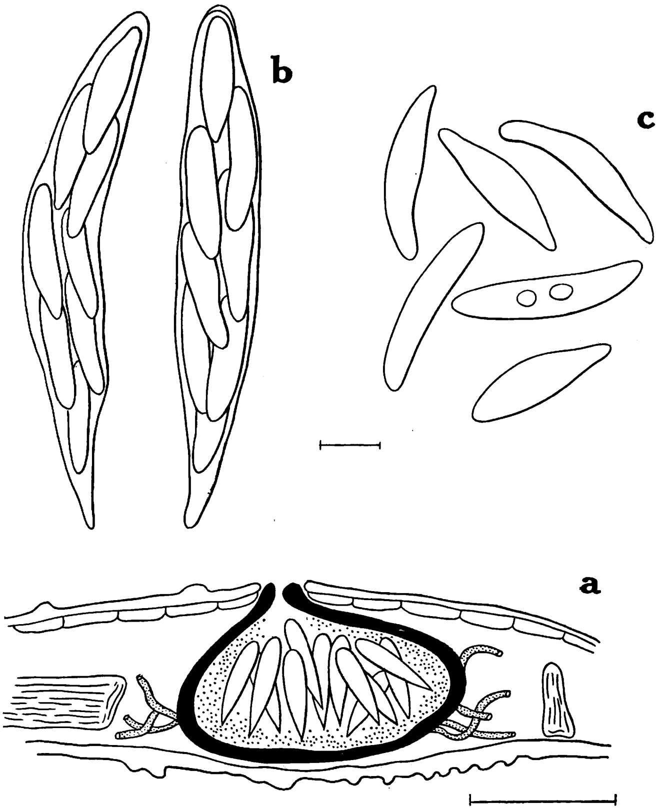

Figure 100. *Phomatospora punctulata* Hino et Katumoto
a: Perithecium　　b: Asci and ascospores　　c: Ascospores
(⊢—⊣: a=100 μ; b, c=10 μ)

Miura (Type, preserved at Akita Prefectural Agr. Exp. Sta.).

Distribution: Asia (Japan).

Note: Perithecia of this fungus are scattered on the diseased leaf blotches and are mixed together with those of *Leptosphaeria apiosis-fortunei* (Miura) Hino et Katum. and pycnidia of *Phyllosticta apiosis-fortunei* Miura as noted by Hino and Katumoto (1966). The present fungus is apparently distinguished from the latters by its structure and size of fruiting bodies.

2) ***Phomatospora punctulata*** **Hino et Katumoto**, Bull. Fac. Agr. Yamaguchi Univ. 9 : 898, 1958—(Figure 100; Plate XXVI: I)—Hino, Icon. Fung. Bamb. Japon. 184, 1961
Conidial state: Unknown.

Perithecia scattered as small and black pin-points on irregular leaf blotch, immersed within leaf tissue, globular or depressed, 170∼200 μ in diam. and 130 μ in height, with a papillar ostiole at the top; wall of perithecium membranceous, composed of angular and thick-walled cells, inner layer being hyaline and thin-walled. Ostiole small, somewhat papillar, 20 μ in diam. and 20 μ in height. Asci clavate or oblong-clavate, unitunicate, thickened at the tip, apical ring indistinct, short-stalked, 70∼80×13.5∼15 μ in size and 74×14 μ in average, 8-spored, without paraphyses. Ascospores irregularly biseriate, hyaline, fusoid to elliptic, sometimes inaequilateral or somewhat curved, unicellular, 23∼35×6.5∼8 μ in size and 28.9×7.2 μ in average.

Host and Material: *Pseudosasa japonica* MAKINO (Yadake)—Kotohira, Kagawa, V-18, 1957, by HINO (HYU-Type).

Distribution: Asia (Japan).

Note: Though apical ring of the present fungus is quite indistinct, systematic position of the fungus determined by HINO and KATUMOTO (1958, 1961) as a member of *Phomatospora* is accepted by the author, because of its different morphologic characteristics from Polystigmataceous genera *Glomerella* and *Physalospora*.

19. Notes on the other genera of Diaporthaceae recorded from Japan

Besides eighteen genera mentioned above, several species belonging to the other genera of Diaporthaceae have been reported from Japan. As the author has been unable to examine their fresh and herbarial material, brief critical notes will be given to them in the following part.

1) ***Gnomoniella*** **SACCARDO**, Michelia 2 : 312, 1881; Syll. Fung. 1 : 413, 1882; MUNK, Dsk. Bot. Ark. 15(2) : 76, 1953; 17(1) : 213, 1957; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 369, 1954; DENNIS, Brit. cup fungi, 206, 1960

Type species: *Gnomoniella tubaeformis* (TODE) SACC.

Conidial state: *Cylindrosporella* HÖHN.

As mentioned previously, the genus *Gnomoniella* was segregated from *Gnomonia* based on its amerosporous ascospore (SACCARDO 1882). At the same time, SACCARDO included the genus *Mamiania* CES. et DE NOT. in it; neverthless *Mamiania* consisted of the species having unicellular and bicellular ascospore. *Mamiania* and *Mamianiella* were later again accepted to be separate genus from *Gnomoniella* by the presence of distinct stroma surrounded by the black crust (HÖHNEL 1917a, ARX 1951, MUNK 1953 etc). *Gnomoniella* sensu stricto is characterized by the perithecium solitarily embedded within leaf tissue, long projecting neck from the leaf surface, and unicellular hyaline ascospore.

In Japan, three species of *Gnomoniella* have been recorded on woody plants (HARA 1954). Among them, record of *Gnomoniella tubaeformis* (TODE) SACC. in Japan is quite doubtful, because original citation was not referred to in "list of Japanese fungi" (SHIRAI & HARA 1927). HARA (1927a, b) described a species of *Gnomoniella*, *G. koreana* HARA, collected on *Viburnum* in Korea. So far as one can judge from his description, it probably does not belong to *Gnomoniella* but to *Sphaerognomonia* POTEB. As *Gnomoniella koreana* was not recorded from Japan, no further notes are added to this species. It is somewhat doubtful whether *Gnomoniella ulmi* SAWADA described on *Ulmus* by SAWADA (1952) actually belongs to the genus *Gnomoniella*. His description was very simple. Although he did not mention the clypeus-like structure around ostiole, the short and broad ostiole of the fungus figured by him indicates that it rather closely relates to *Sphaerognomonia* POTEB. As the author has had no opporturity to examine any herbarial and fresh material of this species, answer to the question is left until specimens become available. The fungus is tentatively treated here as the species of *Gnomoniella*, and the following description is given as a translation of SAWADA's report.

1) ***Gnomoniella ulmi*** **SAWADA**, Bull. Gov. For. Exp. Sta. 53 : 169, 1952

Conidial state: Unknown.

"Spots on leaf, scattered, circular, 3～7 mm in diam., covered with superficial radiate mycelia, dotted by dark-brown points. Perithecia immersed within leaf tissue, subglobular to depressed, 368～470 μ in diam., and 130～192 μ in height; wall of perithecia thin, brown. Asci fusoid, 52～65×19～21 μ in size, 8-spored. Paraphysis absent. Ascospores irregularly biseriate, ellipsoid, hyaline, unicellular, 13～14×7～9 μ in size. On *Ulmus davidiana* var. *laevigata* (Teriha-nire), Mt. Hayachine, Iwate, VII-8, 1905, by K. SAWADA, No. 5326."

Distribution: Asia (Japan).

2. ***Mamiania*** **CESATI et DE NOTARIS**, Schema di Classif. Ital. 36, 1863; WINTER, Rabh. Kryptgfl. I, 2 : 669, 1887; LINDAU, Engl. Naturl. Pflfam. I, 1 : 448, 1897; MUNK, Dsk. Bot. Ark. 15(2) : 77, 1953; 17(1) : 218, 1957; DENNIR, Brit. cup fungi, 205, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 779, 1962

Type species: *Mamiania fimbriata* (PERS.) CES. et DE NOT.

Conidial state: Unknown.

As mentioned in the note of *Mamianiella*, the present genus is a leaf inhabitant and is characterized by the long neck protruding from leaf surface and well developed stroma surrounded by black crust, enveloping one to several perithecia. *Mamiania* and *Mamianiella* may closely relate to *Gnomonia* and *Gnomoniella*. The former group is considered to be a stromatic form of the latter. SACCARDO (1882) rearranged these leaf inhabiting genera into two genera, namely *Gnomonia* and *Gnomoniella*, based on the presence or absence of septum in ascospore. However, the author supports tentatively the HÖHNEL's segregation of *Mamiania* from *Gnomonia* and *Mamianiella* from *Gnomoniella* due to the lack of life-historical study in the genus *Mamiania* and *Mamianiella*. KLEBAHN (1918) failed to isolate *Mamiania fimbriata* in utilizing *Carpinus* leaf decoction agar. It is necessary to clear up the imperfect state of the present genus by further study.

In Japan, HARA (1923) recorded *Mamiania fimbriata* (PERS.) CES. et DE NOT. His description was quite accordant with those of foreign mycologists. The following description is translated from HARA's book:

1) ***Mamiania fimbriata*** **(PERSOON ex FRIES) CESATI et DE NOTARIS**, Schema di Classif. Ital. 37, 1863; WINTER, Rabh. Kryptgfl. I, 2 : 669, 1887; HARA, Diseas. of trees, 123, 1923; MUNK, Dsk. Bot. Ark. 15(2) : 77, 1953; 17(1) : 218, 1957; DENNIS, Brit. cup fungi, 205, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 780, 1962

Synonym: *Sphaeria fimbriata* PERS., Observ. 1 : 70, 1796
Sphaeria fimbriata PERS. ex FRIES, Syst. Myc. 2 : 436, 1823
Gnomonia fimbriata (PERS.) AUERSW. ap. RABH., Fung. Europ. 928, 1866
Gnomoniella fimbriata (PERS.) SACC., Syll. Fung. 1 : 419, 1882
Pulvinaria fimbriata (PERS.) EHRB., Sylv. Berol. 16, 1818
Sphaeria spiculosa BATSCH, Elench. Fung. Cont. 1 : 273, 1786
Mamiania spiculosa (BATSCH) TRAV., Fl. Ital. Crypt. 2 : 167, 1905

Conidial state: Unknown.

"Spots on living leaves, occurring from mid-summer, somewhat swollen; stroma within leaf tissue, smooth at surface, bright black, scattered or coalesced in an irregular shape; perithecia 2 to 20, globular, 400～500 μ in diam., with long neck; asci elliptic, with short-stalked, 40～50×

8～10 μ, 8-spored; ascospores obliquely uniseriate, elliptic to oblong-ovoid, unequally 2-celled, septated near lower end, hyaline, 9～11×3.5～4 μ. On *Carpinus laxiflora* BL. (Koshide)."

Distribution: Asia (Japan), Europe and North America.

3. ***Cryptosporella*** SACCARDO, Mich. 1 : 30, 1877; Syll. Fung. 1 : 466, 1882; LINDAU, Engl. Naturl. Pflfam. I, 1 : 468, 1897; WEHMEYER, Amer. Jour. Bot. 13 : 639, 1926; MUNK, Dsk. Bot. Ark. 15(2) : 84, 1953; 17(1) : 244, 1957; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 273, 1954; GILMAN et al., Ia. Sta. Coll. Jour. Sci. 33 : 329, 1959; DENNIS, Brit. cup fungi, 197, 1960

Type species: *Cryptosporella hypodermia* (FR.) SACC.

Conidial state: *Fusicoccum* CDA. ap. STURM.

The genus *Cryptosporella* is distinguishable from *Ophiovalsa* (=*Cryptospora* TUL.) only by its phyalosporous type of ascospore. Ascospores of *Cryptosporella* are fusoid to elliptic and their length/width ratio is less than 10/1, while those of *Ophiovalsa* are long cylindric, but not acicular, and length/width ratio is more than 10/1.

As noted in the genus *Ophiovalsa*, the present genus was placed in Melanconidaceae in earlier times. Since HÖHNEL's treatment (1917a) to include *Cryptosporella* in Diaporthaceae, it has long been accepted to be a member of this family. Recent establishment of Cryptosporellaceae for the present genus and related genera by ARX and MÜLLER (1954) has not been accepted by the other mycologists. The present author also agrees with the opinion that the genus *Cryptosporella* should be placed in Diaporthaceae.

Imperfect state of *Cryptosporella* was presumably noted as the form-genus *Fusicoccum* CDA. by HÖHNEL (1918) and WEHMEYER (1926a). This genetic relationship was partly proved by JENKINS (1918), and WEHMEYER (1926a, 1933).

In Japan three species of *Cryptosporella* have been recorded. Among them, *Cryptosporella viticola* SHEAR is well known as a causal agent of dead-arm disease of grape vine and it widely distributes throughout Japan (e.g. HIURA 1924, TOGASHI 1950). However, all records on this species are concerned with its conidial state, *Fusicoccum viticolum* REDDICK. Description on its perfect state in some handbooks in Japan (TOGASHI 1950, NAKATA et al. 1957, etc.) is probably a direct translation from SHEAR's publication (1911). It seems certain that the perfect state *Cryptosporella viticola* has not been collected in Japan. Therefore, further notes on this fungus are not made here.

The other two species are *Cryptosporella umbrina* (JENK.) JENK. et WEHM. causing brown canker of rose and *C. bambusicola* HINO et KATUM. on bamboo. The following descriptions were translated from those by ABE (1934) and by HINO and KATUMOTO (1958), respectively.

1 ***Cryptosporella umbrina*** (**JENKINS**) **JENKINS et WEHMEYER**, Phytop. 25 : 887, 1935

Synonym: *Diaporthe umbrina* JENK., Jour. Agr. Res. 15 : 593, 1918; SACCARDO, Syll. Fung. 24 : 755, 1928; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9 : 270, 1933; ABE, Jour. Pl. Prot. 21 : 105, 1934

Conidial state: *Fusicoccum* sp.

"Perithecial pustules on cankered stem, scattered as black dots, elevated by protrusion of converged necks. Perithecia usually embedded beneath pycnidial stroma, clustered globular to subglobular, 110～270 μ in diam., with black neck at the top. Necks collectively erumpent through epiderm or conidial stroma, 110～190 μ in length, penetrated by a pore furnishing periphyses.

Asci clavate, narrower toward the tip, sharply tapered at the base, 35～45×6.5～8 μ in size and 40.4×7.3 μ in average, 8-spored. Paraphysis absent. Ascospores obliquely biseriate, elliptic to oblong-ovoid, hyaline to pale olivish, rarely falsely septated, 6.5～11×3～5 μ in size and 9.6×4.2 μ in average.

Conidial stroma lenticular or irregular, embedded within substratum, erumpent through epiderm, pseudoparenchymatous, with uni- to multi-locules. Wall of locule indistinct but locules differentiated from surrounding stromatic tissue by a layer of hyaline flattened cell and conidiophores. Conidiophores simple or sparsely branched, 13～39×1.6 μ in size, acute at the tip. Conidia fusoid-elliptic or oblong-ovoid, straight or curved, unicellular, hyaline, 6.5～11×2.3～3.2 μ in size and 9.6×2.8 μ in average. On cultivated *Rosa*."

Distribution: Asia (Japan) and North America.

Note: So far as can be judged from the description and figure made by ABE (1934), the present fungus seems to be acceptable as *Cryptosporella umbrina* known in North America (JENKINS 1918, WHEMEYER 1933, JENKINS & WEHMEYER 1935).

2) ***Cryptosporella bambusiocola*** **HINO et KATUMOTO**, Bull. Fac. Agr. Yamaguchi Univ. 9 : 909, 1958; HINO, Icon. Fung. Bamb. Japon. 193, 1961
Conidial state: Uncertain.

"Stromata on culm, subepidermide, subglobular or hemisphaeric, dark-brown, 400～500 μ in diam. and 160～290 μ in height; perithecia immersed within stroma, subglobular, black, 130～200 μ in diam. and 110～130 μ in height, with small ostiole; asci clavate, rounded at the tip, tapered toward the base, short-stalked, 8-spored, 23～34×3～4 μ, without paraphyses: ascospores biseriate, fusoid or oblong-fusoid, obtuse at the ends, hyaline, unicellular, 8.2～9.8×2.8～3.2 μ.

Pycnidia subepidermide, globular or depressed, somewhat lenticular, unilocular, 140～180 μ in diam. and 55～65 μ in height; conidia elliptic, unicellular, hyaline, with two drops, 5.5～6×3～3.5 μ.

On *Phyllostachys nigra* var. *henomis* MAKINO (Hachiku)—Arima, Kobe-city, Hyogo, VI-2, 1957, by H. MUROI (HYU-Type)"

Distribution: Asia (Japan).

Note: No mature fruiting bodies, either of perithecium or pycnidium, were found on the type material of this species. All pustules examined had empty chamber of the fungus. It may be said from the description and figure by HINO and KATUMOTO (1958) that the conidial fungus seems not to belong to *Fusicoccum*.

4. ***Vialaea*** **SACCARDO**, Bull. Soc. Myc. Fr. 12 : 66, 1896; Syll. Fung. 14 : 619, 1899; DENNIS, Brit. cup fungi, 201, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 753, 1962
Type species: *Vialaea insculpta* (FRIES) SACC.
Synonym: *Boydia* SMITH, Trans. Brit. Myc. Soc. 6 : 151, 1919
Conidial state: Unknown.

This genus was established for *Sphaeria insculpta* FRIES having 2-celled, dumbbell-shaped or double-clavate ascospore. In Diaporthaceae, two other genera having such shape of ascospore have been known, namely *Diatractium* SYD. and *Pleuroceras* RIESS. *Vialaea* is characterized by the perithecia erectly embedded within bark tissue in small group and formation of subepidermal clypeus around the neck. *Pleuroceras* differs from *Vialaea* by the solitary perithecium lying horizontally in leaf tissue without stromatic tissue. *Diatractium* SYD. is also different from *Vialaea* in its perithecia placed obliquely or horizontally within well developed pseudostroma in leaf tissue.

According to MÜLLER and ARX (1962), the fact that the ascus tip of *Vialaea insculpta* was blue-stained by iodine was reported by CHADEFAUD (1957) and SCHRANTZ (1960), and CHADEFAUD included it in Amphisphaeriaceae, whereas SCHRANTZ established a new family for *Vialaea*. On the other hand, DENNIS (1960) and MÜLLER and ARX (1962) retained it in Diaporthaceae because of the negative reaction of ascus tip to iodine. MÜLLER AND ARX noted that *Vialaea* seemed to be the intermediate type between Diaporthaceae and Amphisphaeriaceae in some aspects. Precise position of *Vialaea* would be determined through further study on its life-history and developmental type of perithecial centrum from young stage to matured stage.

Boydia remuliformis SMITH was proved to be the same species as *Vialaea insculpta* by PETRAK (1952) and MÜLLER and ARX (1962), so that this monotypic genus *Boydia* was included in a synonym of *Vialaea*.

In Japan, HARA (1913) described a new fungus on bamboo to be the species of *Vialea*. This fungus, *Vialea bambusae* HARA, would be exclude from *Vialaea* so far as judging from his description is concerned, in which its ascospore was said to be "elliptic-fusoid, 3-septated", namely phragmosporous. It is quite difficult to determine what genus can be applied to this fungus with its too brief description.

5. ***Sillia* KARSTEN**, Myc. Fenn. 2 : 20, 1873; SACCARDO, Syll. Fung. 2 : 361, 1883; LINDAU, Engl. Naturl. Pflfam. I, 1 : 480, 1897; MUNK, Dsk. Bot. Ark. 15(2) : 70, 1953; 17(1) : 200, 1957; DENNIS, Brit. cup fungi, 198, 1960

Type species: *Sillia ferruginea* (PERS.) KARST.

Conidial state: Unknown.

The present genus is characterized by the scolecosporous type of ascospore among the bark inhabiting Diaporthaceae. WINTER (1887) united *Sillia* with *Melogramma* and species having brown phragmosporous type and hyaline scolecosporous type of ascospore were included in one genus. LINDAU (1897) separated them again and placed the genus *Sillia* in Melogrammataceae. WEHMEYER (1926a) considered it to be a septate form of the genus *Cryptospora* TUL. (=*Ophiovalsa*) which was placed in Diaporthaceae by him. Recently MUNK (1953, 1957) and DENNIS (1960) treated it as an independent genus of Diaporthaceae. According to the description of type species of *Sillia*, ascospore is not oblong-fusoid but filiform or acicular showing typical scolecosporous type, and is multi-septate. The genus *Ophiovalsa* is, therefore, distinguishable from *Sillia* by its unicellular, long-cylindric or fusoid ascospore. However, presence or absence of septum is considered to be an insignificant characteristic in the spore type of scolecospore. If the genus *Sillia* is accepted as valid, certain species of *Ophiovalsa* are probably to be transferred to *Sillia*, otherwise, all species of *Sillia* are to be united with the genus *Ophiovalsa*. Only a little information was given about its life-history. WEHMEYER (1926a) conducted cultural study of *Cryptospora* (*Sillia*) *cinctula* (CKE. et PK.) SACC. and obtained no conidial state on agar media or on sterilized twig. Until more clear evidence concerned with the life-history of the species belonging to *Ophiovalsa* and *Sillia* are obtained in further study, the genus *Sillia* is accepted as a closely related genus to *Ophiovalsa* in Diaporthaceae.

HARA described a species of *Sillia* on *Thea* plant, *S. theae* HARA, from Japan (HARA 1919, TANAKA 1921) and later on *Camellia* (HARA 1927). Examination of the type specimen of *Sillia* *theae* HARA* showed that the fungus on *Thea* belonged neither to *Sillia* nor to *Berlesiella* to which *Sillia theae* was transferred by HARA (1932). Its ascospore is not scolecosporous but hyalophragmosporous, ascus is apparently bitunicate, and contents of ascus excepting ascospore are blue-stained by MELZER reagent. Therefore, this fungus on *Thea* and *Camellia* is excluded from the genus *Sillia*.

6. ***Sydowiella*** **PETRAK**, Ann. Myc. 21 : 30, 1923; MUNK, Dsk. Bot. Ark. 15(2) : 73, 1953; 17(1) : 204, 1957; DENNIS, Brit. cup fungi, 200, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 716, 1962

Type species: *Sydowiella fenestrans* (DUBY) PETR.

Conidial state: Unknown.

This genus is characterized by the solitarily embedded perithecium within bark without stromatic tissue, the perithecial centrum like *Melanconis*, and the didymosporous ascospore. Relation of *Sydowiella* to *Melanconis*, *Hercospora* and some other genera would be confirmed through life-history studies.

In Japan, HINO and KATUMOTO (1966) described a species of *Sydowiella* on *Azukia*, *S. azukiae* HINO et KATUM. Examination of the type specimen of *Sydowiella azukiae* which has been preserved at Akita Prefecture Agricultural Experiment Station** showed that the fungus on *Azukia* does not belong to *Sydowiella*. Perithecia of the fungus are crowded and coalesced to each other, so that many long black streaks of stroma-like pustules are formed on the surface of stem. Ascospores of the fungus are unicellular and neither multi-cellular as described by MIURA (1957) nor bicellular as described by HINO and KATUMOTO (1966). Asci have unitunicate membrane with somewhat thickened tip, and no apical ring is visible. Paraphyses are absent. Judged from these characteristics, the fungus on *Azukia* may not belong to *Sydowiella* but belong to Polystigmataceae, especially the genus *Glomerella*. Therefore, *Sydowiella azukiae* is excluded from the genus *Sydowiella*.

7. ***Prosthecium*** **FRESENIUS**, Beit. z. Myk. 2 : 62, 1852; PETRAK, Ann. Myc. 21 : 324, 1923; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 14 : 95, 1941; MUNK, Dsk. Bot. Ark. 15(2) : 83, 1953; 17(1) : 245, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 359, 1959; DENNIS, Brit. cup fungi, 196, 1960

Type species: *Prosthecium ellipsosporium* FRES.

Synonym: *Calospora* SACC. (non NITSCHKE 1863), Syll. Fung. 2 : 230, 1883
Calosporella SCHROETER, Pilz Schles. 2 : 442, 1908

Conidial state: *Stilbospora* PERS. ex MERET, *Steganosporium* CDA.

This phragmosporous genus is characterized by the *Melanconis*-like stroma without black zone within substrata and locular type of the imperfect state. *Pseudovalsa* CES. et DE NOT. is quite similar to this genus but it differs from *Prosthecium* by the imperfect state and the development of blackened zone. Imperfect state of *Prosthecium* is locular type and belongs to *Stilbospora* or allied genera, whereas *Pseudovalsa* forms conidia on exposed layer belonging to *Coryneum*. A full

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* On *Thea sinesis* L. (Cha)—Hikiuma, Shizuoka, X-, 1919, by K. HARA (NSM-HARA's 209285, Type)

** On *Azukia angularis* (WILLD.) OHWI (Azuki)—Hayakuchi, Akita, IX-24, 1952, by J. KOBAYASHI account on this genus was given by PETRAK (1923) and WEHMEYER (1941a). Genetic relationship between *Prosthecium* and *Stilbospora* was also verified experimentally by WEHMEYER (1938a, 1941a). *Calospora* SACC. and *Calosporella* SCHROET. were based on the same species and their type species, *Calospora platanoides* NIESSL or *Calosporella innesii* (CURR.) SCHROET., were included in the synonym of *Prosthecium innesii* by him. The validity of this treatment is supported here.

In Japan, SAWADA (1950) described a fungus on *Pinus* as *Calospora* (?) *pini-thunbergii* SAWADA. It is uncertain whether his fungus belongs to *Prosthecium* or not, because his description was too brief to determine its systematic position, and the author was unable to examine any material of this fungus. HINO and KATUMOTO (1955, 1961) also described a species of *Calospora*, *C. atropunctulata* HINO et KATUM., on bamboo. As only empty perithecia were found on the type specimen*, it is quite uncertain whether the fungus belongs to *Prosthecium* or not.

VI. Critical note on genera once placed in Diaporthaceae

1. ***Acanthonitschkia*** **SPEGAZZINI**, Ann. Mus. Nac. Buen. Aires 17 : 116, 1908; SACCARDO, Syll. Fung. 22 : 68, 1913; FITZPATRICK, Mycol. 15 : 61, 1923

Though HÖHNEL (1917a) included the present genus in Diaporthaceae, it apparently does not belong to Diaporthaceae but closely relates to Coronophoraceae. The genus was characterized by the setous perithecia, lysigeneous pore at upper part of perithecium, and long stalked ascus having eight allantoid ascospore (SACCARDO 1913, FITZPATRICK 1923). Pore formed by the collapse of perithecial wall has not been recognized in the member of Diaporthaceae.

2. *Allantoporthe* PETRAK=*Diaporthe* NITSCHKE

3. ***Amphisphaeria*** **CESATI et DE NOTARIS**, Comm. del. Soc. Critt. Ital. I, 4 : 223, 1863; SACCARDO, Syll. Fung. 1 : 718, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 263, 1887; ELLIS & EVERHART, N. Amer. Pyren. 200, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 413, 1897; MUNK, Dsk. Bot. Ark. 15(2) : 100, 1953; 17(1) : 286, 1957; DENNIS, Brit. cup fungi, 203, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 691, 1962

Ascus tip of the present genus is blue-stained with MELZER reagent and furnishes apical plate pierced by a fine pore. This and related genera possess intermediate characters between Diaporthaceae and Xylariaceae; for instance, on the one hand their apical apparatus is much like Diaporthaceae, and on the other hand hymenial structure of perithecial centrum to Xylariaceae or Diatrypaceae. Though DENNIS (1960) placed *Amphisphaeria* and related genera in Diaporthaceae, they are grouped generally into a particular family of Amphisphaeriaceae by these characters (WINTER 1887, LINDAU 1897, ELLIS & EVERHART 1892, MÜLLER & ARX 1962, HINO & KATUMOTO 1964).

In Japan two species of *Amphisphaeria*, namely *A. palmicola* HINO et KATUM. on *Livistoma* and *A. muroiana* HINO et KATUM. on bamboo, were reported by HINO and KATUMOTO (1966) and KATUMOTO (1966). An old species described in Japan, *Amphisphaeria phyllostachydis* HARA on bamboo (HARA 1918b), was excluded from this genus by HINO and KATUMOTO (1965).

4. ***Anisogramma*** **THEISSEN et SYDOW**, Ann. Myc. 14 : 451, 1916; MUNK, Dsk. Bot. Ark. 17(1) : 240, 1957; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 766, 1962

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* On *Phyllostachys bambusoides* SIEB. et ZUCC. (Madake)—Tokuyama-city, Yamaguchi, XI-28, 1954, by I. HINO (HYU-Type).

Type species: *Anisogramma virgultorum* (Fr.) Theiss. et Syd.

Synonym: *Apioporthe* Höhnel, Oster. Bot. Zeit. 57, 1916 (nom. nud.); Ber. Deut. Bot. Ges. 35 : 247, 1917 (nom. nud.); Sitzb. Kais. Akad. Wiss. Wien, Mathem. naturw. Kl. 126 : 381, 1917; Wehmeyer, Univ. Michig. Stud. Sci. Ser. 9 : 218, 1933; Gilman et al., Ia. St. Coll. Jour. Sci. 33 : 333, 1959; Dennis, Brit. cup fungi, 193, 1960

Conidial state: Undetermined.

Both genera *Anisogramma* and *Apioporthe* were established separately at almost the same time. Though Höhnel (1917a) treated *Anisogramma* to be a synonym of *Apioporthe* which was adopted by many later mycologists, nomenclatural priority was of *Anisogramma* as pointed out by Petrak (1934). First the type species was considered to be a member of Dothideales by its well developed stroma; however, more detailed observation on its structure of stroma and perithecia showed that *Sphaeria virgultorum* does not belong to Dothideales but to Sphaeriales (Theissen & Sydow 1915, Höhnel 1917b). Theissen and Sydow (1916) included it in Melogrammataceae. Munk (1957) treated it as a member of Diaporthaceae based on its distinct *Diaporthe*-type centrum of perithecium. Müller and Arx (1962) accepted Petrak's and Munk's opinion.

Anisogramma was characterized by the perithecia formed within compact and *Diatrype*-like stroma, and by apiosporous type of ascospore. According to Müller and Arx (1962), *Anisogramma virgultorum* formed its conidial state on the surface of the stroma. However, its taxonomic position is uncertain and no record has been found of the life-history studies on the fungi belonging to *Anisogramma*. Species of *Apioporthe*, the conidial state of which was proved experimentally by Wehmeyer (1927, 1933), may not belong to *Anisogramma* but to *Cryptodiaporthe* as indicated by Petrak (1934).

5. ***Anisomyces*** **Theissen et Sydow** (non Pilat 1930), Ann. Myc. 12 : 270, 1914; Petrak, Sydowia 1 : 38, 1947; Müller & Arx, Beit. Kryptgfl. Schw. 11(2) : 739, 1962

Type species: *Anisomyces nectrioides* (Rehm) Petrak

Synonym: *Phaeoapiospora* (Sacc. et Syd.) Saccardo, Syll. Fung. 16 : 477, 1902 (subgenus); Theissen & Sydow, Ann. Myc. 13 : 302, 1915

Stegastroma Sydow, Ann. Myc. 14 : 81, 1916

Conidial state: *Biophomopsis* Petrak

This little known genus is a tropic leaf inhabitant. Theissen and Sydow (1914) placed *Anisomyces* in Melogrammataceae. They considered it to be a closely related genus to *Valsaria*. Later, Petrak (1947) critically examined the genus *Anisomyces* and *Phaeoapiospora*, to which Theissen and Sydow (1915) gave indistinct position, and came to the conclusions that the type species of both genera was nothing but the same species, and a specific epithet *nectrioides* (Rehm 1897) was accepted newly instead of *pailloideo-septatus* (Hennings 1904) for the type species of *Anisomyces*, and that the genus *Anisomyces* would be placed in Diaporthaceae as having the conidial state *Biophomopsis* Petrak (1931). *Stegastroma* Syd. was closely related to *Pseudothis* Theiss. et Syd. by Petrak (1941) and was treated later by Müller and Arx (1962) to be a synonym of *Anisomyces* by the complete accordance of the morphological characters with the latter and by common host of both genera.

This genus may be an intermediate form between typical Diaporthaceae and Amphisphaeriaceae, judging from descriptions and figures made by the earlier workers. Asci and paraphyses arranged in a hymenial layer along the perithecial wall in the early young stage are quite similar to those of Amphisphaeriaceae. This hymenial layer solves in later matured stage and asci are loosed irregularly within perithecium. If ascus tip is stained blue with MELZER reagent, it is much like Amphisphaeriaceae. No record was found on iodine reaction of the species belonging to *Anisomyces* and on their conidial state.

6. ***Apiognomonia*** **HÖHNEL**, Ber. Deut. Bot. Ges. 35 : 635, 1917 (nom. nud.); Ann. Myc. 16 : 51, 1918; ARX, Anton. Leauenh. 17 : 266, 1951; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 748, 1962

Type species: *Apiognomonia errabunda* (ROB. ap. DESM.) HÖHNEL

Conidial state: *Discula* SACC.

The present genus was segregated from *Gnomonia* CES. et DE NOT. only by its apiosporous ascospore. MÜLLER and ARX (1962) suggested that ascospore of the present genus showed atypical type of apiospore, and that it might be united again with *Gnomonia* in future. If the ascospore of *Apiognomonia* is a typical apiospore as figured by KLEBAHN (1918), this genus is considered to be acceptable. On the other hand, if its ascospore is not apiosporous but only a variation of normal median septation, it is reunited with *Gnomonia* as suggested by MÜLLER and ARX. Conidial state of the type species of *Apiognomonia* was proved by KLEBAHN (1918) to be *Gloeosporium* sensu lato, and this imperfect state was later transferred to *Discula* SACC. by ARX (1957). This conidial state is common to that of *Gnomonia*.

Gloeosporium nervisequum (FUCK.) SACC., which was recorded from Japan as causal agent of anthracnose of plane tree (NAMBU 1917), was also treated as a synonym of *Discula quercina* (WEST.) ARX, the imperfect state of *Apiognomonia errabunda*, by ARX (1957).

7. *Apioporthe* HÖHNEL = *Anisogramma* THEISSEN et SYDOW

8. ***Apioporthella*** **PETRAK**, Ann. Myc. 27 : 401, 1929; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 759, 1962

Type species: *Apioporthella bavarica* PETRAK

Conidial state: Unknown.

This genus is characterized by the poorly developed stroma much like *Cryptodiaporthe* as well as the apiosporous ascospore (PETRAK 1929, 1934). WEHMEYER (1933) incorrectly accepted the concept of the genus *Apioporthe* (= *Anisogramma*) and included several species of *Cryptodiaporthe* and *Apioporthella bavarica* in *Apioporthe*. However, as pointed out already (PETRAK 1929, 1934), *Apioporthe* (= *Anisogramma*) differs from *Apioporthella* by its well developed stroma in which perithecia are entirely embedded. Then, the genus *Apioporthella* is accepted to be an independent genus in Diaporthaceae, if it has true apiospore. As life-history of the present genus has not been examined hitherto, determination of conidial state is needed to confirm its relation to the other genera of Diaporthaceae.

9. ***Apiorhynchostoma*** **PETRAK**, Ann. Myc. 21 : 185, 1923; DENNIS, Brit. cup fungi, 204, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 706, 1962

This genus does not belong to Diaporthaceae but to Amphisphaeriaceae by its structure of perithecial centrum and ascus, though DENNIS (1960) included this genus in Diaporthaceae. According to MÜLLER and ARX (1962), the type species of the genus furnishes germ-pore on ascospore.

10. ***Apiospora*** **SACCARDO**, Consp. Gen. Pyren. 9, 1875; Syll. Fung. 1 : 539, 1882; ELLIS & EVERHART, N. Amer. Pyren. 311, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 430, 1897; DENNIS,

Brit. cup fungi, 200, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2): 739, 1962

LINDAU's inclusion (1897) of the present genus in Pleosporaceae was revised by PETRAK (1925) and DENNIS (1960); they transferred it to Diaporthaceae based on its unitunicate ascus. However, it does not belong to Diaporthaceae but to Amphisphaeriaceae by its structure of perithecial centrum which is much like *Amphisphaeria*.

In Japan, a species of *Apiospora*, *A. shiraiana* (MIYAKE et HARA) HARA, was described on bamboo as having the conidial state *Coniosporium shiraiana* BUB. (MIYAKE & HARA 1910, HARA 1954).

11. *Apiosporosis* (TRAVERSO) MARIANI＝*Sphaerognomonia* POTEBNIA

12. *Aporhytisma* HÖHNEL＝*Diaporthopsis* FABRE

13. ***Bagcheea* MÜLLER et MENON** See page 147

14. *Batschiella* KIRSCHSTEIN＝*Diaporthopsis* FABRE

15. *Bioporthe* PETRAK＝*Plagiostigme* SYDOW

16. *Boydia* SMITH＝*Vialaea* SACCARDO

17. *Calospora* NITSCHKE apud FUCKEL (non SACCARDO)＝*Melanconis* TULASNE

18. *Calospora* SACCARDO (non NITSCHKE ap. FUCKEL)＝*Prosthecium* FRESENIUS

19. *Calosporella* SCHROETER＝*Prosthecium* FRESENIUS

20. *Caudospora* STÄRBACK＝*Hercospora* FRIES

21. *Ceratoporthe* PETRAK＝*Hercospora* FRIES

22. ***Ceratosphaeria* NIESSEL**, Verh. Naturf. Ver. Brunn. 14: 208, 1876; SACCARDO, Syll. Fung. 2: 227, 1883; ELLIS & EVERHART, N. Amer. Pyren. 197, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1: 407, 1897; MUNK, Dsk. Bot. Ark. 15(2): 68, 1953; 17(1): 190, 1957; DENNIS, Brit. cup fungi, 207, 1960

MUNK (1953, 1957) included *Ceratostomella* and allied genera in Diaporthaceae and newly established a subfamily Rhamphorioideae. However, this inclusion of genera in Diaporthaceae is not accepted. Common character of these genera is the persistent hymenial layer along the perithecial wall with asci and paraphyses. If ascus tip reacted to MELZER reagent, they may belong to Amphisphaeriaceae. If they have ascus unstained blue with iodine, a small family could be set up for them in Sphaeriales. Conidial connection of these genera has not been recorded, so far as the author is aware. Further study on the life-history and cultural character of these fungous groups is needed to determine their precise systematic position.

The present genus is characterized by scolecosporous ascospore and persistent hymenial layer formed in perithecium. It is excluded from Diaporthaceae for the reason mentioned above.

23. ***Ceratostomella* SACCARDO**, Mich. 1: 370, 1878; Syll. Fung. 1: 408, 1882; WINTER, Rabh. Kryptgfl. I, 2: 249, 1887; ELLIS & EVERHART, N. Amer. Pyren. 194, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1: 406, 1897; MUNK, Dsk. Bot. Ark. 15(2): 68, 1953; DENNIS, Brit. cup fungi,

207, 1960

The reason mentioned in the note of *Ceratosphaeria* explains why the present genus is also excluded from Diaporthaceae. This is characterized by hyaline, unicellular and elliptic ascospore and hymenial layer with asci and paraphyses along perithecial wall. Though ARX and MÜLLER 1954) treated it as a synonym of *Endoxyla* FUCK. having allantoid ascospore, it is retained as an independent genus on account of the difference in the shape of ascospore (see *Endoxyla*, page 186).

All species of *Ceratostomella* recorded from Japan do not belong to this genus but to *Ceratocystis* or *Ophiostoma*.

24. ***Ceriophora*** **HÖHNEL**, Sitzb. Kais. Akad. Wiss. Wien, Math. naturw. Kl. 128 : 586, 1919; MUNK, Dsk. Bot. Ark. 17(1) : 176, 1957; DENNIS, Brit. cup fungi, 203, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 689, 1962

This genus apparently belongs to Amphisphaeriaceae by reason of its hymenial type of perithecial centrum and reaction of ascus tip stained blue with iodine (HÖHNEL 1919, MÜLLER & ARX 1962), though DENNIS (1960) included it in Diaporthaceae.

25. *Ceuthocarpon* KARSTEN = *Linospora* FUCKEL

26. *Chalcosphaeria* HÖHNEL = *Plagiostoma* FUCKEL

27. *Chorostate* (SACCARDO) TRAVERSO = *Diaporthe* NITSCHKE

28. *Chorostella* (SACCARDO) CLEMENTS et SHEAR = *Cryptodiaporthe* PETRAK

29. *Clypeocarpus* KIRSCHSTEIN = *Mazzantia* MONTAGNE

30. *Clypeoporthe* HÖHNEL = *Diaporthe* NITSCHKE

31. *Clypeoporthella* PETRAK = *Diaporthopsis* FABRE

32. *Clypeorhynchus* KIRSCHSTEIN = *Diaporthe* NITSCHKE

33. ***Clypeosphaeria*** **FUCKEL**, Jahrb. Nass. Ver. Naturk. 23/24 : 117, 1870; SACCARDO, Syll. Fung. 2 : 90, 1883, WINTER, Rabh. Kryptgfl. I, 2 : 562, 1887; ELLIS & EVERHART, N. Amer. Pyren. 409, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 453, 1897; MUNK, Dsk. Bot. Ark. 17(1) : 122, 1957; DENNIS, Brit. cup fungi, 203, 1960

The present genus having phragmosporous ascospore may belong to Xylariaceae or Diatrypaceae since its perithecia have coriaceous wall and clypeus, though DENNIS (1960) tentatively placed it in Diaporthaceae.

In Japan, two species of this genus, *Clypeosphaeria hottai* HARA on *Thea* and *C. japonica* HARA on *Camellia*, were described by HARA (1954).

34. *Clypeotrabutia* CHARDON = *Ophiodothella* (HENNINGS) HÖHNEL

35. *Cryphonetria* SACCARDO = *Endothia* FRIES

36. *Cryptoderris* AUERSWALD = *Pleuroceras* RIESS

37. ***Cryptodiaporthe*** **PETRAK** See page 49

38. *Cryptonectriopsis* HÖHNEL=*Heteropera* THEISSEN

39. *Cryptospora* TULASNE (non KIRLIN et KIRILOW)=*Ophiovalsa* PETRAK

40. ***Cryptosporella*** **SACCARDO** See page 174

41. ***Cytomelanconis*** **NAOUMOFF**, Not. Syst. Sect. Inst. Bot. Acad. Sci. USSR 7 : 108, 1951; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 783, 1962
Type species: *Cytmelanconis systema solare* NAOUM.
Conidial state: *Cytospora* EHRH.

According to MÜLLER and ARX (1962), the present genus was established for a fungus on *Salix*, which was much like *Melanconis* but differed from the latter by its *Cytospora* type of conidial state. As pointed out by them, it is necessary to confirm whether the conidial state found by NAOUMOFF belongs to true *Cytospora* or not.

42. ***Debaryella*** **HÖHNEL**, Ann. Myc. 2 : 274, 1904; MUNK, Dsk. Bot. Ark. 17(1) : 137, 1957

The present genus is characterized by the perithecium having soft and fleshy wall, and phragmosporous ascospore. Although HÖHNEL placed it is Hypocreaceae, its structure of perithecial centrum is quite similar to the genera belonging to Amphisphaeriaceae, judging from HÖHNEL's and MUNK's descriptions. Though MUNK (1957) placed it in subfamily Rhamphorioideae of Diaporthaceae, this subfamily is not accepted as a member of Diaporthaceae, and, therefore, the genus *Debaryella* is excluded from Diaporthaceae.

43. ***Diapleella*** **MUNK**, Dsk. Bot. Ark. 15(2) : 74, 1953; 17(1) : 208, 1957

The present genus was established by MUNK (1953) based on a fungus hitherto known as *Leptosphaeria olivensis* (BERK. et BR.) SACC. and placed in the family Diaporthaceae. As is evident from the note and figure by MUNK (1953, 1957) and DENNIS (1960), this monotypic genus belongs neither to the genus *Leptosphaeria* having bitunicate ascus nor to Diaporthaceae. Its long stalked ascus and persistent hymenial layer suggest that it closely relates to family Diatrypaceae. It is, therefore, not accepted to be a member of Diaporthaceae sensu stricto.

44. ***Diaporthe*** **NITSCHKE** See page 62

45. ***Diaporthella*** **PETRAK**, Ann. Myc. 22 : 30, 1924; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9 : 216, 1933; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 764, 1962
Type species: *Diaporthella aristata* (FR.) PETRAK
Conidial state: Unknown.

Diaporthella was characterized by the well developed stroma entirely composed of fungous tissue (PETRAK 1924, WHEMEYER 1933, MÜLLER & ARX 1962). Superficially it is somewhat like Diatrypaceae, but differs from the latter family in its apparent *Diaporthe*-type structure of perithecial centrum. Species of *Diaporthella* forms blackened zone within bark and wood, and closely relates to the genus *Diaporthe*, though it is apparently differentiated from the latter by the type of stroma. No conidial state was reported on this genus.

46. ***Diaporthopsis*** **FABRE**, Ann. Sci. Nat. VI, 15 : 35, 1883; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 9 : 229, 1933; MUNK, Dsk. Bot. Ark. 15(2) : 88, 1953; ARX & MÜLLER, Beit. Kryptgfl.

Schw. 11(1) : 370, 1954; GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 331, 1959; DENNIS, Brit. cup fungi, 193, 1960

Type species: *Diaporthopsis angelicae* (BERK.) WEHM.

Synonym: *Aporhytisma* HÖHNEL, Ann. Myc. 15 : 318, 1917; PETRAK, Ann. Myc. 25 : 213, 1927
Clypeoporthella PETRAK, Ann. Myc. 22 : 149, 1924
Batschiella KIRSCHSTEIN, Kryptgfl. Markbrdbg. VII, 3 : 324, 1938

Conidial state: *Phomopsis* SACC. or *Placosphaeria* SACC.

The present genus is distinguishable from *Diaporthe* only by its unicellular ascospore (WEHMEYER 1933). *Aporhytisma*, which was first placed in Phacidiaceae by HÖHNEL (1917c), was critically studied by PETRAK (1927) and transferred to Diaporthaceae by reason of its centrum structure of perithecium. As mentioned by ARX and MÜLLER (1954), it is quite accordant with the older genus *Diaporthopsis*. The genus *Clypeoporthella* is characterized by the formation of clypeus within epidermal layer (PETRAK 1924). ARX and MÜLLER (1954) denied the independency of *Clypeoporthella* on grounds that formation of clypeus in epiderm is commonly recognized among the species of *Diaporthopsis*, and that the conidial state of *Clypeoporthella* belongs to *Phomopsis* as that of *Diaporthopsis*. Inclusion of *Batschiella lysimachiae* KIRSCHST. to *Diaporthopsis kriegeriana* (REHM) HÖHN. (HÖHNEL 1918)=*Clypeoporthella kriegeriana* (REHM) PETR. (PETRAK 1940) resulted from the reexamination of the type material of both species by ARX and MÜLLER (1954).

MUNK's opinion (1957) that *Diaporthopsis* would be regarded a member of *Diaporthe arctii* group seems to be acceptable on the hand; on the other hand his treatment increases difficulties in identifying the species of *Diaporthe*. Hence, *Diaporthopsis* is retained here as a genus closely related to *Diaporthe*.

Form-genera *Phomopsis* SACC. and *Placosphaeria* SACC. were presumably related to *Diaporthopsis* by PETRAK (1924, 1927), WEHMEYER (1933), and ARX and MÜLLER (1954), but not proved experimentally.

47. ***Diatractium*** **SYDOW**, Ann. Myc. 18 : 183, 1920; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 734, 1962

Type species: *Diatractium cordiana* (ELL. et KELS.) SYD.

Synonym: *Trabutiella* STEV., Bot. Gaz. 70 : 401, 1920 (non THEISSEN et SYDOW 1915).
Stevensiella TROTT. ap. SACC., Syll. Fung. 24 : 808, 1928

Conidial state: Unknown.

The present leaf inhabitant is characterized by dumbbell-shaped or double-clavatee ascospore, horizontally placed perithecia within loose stroma, and lateral neck of perithecium. It is similar to *Pleuroceras* RIESS and *Vialaea* SACC. in its shape of ascospore. *Vialaea* inhabiting bark of woody plants differs from the present genus by its erect perithecium. *Pleuroceras* is also characterized by the horizontal perithecium in leaf tissue, but it differs from *Diatractium* by its solitarily embedded perithecium without stroma tissue.

The genus *Trabutiella* STEV. published in 1920 was altered to *Diatractium* by SYDOW (1920), because the name *Trabutiella* could not be used for the earlier genus *Trabutiella* THEISS. et SYD. published in 1915 (THEISSEN & SYDOW 1915). Similar treatment to change the genus name to *Stevensiella* by TROTTER and SACCARDO (SACCARDO 1928) was apparently invalidated by SYDOW's earlier treatment. According to SYDOW (1920), STEVENS mistakenly counted the number of ascospores to be sixteen in each ascus by the collapse of eight ascospores into sixteen cells. Although MÜLLER and ARX (1962) regarded *Scolecodothopsis* STEV. to be synonymous with *Diatractium*, it is rather similar to *Ophiodothella* (HENN.) HÖHNEL by its shape of ascospore. According to STEVENS' description and figure (STEVENS 1923), ascospore of *Scolecodothopsis* was not dumbbell shape but typical scolecospore (see also *Ophiodothella*, page 191).

A fungus collected on *Ficus* in Japan was first described as *Auerswaldia microthyrioides* HENN. and later transferred to the genus *Trabutiella* THEISS. et SYD. (HENNINGS 1904, SACCARDO 1905, THEISSEN & SYDOW 1915, SHIRAI & MIYAKE 1917). This fungus was recently treated as a synonym of *Phyllachora ficuum* NIESSL by MÜLLER and ARX (1962), and does not belong to the genus discussed above.

48. ***Dictyoporthe*** **PETRAK**, Sydowia 9 : 556, 1955
Type species: *Dictyoporthe ahmadii* PETRAK
Conidial state: Unknown.

This is distinguishable from *Phragmodiaporthe* WEHM. only by its dictyosporous ascospore. PETRAK (1955) observed only one indistinct septum formed in longitudinal or oblique direction. If it has true longitudinal septum, to maintain it as an independent genus of Diaporthaceae is acceptable; and if not so, it should be included as a synonym of *Phragmodiaporthe* WEHM. or *Phragmoporthe* PETR.

49. ***Diplacella*** **SYDOW**, Ann. Myc. 28 : 101, 1930; ARX, Anton. Leauenh. 17 : 67, 1951; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 368, 1954
Type species: *Diplacella mararyensis* (HENN.) ARX et MÜLLER
Conidial state: Unknown.

This genus based on a fungus causing leaf spot of tropical plants (SYDOW 1930) is similar to *Gnomoniella* SACC. and *Sphaerognomonia* POTEB. in its developmental type of perithecium. It differs from *Gnomoniella* by its entirely embedded perithecia within loose stroma and short neck. *Sphaerognomonia* is distinguishable from *Diplacella* by its only poorly developed clypeus above the perithecium. Whether it is really close to both these genera or not is uncertain, and will so remain until the conidial state of these fungi is confirmed in further study.

50. *Discodiaporthe* PETRAK=*Melanconis* TULASNE

51. ***Ditopella*** **DE NOTARIS**　See page 156

52. ***Ditopellina*** **REID et BOOTH**, Can. Jour. Bot. 45 : 1481, 1967
Type species: *Ditopellina saccardiana* (TRAV. et SPESSA) REID et BOOTH
Conidial state: Unknown.

The genus *Ditopellina* was based on the fungus hitherto known as *Cryptospora saccardiana* on *Cinnamomum* (REID & BOOTH 1967). It has scolecosporous ascospore as *Cryptospora* (=*Ophiovalsa*). Chief criteria to segregate it from *Cryptospora* are the presence of stroma entirely enveloping several perithecia, and short ostiole not-confluent as that of *Ophiovalsa*. Relationship of conidial state among these allied genera is not clear. Further study is needed to confirm the life-history of *Ditopellina*, *Ophiovalsa* and related genera.

53. ***Ditopellopsis*** **REID et BOOTH**　See page 47

54. ***Dothivalsaria*** **PETRAK**, Sydowia 19 : 283, 1966
Type species: *Dothivalsaria magalospora* (AUERSW.) PETRAK

Coninial state: Unknown.

The present genus was established by PETRAK (1966) for *Valsaria megalospora* AUERSW., which was considered by MÜLLER and ARX (1962) as a second species of *Massariovalsa* SACC., a member of Diaporthaceae. According to him, the fungus has characteristics similar to Sphaeriales on the one hand and to Dothideales on the other hand, so that systematic position of this genus is quite indistinct. If the fungus has characteristics as described by PETRAK, it does not belong to Diaporthaceae. Precise position of the fungus can be determined only through further morphologic and cultural studies on many fresh materials.

55. ***Enchnoa*** **FRIES**, Sum. Veg. Scand. 393, 1849; SACCARDO, Syll. Fung. 1 : 89, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 536, 1887; ELLIS & EVERHART, N. Amer. Pyren. 735, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 444, 1897; MUNK, Dsk. Bot. Ark. 17(1) : 220, 1957; DENNIS, Brit. cup fungi, 188, 1960

Systematic position of the genus *Enchnoa* having allantoid ascospore is still uncertain. It may, however, belong to Coronophoraceae, though it was included in Diaporthaceae by MUNK (1957), in Diatrypaceae by DENNIS (1960) and in Calosphaeriaceae by HÖHNEL (1909). It has no distinct preliminary ostiole, and black elastic wall of perithecium. Therefore, it is excluded here from the family Diaporthaceae.

56. ***Endothia*** **FRIES** See page 132

57. ***Endoxyla*** **FUCKEL**, Symb. Myc. Nacht. 1 : 321, 1871; SACCARDO, Syll. Fung. 1 : 181, 1882; ELLIS & EVERHART, N. Amer. Pyren. 519, 1892; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 353, 1954; MUNK, Dsk. Bot. Ark. 17(1) : 195, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 332, 1959; DENNIS, Brit. cup fungi, 188, 1960

The genus *Endoxyla* is characterized by allantoid and brown ascospore, presistent hymenial layer along perithecial wall with asci and paraphyses, and black coriaceous wall of perithecium. This concept is appreciably different from that given by ARX and MÜLLER (1954) who combined *Ceratostomella* SACC. with *Endoxyla*. *Endoxyla* sensu stricto excluding *Ceratostomella* is unlike Diaporthaceae. It may belong to Diatrypaceae or Xylariaceae.

58. ***Fenestella*** **TULASNE**, Sel. Fung. Carp. 2 : 208, 1863; SACCARDO, Syll. Fung. 2 : 325, 1883; WINTER, Rabh. Kryptgfl. I, 2 : 792, 1887; ELLIS & EVERHART, N. Amer. Pyren. 543, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 467, 1897; GILMAN et al., Ia. St. Coll. Jour. Sci. 31 : 633, 1957; MUNK, Dsk. Bot. Ark. 17(1) : 412, 1957; DENNIS, Brit. cup fungi, 256, 1960

Fenestella was characterized in earlier times as the phaeodictyosporous genus having *Valsa*-type perithecia, and included in Valsaceae (WINTER 1887, LINDAU 1897, SACCARDO 1899). However, it was later transferred to Ascoloculares on account of its structure of perithecial centrum and bitunicate ascus (MUNK 1957, DENNIS 1960).

59. *Flageoletia* (SACCARDO) HÖHNEL=*Phomatospora* SACCARDO

60. *Gaeumannomyces* ARX et OLIVIER=*Linocarpon* SYDOW

61- ***Gibellia*** **SACCARDO**, Att. d. R. Ist. Venet. d. Venez. VIa, 3 : 723, 1885; Syll. Fung. 9 : 608, 1891; LINDAU, Engl. Naturl. Pflfam. I, 1 : 478, 1897; THEISSEN & SYDOW, Ann. Myc. 13 : 185, 1915; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 374, 1954

Type species: *Gibellia dothideoides* SACC. et BERL.
Conidial state: Unknown.

The present genus was established by SACCARDO (1891) as a "sphaerialer" genus. HÖHNEL (1912) suggested that it belonged to Diaporthaceae and was not different from *Mazzantia* MONT. THEISSEN and SYDOW (1915) recognized an independency of both genera *Mazzantia* and *Gibellia* based on their structure of stroma and perithecium. The genus *Gibellia* was fully redescribed by ARX and MÜLLER (1954) with some amendment to original description (SACCARDO 1891). Its characters represented by conspicuous development of stroma within bark and wood tissue are similar to those of *Ditopellopsis* REID et BOOTH excepting its unicellular ascospore. Affinity between both genera is, however, unconfirmed because of the uncertainty about their conidial state.

62. ***Gnomonia*** **CESATI et DE NOTARIS** See page 162

63. ***Gnomoniella*** **SACCARDO** See page 172

64. *Gnomonina* HÖHNEL＝*Plagiostoma* FUCKEL

65. *Gnomoniopsis* BERLESE＝*Gnomonia* CESATI et DE NOTARIS

66. ***Griphosphaeria*** **HÖHNEL,** Ann. Myc. 16 : 87, 1918; MUNK, Dsk. Bot. Ark. 17(1) : 180, 1957; DENNIS, Brit. cup fungi, 199, 1960

This genus was tentatively included in Diaporthaceae by DENNIS (1960). However, it does not belong to Diaporthaceae but to Amphisphaeriaceae as evidenced by the nature of ascus tip stained blue with iodine (HÖHNEL 1918, DENNIS 1960) and structure of perithecial centrum.

67. ***Hercospora*** **FRIES,** Syst. Orbis Veget. 119, 1825; Sum. Veg. Scand. 397, 1849; PETRAK, Ann. Myc. 36 : 55, 1938; DENNIS, Brit. cup fungi, 195, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 724, 1962

Type species: *Hercospora tiliae* (PERS. ex FR.) FRIES
Synonym: *Hercospora* TUL., Sel. Fung. Carp. 2 : 154, 1863; SACCARDO, Syll. Fung. 1 : 605, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 715, 1887
Caudospora STÄRB., Vetensk. Akad. Handl. 15 : 11, 1889; LINDAU, Engl. Naturl. Pflfam. I, 1 : 465, 1897; MUNK, Dsk. Bot. Ark. 15(2) : 84, 1953; 17(1) : 246, 1957; DENNIS, Brit. cup fungi, 194, 1960
Ceratoporthe PETRAK, Ann. Myc. 23 : 14, 1925
Conidial state: *Rabenhorstia* FRIES

The present genus has been differentiated from *Diaporthe* in its well developed stroma within bark tissue, black zone delimiting entirely each perithecial pustule, and conidial state to which experimental proof was lacking. The genus *Ceratoporthe* was based on a *Diaporthe*-like fungus having a septum of ascospore at lower one-third (PETRAK 1925, 1959). MÜLLER and ARX (1962) extended PETRAK's concept on *Hercospora* (PETRAK 1938) to include *Ceratoporthe* and treated the latter as a synonym of the former genus. Basis given by them is that ascospore of *Ceratoporthe* is not apiosporous but didymosporous. *Caudospora* STÄRB. was established for a fungus having many appendages at the ends and around the septum of ascospore. Difference of the position furnishing appendage seems to be invalid to separate genera. Type species of *Caudospora* was included in the genus *Diaporthe* by WEHMEYER (1933), but PETRAK (1938) and MÜLLER and ARX (1962) considered it to be a species of *Hercospora*. It is apparently different from *Diaporthe*, but it is uncertain whether *Caudospora taleola* (FR.) STÄRB. is typical *Hercospora* or not, so far as can be judged from the description and figure by PETRAK (1938) and MÜLLER and ARX (1962). However, the author follows tentatively the reasoning of PETRAK and that of MÜLLER and ARX by whom *Ceratoporthe* and *Caudospora* were treated as the synonym of *Hercospora*. Conidial state of the type species of *Hercospora* was asserted to be *Rabenhorstia* (PETRAK 1938), but this needs to be proved experimentally.

68. *Hercospora* TULASNE=*Hercospora* FRIES

69. ***Heteropera* THEISSEN**, Ann. Myc. 14 : 423, 1916; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 359, 1954; PETRAK, Sydowia 14 : 347, 1960
Type species: *Heteropera borealis* (SACC.) THEISS.
Synonym: *Cryptonectriopsis* HÖHNEL, Ann. Myc. 17 : 131, 1919; ARX, Anton. Leauenh. 17 : 205, 1951
Paramazzantia PETRAK, Ann. Myc. 25 : 233, 1927
Conidial state: Unknown.

THEISSEN (1916) included *Heteropera* in Coronophoraceae, but ARX and MÜLLER (1954) proved that it belonged to Diaporthaceae based on reexamination of the type material. *Heteropera* is characterized by the black sclerotioid stroma enveloping separate perithecium and hyalosporous type of ascospore. It is somewhat similar to *Mamianiella* HÖHN. inhabiting leaf, but it differs from the latter by its short and non-projecting neck, and solitarily embedded perithecium. *Mazzantia* MONT. is also similar to *Heteropera* but is distinguishable from the latter by the lack of basal crust and aggregated perithecia in one stroma.

Cryptonectriopsis established by HÖHNEL (1918, 1919) was described as a hyperparasite belonging to Diaporthaceae owing to the presence of the crust around perithecium. ARX and MÜLLER (1954) believed that HÖHNEL mistakenly observed the state of stroma and wall of perithecium and treated *Cryptonectriopsis biparasitica* HÖHNEL as a synonym of *Heteropera borealis* (SACC.) THEISS. On the other hand, PETRAK (1960) supported HÖHNEL's opinion and denied the treatment by ARX and MÜLLER to be incorrect, based on his examination of the authentic specimens of *Cryptonectriopsis biparasitica* and *Heteropera borealis*. He conclusively stated from this examination that the genus *Heteropara* THEISS. would be denied, therefore *Cryptonectriopsis* HÖHN. was revived. The author has no data as to whether the fungi in question are real hyperparasite or not. The genus *Heteropera* is provisionally accepted here under the sense of ARX and MÜLLER (1954), because no hyperparasitic species is known in Diaporthaceae up to the present time. ARX and MÜLLER's treatment including *Paramazzantia* in *Heteropera* is supported so far as can be judged from PETRAK's original description (1927).

70. *Hypospila* (FRIES) HÖHNEL=*Hypospilina* (SACCARDO) TRAVERSO

71. ***Hypospilina* (SACCARDO) TRAVERSO**, SACCARDO, Syll. Fung. 2 : 191, 1883 (subgenus); TRAVERSO, Fl. Ital. Critt. 1 : 495, 1913; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 781, 1962
Type species: *Hypospilna bifrons* (DC.) TRAV.
Synonym: *Hypospila* auct. (non FRIES 1825); SACCARDO, Syll. Fung. 2 : 189, 1883, WINTER, Rabh. Kryptgfl. I, 2 : 564, 1887; ELLIS & EVERHART, N. Amer. Pyren. 412, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 453, 1897; MUNK, Dsk. Bot. Ark. 15(2) : 77, 1953; 17(1) : 217, 1957; DENNIS, Brit. cup fungi, 205, 1960
Conidial state: Unknown.

HÖHNEL (1918) pointed out that the type species of *Hypospila* FRIES was invalid and impossible to keep as a distinct species, consequently he authorized FRIES's second series *Hypospila bifrons* (D.C) FR. to be the type for the genus *Hypospila*. However, TRAVERSO (1913) gave the genus rank to the subgenus Hypospilina SACC. of the genus *Hypospila* based on *H. bifrons*. As this treatment has nomenclatural priority, *Hypospila* FR. emend HÖHN. was included as a synonym of *Hypospilina* (SACC.) TRAV. (PETRAK & SYDOW 1923, MÜLLER & ARX 1962).

This leaf inhabiting genus is characterized by the horizontally lying perithecium, dark crust enveloping perithecium and leaf tissue around the perithecium, lateral neck not projecting from the leaf surface, and apiosporous ascospore. The present genus seems to be closely related to some leaf inhabiting genera, such as *Mamiania*, *Mamianiella*, *Lambro*, *Stegophora*, etc. Affinity among these genera could be confirmed through detailed life-historical and ecological studies.

72. *Khekia* PETRAK=*Pseudovalsa* CESATI et DE NOTARIS

73. *Laestadia* AUERSWALD=*Plagiostoma* FUCKEL

74 ***Lambro*** **RACIBORSKI**, Parasit. Algen u. Pilze Javas 2 : 13, 1900; MÜLLER & ARX, Beit. Schw. 11(2) : 775, 1962

Type species: *Lambro insignis* RACIB.

Synonym: *Metadothella* HENN., Hedw. 43 : 384, 1904; SACCARDO, Syll. Fung. 18 : 167, 1906

Conidial state: Unknown.

According to MÜLLER and ARX (1962), this genus is characterized by the campact stroma entirely enveloping perithecia and apiosporous ascospore. They included *Stegophora* SYD. and *Metadothella* HENN. in this genus as the synonyms. Among them, *Stegophora* was treated by the author to be an independent genus of Diaporthaceae (see the note on *Stegophora*, page 149). Though MÜLLER and ARX did not mention whether they examined material of *Metadothella* or not, inclusion of *Metadothella* in *Lambro* is tentatively accepted here. HENNINGS' description and figure (1904) indicate that it is somewhat different from *Lambro* in its morphological characters.

75. ***Lentomita*** **NIESSL**, Not. U. Pyren. 44, 1876; SACCARDO, Syll. Fung. 1 : 584, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 255, 1887; ELLIS & EVERHART, N. Amer. Pyren. 200, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 406, 1898; MUNK, Dsk. Bot. Ark. 15(2) : 68, 1953; 17(1) : 191, 1957; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 583, 1962

The present genus does not belong to Diaporthaceae as is evidenced by its hymenial development along perithecial wall with apparent persistent paraphyses and asci, though MUNK (1953, 1957) included it in his subfamily Rhamphorioideae of Diaporthaceae. MÜLLER and ARX (1962) considered it to be a member of Sphaeriaceae.

76. ***Leucostoma*** **(NITSCHKE) HÖHNEL** See page 124

77. ***Linocarpon*** **SYDOW** See page 158

78. ***Linospora*** **FUCKEL**, Jahrb. Nass. Vereins. Vereins. f. Naturk. 23/123, 1870; SACCARDO, Syll. Fung. 2 : 354, 1883; WINTER, Rabh. Kryptgfl. I, 2 : 567, 1887; ELLIS & EVERHART, N. Amer. Pyren. 411, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 454, 1897; ARX & OLIVIER, Trans. Brit. Myc. Soc. 35 : 30, 1951; MUNK, Dsk. Bot. Ark. 15(2) : 76, 1953; 17(1) : 216, 1957; DENNIS, Brit. cup fungi, 207, 1960

Type species: *Linospora capreae* (DC.) FUCK.

Sononym: *Ceuthocarpon* KARST., Mycol. Fenn. 2 : 459, 1873

? *Phoma* FRIES, in HÖHNEL, Ber. Deut. Bot. Ges. 35 : 636, 1917; Ann. Myc. 16 : 98, 1918

Conidial state: Unknown.

The present genus is characterized by horizontally lying perithecia with clypeus-like stroma, lateral neck protruding from leaf surface, and scolecosporous ascospore. It seems to be similar to *Plagiosphaera* PETR., but it differs from the latter in having no stroma and non-protruding neck. HÖHNEL (1918) accepted *Phoma* FRIES instead of *Linospora*, because the first species of *Phoma*, *P. saligena* FRIES, is the young immature state of *Linospora capreae*. However, this treatment is denied due to the uncertainty of identification on immature fungus, as already pointed out by THEISSEN and SYDOW (1917) and ARX (1951).

Type species of *Ceuthocarpon* KARST., *C. populinum* (PERS.) KARST., was transferred to the older genus *Linospora* by SACCARDO (1883) and this treatment was accepted by later mycologists excepting HÖHNEL (1917a), who recognized it to be an independent genus in Diaporthaceae. It seems to be apparent that there is no reason to divide both genera *Linospora* and *Ceuthocarpon*.

79. *Macrodiaporthe* PETRAK = *Melanconis* TULANSNE

80. ***Maireomyces*** **FELDMANN**, Bull. Soc. Hist. Nat. Afr. Nord 31 : 163, 1940; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 392, 1954

It is quite uncertain whether this genus having large scolecosporous ascospore belongs to Diaporthaceae or not. Though ARX and MÜLLER (1954) stated that it presumably belonged to Diaporthaceae, it seems to be unlikely that the fungus inhabiting marine algae is a true member of family.

81. ***Mamiania*** **CESATI et DE NOTARIS** See page 173

82. ***Mamianiella*** **HÖHNEL** See page 167

83. ***Massariella*** **SPEGAZZINI**, Ann. Soc. Cient. Argent. IV, 9 : 192, 1880; SACCARDO, Syll. Fung. 1 : 716, 1882; WINTER, Rabh. Kryptgfl- I, 2 : 538, 1887; ELLIS & EVERHART, N. Amer. Pyren. 405, 1892; MUNK, Dsk. Bot. Ark. 17(1) : 423, 1957; DENNIS, Brit. cup fungi, 202, 1960

This genus does not belong to Diaporthaceae but to Amphisphaeriaceae. Ascus tip is blue-stained with MELZER reagent (DENNIS 1960) and solitarily embedded perithecium is filled with a hymenial layer along the wall with asci and long paraphyses.

84. ***Massariovalsa*** **SACCARDO**, Mich. 2 : 569, 1882; Syll. Fung. 2 : LV, 1883; ELLIS & EVERHART, N. Amer. Pyren. 408, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 445, 1897; WEHMEYER, Amer. Jour. Bot. 26 : 831, 1939; PETRAK, Sydowia 6 : 284, 1952; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 728, 1962

Type species: *Massariovalsa sudans* (BERK. et CURT.) SACC.

Conidial state: *Melanconiopsis* ELL. et EV.

This genus is characterized by the valsoid perithecia, phaeodidymous ascospore with gelationous envelope, epispore, large asci loosed in perithecium at full maturity, and paraphysoides conglutinated in later stage. WEHMEYER (1939) proved through his cultural studies that *Massariovalsa sudans* was the perfect state *Melanconiopsis inquinans* ELL. et EV. Later (1941) he treated *Massariovalsa* as a subgenus of *Melanconis* based on the similarity of structure and developmental type of perfect state between both genera. Imperfect state of *Melanconis* is *Melanconium* forming conidia on acervulus, which is distinguishable from *Melanconiopsis* producing conidia in locules. On the other hand, PETRAK (1952b) rejected WEHMEYER's opinion and he included *Massariovalsa* in Massariaceae which had bitunicate ascus and belonged to Ascoloculares, based on the similarity of imperfect state to that of *Massariella* (=*Pteridiospora*). MÜLLER and ARX (1962) also contended *Massariovalsa* to be a separate genus from *Melanconis* but they included it in Diaporthaceae on grounds that ascus of *Massariovalsa* was not bitunicate but unitunicate, and conidial state was rather similar to that of *Melanconis*. Recently, PETRAK (1966) again opposed MÜLLER and ARX, and persisted in holding his previous opinion. Precise systematic position of *Massariovalsa* would be determined through morphologic and cultural studies.

85. ***Mazzantia*** **MONTAGNE**　See page 154

86. *Melanconidium* KUNTZE=*Melanconis* TULANSNE

87. *Melanconiella* SACCARDO=*Melanconis* TULANSNE

88. ***Melanconis*** **TULASNE**　See page 9

89. *Melanopelta* KIRSCHSTEIN=*Gnomonia* CESATI et DE NOTARIS

90. *Melanoporthe* WEHMEYER=*Diaporthe* NITSCHKE

91. *Metadothella* HENNINGS=*Lambro* RACIBORSKI

92. *Microphiodothis* SPEGAZZINI=*Ophiodothella* (HENNINGS) HÖHNEL

93. *Neokeissleria* PETRAK=*Melanconis* TULASNE

94. ***Neozimmermannia*** **KOORDERS**, Verh. Akad. Wetensch. Amsterd. II, 13(4) : 59, 1907; SACCARDO, Syll. Fung. 22 : 70, 1913

The present genus was originally described as a member of Gnomoniaceae and then included in Diaporthaceae by HÖHNEL (1917a, 1918) without any available account. Type species of the genus, *Neozimmermannia elasticae* KOORD., was the perfect state of *Gloeosporium elasticae* CKE. et MASS. (=*Colletotrichum ficus* KOORD.) causing anthracnose of *Ficus*. If the imperfect state it true *Colletotrichum*, the perfect state does not belong to Diaporthaceae. As already suggested by SHEAR and WOOD (1913), *Neozimmermannia elasticae* KOORD. was treated by ARX and MÜLLER (1954) to be a synonym of *Glomerella cingulata* (STON.) SPAULD. et SCHR.

95. ***Ophiodothella*** **(HENNINGS) HÖHNEL**, HENNINGS, Hedwigia 43 : 258, 1904 (subgenus); HÖHNEL, Sitzb. Kais. Akad. Wiss. Wien, Math. naturw. Kl. 119 : 940, 1910; THEISSEN & SYDOW, Ann. Myc. 13 : 611, 1915

Type species; *Ophiodothella atromaculans* (HENN.) HÖHN.

Synonym: *Microphiodothis* SPEG., Bol. Cordoba 23 : 495, 1919
Scolecodothopsis STEVENS, Illinoi Biol. Monog. 8(3) : 183, 1923
Clypeotrabutia CHARDON, Sci. Surv. Porto Rico 8 : 60, 1926

Conidial state: Undetermined genus of Melanconiales.

The present genus was first considered to be a dothideoid genus (HÖHNEL 1910, THEISSEN & SYDOW 1915, CLEMENTS & SHEAR 1931), and was later transferred to Clypeosphaeriaceae by BOYD (1934). According to HÖHNEL, *Ophiodothella* was characterized by the perithecia embedded within clypeus-like stroma in leaf tissue and the scolecosporous ascospore. BOYD noted positive reaction of ascus tip to iodine in his new species *Ophiodothella vaccinii*, but no mention was made on the reaction in the other old species of *Ophiodothella* examined by him. *Ophiodothella atromaculans* has sparse or no paraphysis (HÖHNEL 1910), while *O. vaccinii* has abundant paraphysis (BOYD 1934). Judged from such descriptions and figures by the earlier investigators, the genus *Ophiodothella* may belong to either Amphisphaeriaceae or Diaporthaceae. It is tentatively accepted here as a member of Diaporthaceae.

MÜLLER and ARX (1962) treated *Scolecodotopsis* STEV. as a synonym of *Diatractium* SYD. However, inclusion of *Scoleocodothopsis* to *Ophiodothella* by BOYD (1934) is supported by the author (see also page 184). *Microphiodothis* SPEG. and *Clypeotrabutia* CHARD. were treated respectively as the synonyms of *Ophiodothella* by PETRAK (1951) and by BOYD (1934).

96. ***Ophiognomonia*** **SACCARDO**, Syll. Fung. 1 : 919, 1882 (subgenus); 14 : 613, 1899; HÖHNEL, Ann. Myc. 16 : 98, 1918; ARX & OLIVIER, Trans, Brit. Myc. Soc. 35 : 31, 1951

Type species *Ophiognomonia melanostyla* (DC.) SACC.

Conidial state: Unknown.

Ophiognomonia was first established as a subgenus of *Gnomonia* by reason of its scolecosporous ascospore (SACCARDO 1882), and later segregated from *Gnomonia* as an independent genus (SACCARDO 1899). This genus is a member of Diaporthaceae (HÖHNEL 1917a, ARX 1951) and much like *Gnomoniella* as well as *Gnomonia* in its developmental type of perithecium. Life-historical study was conducted by KLEBAHN (1918) on the type species *Ophiognomonia melanostyla*. On agar culture, no conidial bodies were produced but immature perithecia of the fungus were obtained on agar and on sterilized leaf of *Tilia*, though these perithecia did not mature.

97. ***Ophiovalsa*** **PETRAK** See page 38

98. ***Paradidymella*** **PETRAK**, Ann. Myc. 25 : 237, 1927; MUNK, Dsk. Bot. Ark. 15(2) : 74, 1953; 17(1) : 198, 1957; DENNIS, Brit. cup fungi, 201, 1960

Paradidymella which was included in Diaporthaceae by MUNK (1953) and DENNIS (1960) is excluded from this family by its asci and paraphyses forming hymenial layer along perithecial wall, and by the positive reaction of ascus tip to MELZER reagent. Recently, MÜLLER and ARX (1962) treated it as a synonym of *Lejosphaerella*, a member of Amphisphaeriaceae.

99. *Paramazzantia* PETRAK=*Heteropera* THEISSEN

100. ***Peroneutypa*** **BERLESE**, Icon. Fung. 3 : 80, 1902; SACCARDO, Syll. Fung. 17 : 569, 1905; DENNIS, Brit. cup fungi, 197, 1960

HÖHNEL (1917a) included this genus in subfamily Valseae of his Diaporthaceae. However, it is a typical genus of Diatrypaceae by its structure of perithecial centrum, so that *Peroneutypa* is excluded from Diaporthaceae.

101. ***Petrakiella*** **SYDOW**, Ann. Myc. 22 : 230, 1924

Type species: *Petrakiella insignis* SYDOW
Conidial state: Unknown.

This monotypic genus was characterized by the markedly developed stroma having a perithecial layer on its peripheral part and the phragmosporous ascospore. According to SYDOW (1924), centrum structure of perithecium in *Petrakiella insignis* was quite simialr to that of Diaporthaceae, especially of *Pseudovalsa*, but he did not mention the structure of ascus. Though certain criteria by which the fungus is included in Diaporthaceae are still uncertain from SYDOW's description and figure, the genus *Petrakiella* is accepted here as a member of Diaporthaceae.

102. *Phaeoapiospora* (SACCARDO et SYDOW) THEISSEN et SYDOW=*Anisomyces* THEISSEN et SYDOW

103. *Phaeodiaporthe* PETRAK=*Melanconis* TULASNE

104. *Phoma* FRIES (non SACC.)=*Linospora* FUCKEL

105. ***Phomatospora*** **SACCARDO** See page 169

106. *Phomatosporopsis* PETRAK=*Phomatospora* SACCARDO

107. ***Phragmodiaporthe*** **WEHMEYER**, Mycol. 33 : 54, 1941; GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 358, 1959
Type species: *Phragmodiaporthe caryae* (PECK) WEHM.
Conidial state: *Cytosporina* SACC.

This genus has a quite similar spore type to *Phragmoporthe* PETR., but it differs from the latter by its aggregated perithecia and black dorsal zone outlined ectostroma. Its imperfect state was also described by WEHMEYER (1941b). According to his description and figure, the imperfect state of the type species *Phragmodiaporthe caryae* may belong to *Cytosporina* SACC. If the conidial state of *Phragmoporthe* PETR. belongs to the same form-genus, *Phragmodiaporthe* may be combined with *Phragmoporthe*.

108. ***Phragmoporthe*** **PETRAK**, Ann. Myc. 32 : 359, 1934; Ann. Myc. 39 : 285, 1941; REID & BOOTH, Can. Jour. Bot. 45 : 1482, 1967
Type species: *Phragmoporthe conformis* (BERK. et BR.) PETRAK
Conidial state: Unknown.

The present genus is somewhat like *Ophiovalsa*, *Sillia* and other scolecosporous genera of Diaporthaceae, but it differs from them by its wider and shorter hyalophragmosporous type of ascospore, ectostroma surrounding neck and singly embedded perithecium beneath the ectostroma. It also differs from *Phragmodiaporthe* by its solitary development of perithecium and lack of black zone. As life-historical study has not been reported on this genus, its relationship to other phaeophragmosporous genera, such as *Prosthecium* and *Pseudovalsa*, is uncertain.

109. ***Phyllocelis*** **SYDOW**, Ann. Myc. 23 : 353, 1925
The species: *Phyllocelis oyedaeae* SYDOW
Conidial state: Unknown.

This leaf inhabiting genus is characterized by the epidermal development of stroma showing ultimately superficial appearance, perithecia entirely embedded within such stroma in a layer, and hyalophragmosporous ascospore. This is distinguishable from the other hyalophragmosporous genera by its superficially developed stroma on the substratum.

110. ***Phylloporthe*** **SYDOW**, Ann. Myc. 23 : 348, 1925; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 773, 1962
Type species: *Phylloporthe veroniae* SYDOW
Synonym: *Uleporthe* PETRAK, Ann. Myc. 39 : 279, 1941
Conidial state: Unknown.

The present genus is distinguishable from the the previous genus only by its hyalodidymous type of ascospore. *Uleoporthe* PETRAK (1941) was characterized by the prosenchymatous stroma excepting the outer pseudoparenchymatous part, in contrast with the plectenchymatous to pseudoparenchymatous stroma of *Phylloporthe*. However, as pointed out by MÜLLER and ARX (1962), it is indistinct criterion to divide them into separate genus. Their treatment uniting *Uleoporthe* with *Phylloporthe* is accepted. Though CLEMENTS and SHEAR (1931) included *Phylloporthe* in the synonym of *Melanconis* without any account, this treatment is not accepted. Whether conidial fungus described by SYDOW (1916) is really connected with *Valsonectria orbiculata* SYD. (=*Uleoporthe orbiculata* (SYD.) PETR.=*Phylloporthe orbiculata* (SYD.) MÜLLER) or not, remains uncertain. According to PETRAK (1941), it has similar characters to *Phomopsis*.

111. ***Plagiophiale*** **PETRAK**, Sydowia 9 : 585, 1955; 18 : 385, 1965
Type species: *Plagiophiale petrakii* (MÜLLER) PETRAK
Conidial state: Unknown.

First, PETRAK (1955) established this genus based on a fungus inhabiting decayed leaves of *Polygonum* and identified its type species as the same as *Sphaerella eucarpa* KARST. The genus was characterized by horizontal perithecium, non-protruding neck, and didymosporous ascospore. However, it was pointed out by BARR (1959) and MÜLLER (1965) that *Sphaerella eucarpa* KARST. was apparently different from the fungus collected by PETRAK and was transferred already to the genus *Wettsteinina* as *W. eucarpa* (KARST.) MÜLLER et ARX. MÜLLER (1965) also collected a fungus on *Polygonum*, which was identical with the fungus described by PETRAK, and newly named it *Plagiostigme petrakii* MÜLLER. His grounds on which the fungus was included in the genus *Plagiostigme* SYD. were opposed by PETRAK (1965). Chief criteria to differentiate both genera, *Plagiophiale* and *Plagiostigme*, are type of ascospore and ecological nature. According to PETRAK (1955, 1965), ascospore of *Plagiophiale* is typical didymospore and the type species inhabits decayed *Polygonum* as a saprophyte, whereas *Plagiostigme* is characterized by apiosporous ascospore and is parasitic on living leaves of tropical plants. Though explanation by PETRAK seems to be not so convincing, *Plagiophiale* PETRAK is accepted as an indendent genus until more available data on the genera under consideration is obtained.

112. ***Plagiosphaera*** **PETRAK**, Ann. Myc. 39 : 288, 1941; Sydowia 14 : 350, 1960; ARX & OLIVIER, Trans. Brit. Myc. Soc. 35 : 31, 1951
Type species: *Plagiosphaera immersa* (TRAIL) PETRAK
Conidial state: Unknown.

The present genus, though similar to *Linospora* in certain respects, is different by its non-protruding neck from the leaf surface and solitary perithecium without stromatic tissue. Besides the difference of the type of ascospore, *Plagiosphaera* shows the same developmental form as *Pleuroceras* and *Plagiostoma*. In this genus ascospore is scolecosporous, while the latter genera have hyalodidymosporous or dumbbell-shaped ascospore.

113. ***Plagiostigme*** **SYDOW**, Ann. Myc. 23 : 341, 1925; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 732, 1962; PETRAK, Sydowia 18 : 380, 1965

Type species: *Plagiostigme couraliae* SYDOW

Synonym: *Bioporthe* PETRAK, Ann. Myc. 27:24, 1929; Sydowia 18:384, 1965

Conidial state: Unknown.

This is quite similar to *Diatractium* in its horizontally lying perithecia within leaf tissue, pseudostroma enveloping perithecium, and lateral neck non-protruding from the leaf surface. However, *Plagiostigme* differs from the latter by its type of ascospore. In this genus ascospore is clavate and subapiosporous, while *Diatractium* has dumbbell-shaped or double-clavate ascospore. *Stegophora* is also similar to this genus, but it differs from the present genus by its distinct apiosporous ascospore and clypeus extended only within epidermal layer.

According to MÜLLER and ARX (1962), type species ef *Bioporthe* PETR. was quite accordant with *Plagiostigme* in its morphological characteristics excepting ascospore showing intermediate type of *Plagiostigme* and *Diatractium*. Both genera, *Bioporthe* and *Plagiostigme*, inhabit living leaves of tropical plants. Though PETRAK (1965) objected to MÜLLER and ARX's treatment (1962), the genus *Bioporthe* is understood to be synonym of *Plagiostigme* SYD. It is still uncertain whether a conidial fungus observed by PETRAK (1929) is really connected with *Bioporthe brenesii* PETR. (=*Plagiostigme brenesii* (PETR.) MÜLLER) or not.

114. ***Plagiostoma*** **FUCKEL**, Symb. Myc. 118, 1869; ARX. Anton. Leauenh. 17 : 264, 1951; MUNK, Dsk. Bot. Ark. 15(2) : 78, 1953; 17(1) : 214, 1957; DENNIS, Brit. cup fungi, 206, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 744, 1962

Type species: *Plagiostoma euphorbiae* FUCK.

Synonym: *Laestadia* AUERSW., Hedwigia 8 : 177, 1869 (non KUNTH 1832)
Gnomonina HÖHN., Ann. Myc. 16 : 46, 1918
Chalcosphaeria HÖHN., Ann. Myc. 16 : 97, 1918

Conidial state: Unknown.

The geneus *Plagiostoma* is characterized by the solitarily embedded perithecium within leaf tissue without stroma, hyalodidymosporous ascospore, and lateral neck non-protruding from the leaf surface. As mentioned above, *Plagiostoma* constitutes a group in Diaporthaceae with *Pleuroceras* and *Plagiosphaera* in their developmental type of perithecium.

Laestadia alnea, the type species of the genus *Laestadia* AUERSW. and of HÖHNEL's *Gnomonina*, was included into this genus by ARX (1951) and *Plagiostoma* established in 1869 was authorized by him instead of *Laestadia* AUERSW. due to the earlier homonym *Laestadia* KUNTH. Therefore, the treatment of including *Laestadia* AUERSW. in *Guignardia* VIALA et RAV. based on the second species of *Laestadia*, *L. punctoides* (CKE.) AUERSW., was revised by him. *Chalcosphaeria* HÖHN. was also united to *Plagiostoma* by ARX (1951) based on its complete agreement with the type species of the latter. These treatments were accepted by the later workers listed above.

KLEBAHN (1918) studied the life-history of *Plagiostoma alnea* and *P. pustula*. He did not observe any conidial state on agar culture, but obtained mature perithecia of the former on agar. No conidial state was found on host plant by him.

115. ***Plagiostomella*** **HÖHNEL**, Ann. Myc. 16 : 51, 1918; Ann. Myc. 17 : 131, 1919; ARX, Anton. Leauenh. 17 : 269, 1951; MÜLLER & ARX, Beit. Kryptgfl. Schw, 11(2) : 747, 1962

Type species: *Plagiostomella carpinicola* HÖHN.

Conidial state: Unknown.

This genus differs from the previous genus only by its apiosporous ascospore and neck protruding from the leaf surface. KLEBAHN (1918) attempted to isolate the type species of the genus but he was unsuccessful.

116. ***Pleuroceras*** **RIESS**, Hedwigia 1 : 25, 1854; ARX, Anton. Leauenh. 17 : 270, 1951; ARX & OLIVIER, Trans. Brit. Myc. Soc. 35 : 30, 1951; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 751, 1962

Type species: *Pleuroceras cryptoderis* (LÉV.) HÖHNEL

Synonym: *Cryptoderis* AUERSW., Myc. Eur. 5/6 : 29, 1869

Conidial state: *Marssonina* MAGNUS or *Marssoniella* HÖHN.

This genus is quite similar to *Plagiostoma* excepting its dumbbell-shaped ascospore. *Cryptoderis* AUERSW. was united with *Pleurceras* by HÖHNEL (1918) and this treatment was accepted by ARX (1951). According to HÖHNEL, *Cryptoderis lamprotheca* (DC.) AWD. was the same species as the older *Sphaeria cryptoderia* LÉV. (=*Pleuroceras cryptoderis*). THOMPSON (1954) described a species of *Pleuroceras*, *P. populi* THOMP., as the perfect state of *Marssonina rhabdospora* (ELL. et EV.) MAGN. This *Marssonina* has cylindric conidia which are somewhat different from typical apiosporous conidia of *Marssonina*. HÖHNEL (1916) established a new form-genus *Marssoniella* for such species of *Marssonina* as having fusoid to cylindric type of conidia.

117. ***Prosthecium*** **FRESENIUS** See page 177

118. *Pseudodiaporthe* PETRAK (non SPEGAZZINI)=*Melanconis* TULANSNE

119. ***Pseudodiaporthe*** **SPEGAZZINI** (non PETRAK 1921), Ann. Mus. Buen. Aires 19 : 359, 1909; SACCARDO, Syll. Fung. 22 : 388, 1913; WEHMEYER, Rev. del. Mus. d. La Plata, n. s., II, Ser. Bot. 86, 1938

The present genus was first considered to be similar to *Diaporthe* and was later accepted as a doubtful member of Diaporthaceae by WEHMEYER (1938). Recently, BOSE (1961), who critically restudied *Massarina* SACC. and related genera, however, treated the genus *Pseudodiaporthe* SPEG. as a synonym of *Massarina* SACC. based on the re-examination of the type specimen of the former. MÜLLER and ARX (1962) also confirmed the validity of BOSE's treatment in the examination of the type material. As the genus *Massarina* is a member of Ascoloculares having bitunicate ascus, *Pseudodiaporthe* SPEG. is excluded from the family Diaporthaceae.

120. ***Pseudomassaria*** **JACZEWSKY**, Bull. Herb. Boissier 2 : 612, 1896; LINDAU, Engl. Natul. Pflfam. I, 1 : 444, 1897; ARX, Ber. Schw. Bot. Ges. 62 : 340, 1952; MUNK, Dsk. Bot. Ark. 17(1) : 174, 1957; DENNIS, Brit. cup fungi, 199, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 683, 1962.

This genus does not belong to Diaporthaceae but to Amphisphaeriaceae by reason of its stalked persistent asci and positive reaction of ascus tip to MELZER reagent, though DENNIS (1960) placed it in Diaporthaceae.

121. ***Pseudothis*** **THEISSEN et SYDOW**, Ann. Myc. 12 : 274, 1914, MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 736, 1962

Type species: *Pseudothis coccodes* (LÉV.) THEISS. et SYD.

Conidial state: *Lasmeniella* PETRAK et SYDOW

According to the descriptions by THEISSEN and SYDOW (1914) and THEISSEN (1918) and figure by MÜLLER and ARX (1962), the genus *Pseudothis* has characters similar to Diatrypaceae rather than to Diaporthaceae. Though stroma of the present genus is much like *Phylloporthe* and *Heteropera,* it is necessary to restudy this tropical genus as to its systematic position. According to PETRAK (1941), *Pseudothis* is a hyperparasite on the stroma of *Phyllachora* and has a conidial state belonging to *Lasmeniella* PETR. et SYD.

122. ***Pseudovalsa*** **CESATI et DE NOTARIS**, Comm. Soc. Critt. Ital. 1 : 206, 1863; SACCARDO, Syll. Fung. 2 : 135, 1883; WINTER, Rabh. Kryptgfl. I, 2 : 783, 1887; ELLIS & EVERHART, N. Amer. Pyren. 537, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 470, 1897; PETRAK, Ann. Myc. 21 : 325, 1923; WEHMEYER, Amer. Jour. Bot. 13 : 639, 1926; Univ. Michig. Stud. Sci. Ser. 14 : 79, 1941; MUNK, Dsk. Bot. Ark. 15(2) : 71, 1953; 17(1) : 240, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 33 : 360, 1959; DENNIS, Brit. cup fungi, 198, 1960
Type species: *Pseudovalsa lanciformis* (FRIES) CES. et DE NOT.
Synonym: *Khekia* PETRAK, Hedwigia 62 : 284, 1921
Conidial state: *Coryneum* NEES ex FR.

This phragmosporous genus is distinguishable from *Prosthecium* FRES. noted above by the presence of blackened zone surrounding entostromatic area and conidial state formed on exposed layer. Genetic relationship between *Pseudovalsa* and *Coryneum* was assumed by PETRAK (1923) and culturally proved by WEHMEYER (1926a, 1941a). PETRAK (1921b) described a genus *Khekia* based on *Calospora ambigua* PASS. in Lophiostomataceae and defined it as a hyperparasite on *Diatrypella.* WEHMEYER (1941a) reexamined PETRAK's specimen of *Calospora ambigua* and regarded it as a synonym of *Pseudovalsa longipes* (TUL.) SACC. Through this treatment, *Khekia* was included as a synonym of *Pseudovalsa* and PETRAK's opinion that *Khekia* was a hyperparasite was rejected.

123. ***Pseudovalsella*** **HÖHNEL** See page 30

124. ***Rehmiella*** **WINTER**, Hedwigia 22 : 2, 1388; LINDAU, Engl. Naturl. Pflfam. I, 1 : 451, 1897; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 365, 1954
Type species: *Rehmiella alpina* WINTER
Conidial states: Unknown.

The present leaf inhabiting genus is characterized by the ascus containing multi-ascospores, long protruding neck from the leaf surface and the solitarily embedded perithecium without stroma. It was first placed in Gnomoniaceae, and later treated as a subgenus of *Gnomonia* (WINTER 1887). HÖHNEL (1919) included it in the genus *Ditopella* which has also multi-ascospore in each ascus, as a subgenus. However, *Rehmielle* differs from *Ditopella* by the lack of clypeus-like stroma above the perithecium and long beak projecting from the leaf surface. *Rehmiella* is quite similar to *Gnomoniella* in its morphological characters excepting the number of ascospore in each ascus.

MIYAKE (1914) reported a fungus collected on *Ulmus* in China as a species of *Rehmiella, R. ulmicola* MIYAKE. However, it does not belong to *Rehmiella* on account of its horizontal perithecium embedded within leaf tissue and lateral neck bent strongly toward the leaf surface. If the fungus has multi-spored ascus and apiosporous ascospore as described and figured by MIYAKE (MIYAKE 1914, SACCARDO 1928), a new genus is required for it near *Plagiostigme* or *Plagiostomella.* No authentic specimen of this fungus was found, consequently no further available data for this problem was obtained.

125. ***Rhamphoria*** **NIESSL**, Verh. Naturforsch. Ver. Brunn 14 : 209, 1876; SACCARDO, Syll. Fung. 2 : 307, 1883; WINTER, Rabh. Kryptgfl. I, 2 : 259, 1887; ELLIS & EVERHART, N. Amer. Pyren. 200, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 408, 1897; MUNK, Dsk. Bot. Ark. 15(2) : 69, 1953; 17(1) : 192, 1957; DENNIS, Brit. cup fungi, 208, 1960

In this unique genus ascus contains hyalodictyosporous ascospore in the early stage and is finally filled with a large number of minute conidia produced from ascospore by the same budding manner as found in a Discomycetous genus *Tympanis*. Besides this feature, it is much like *Ceratostomella* and allied genera in the common morphological character. Therefore, it is excluded from Diaporthaceae, though MUNK (1953, 1957) placed it in Diaporthaceae as a representative of his subfamily Rhamphorioideae of Diaporthaceae.

126. *Rostrocoronophora* MUNK=*Gnomonia* CESATI et DE NOTARIS

127. ***Savulescua*** **PETARK**, Omagju Lui Traian Savulescu, Ac. Rep. Pop. Rom. 591, 1959; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 731, 1962

Type species: *Savulescua insignis* PETRAK

Conidial state: Unknown.

This monotypic genus was recently translated by MÜLLER and ARX (1962). According to their note, this fungus causing fusoid canker on living twig apparently belongs to Diaporthaceae. This was differentiated from the hitherto known genera by its perithecia embedded entirely within fungous stroma and didymosporous ascospore enveloping thick epispore. Structure of perithecial centrum is similar to that of *Melanconis*, *Hercospora* or some leaf inhabiting genera such as *Bagcheea* and *Stegophora*, from which it is distinguishable by the structure of stroma.

128. ***Schizoparme*** **SHEAR**, Mycol. 15 : 120, 1923

Type species: *Schizoparme straminea* SHEAR

Conidial state: Undetermined genus of Sphaeropsidaceae.

Though description of this genus by SHEAR (1923) was somewhat indistinct, *Schizoparme* seems to be a particular genus in Diaporthaceae, judging from his fine photographs and figures. He stated that the conidial state of the fungus resembling *Coniothyrium* was found on the same material as that of perithecial state. His conidial state, however, does not belong to *Coniothyrium* but probably to *Fusicoccum* or related form-genera in its characteristics. There is no identical genus with *Schizoparme*, which is characterized by the solitary perithecium having thick clypeus-like stroma above it, the hyalosporous ascospore and the short papillate ostiole. *Ditopella* and *Sphaerognomonia* have somewhat similar type of stromatic tssue to *Schizoparme*.

129. *Scolecodothopsis* STEVENS=*Ophiodothella* (HENNINGS) HÖHNEL

130. ***Scoptria*** **NITSCHKE**, Pyren. Germ. 83, 1867; WINTER, Rabh. Kryptgfl. I, 2 : 827, 1887; LINDAU, Engl. Naturl. Pflfam. I, 1 : 477, 1897

HÖHNEL (1917a, 1918) included this genus in Diaporthaceae. According to him, it has *Diaporthe*-type centrum of perithecium, but he did not give any details. It is not accepted to be a member of Diaporthaceae by its structure of perithecial centrum, if we are are to judge from the description by WINTÈR (1887) and LINDAU (1897). It may belong to Diatrypaceoe. The imperfect state of *Scoptria* presumably belongs to the form-genus *Harpographium* of Stilbaceae.

131. *Septomazzantia* THEISSEN et SYDOW=*Diaporthe* NITSCHKE

132. ***Sillia*** **KARSTEN** See page 176

133. *Skottsbergiella* PETRAK apud KEISSLER=*Diaporthe* NITSCHKE

134. ***Sphaerognomonia*** **POTEBNIA** See page 152

135. *Stegastroma* SYDOW=*Anisomyces* THEISSEN et SYDOW

136. ***Stegophora*** **SYDOW** See pape 149

137. *Stevensiella* TROTTER apud SACCARDO=*Diatractium* SYDOW

138. *Stigmatopsis* TRAVERSO=*Diaporthe* NITSCHKE

139. ***Sydowiella*** **PETRAK** See page 177

140. ***Titania*** **BERLESE**, Icon. Fung. 1 : 49, 1894; SACCARDO, Syll. Fung. 9 : 823, 1891; LINDAU, Engl. Naturl. Pflfam. I, 1 : 472, 1897; WEHMEYER, Univ. Michig. Stud. Sci. Ser. 14 : 110, 1941
Type species: *Titania berkeleyi* BERL.
Conidial state: Unknown.

This monotypic genus is characterized by the phragmosporous ascospore and ascus containing only one ascospore. It is similar to *Pseudovalsa* or *Prosthecium* in the characters other than ascus. Further life-history study may confirm the relationship between *Titania* and other similar genera of Diaporthaceae.

141. *Trabutiella* STEVENS (non THEIS. et SYD. 1915)=*Diatractium* SYDOW

142. *Uleoporthe* PETRAK=*Phylloporthe* SYDOW

143. *Urospora* FABRE (non ARESCHOUG 1866, 1874)=*Urosporella* ATKINSON

144. ***Urosporella*** **ATKINSON**, Bull. Agr. Exp. Sta. Corn. Univ. 3 : 99, 1897; SACCARDO, Syll. Fung. 14 : 523, 1899; ARX & MÜLLER, Beit. Kryptgfl. Schw. 11(1) : 198, 1954; BARR, Mycol. 58 : 690, 1966

HÖHNEL (1917a) included this genus in Diaporthaceae without any account. This inclusion was not accepted by ARX and MÜLLER (1954) and by BARR (1966), who considered *Urosporella* to be a member of Amphisphaeriaceae. Asci and paraphyses form a persistent layer on the bottom of perithecium and do not form a circular layer along perithecial wall. Ascus tip is not stained blue with iodine. Judged from these characters and coriaceous wall of the fungus belonging to *Urosporella*, the present genus is understood to be a somewhat eligible member of Amphisphaeriaceae.

HÖHNEL (1917a) also placed *Urospora* in Diaporthaceae as a separate genus. *Urospora* FABRE was combined with *Urosporella* ATK. by ARX and MÜLLER (1954), because it could not be used for the earlier homonym *Urospora* ARESCHOUG. Therefore, the genus *Urosporella* ATK. (=*Urospora* FABRE) are excluded from Diaporthaceae.

145. ***Valsa*** **FRIES** See page 99

146. ***Valsaria*** **CESATI et DE NOTARIS**, Comm. Soc. Critt. Ital. 1 : 205, 1863; SACCARDO, Syll. Fung. 1 : 741, 1882; WINTER, Rabh. Kryptgfl. I, 2 : 804, 1887; ELLIS & EVERHART, N. Amer. Pyren. 555, 1892; WEHMEYER, Amer. Jour. Bot. 13 : 640, 1926; MUNK, Dsk. Bot. Ark. 15(2) : 129, 1953; 17(1) : 436, 1957; GILMAN et al., Ia. St. Coll. Jour. Sci. 31 : 632, 1957; DENNIS, Brit. cup fungi, 235, 1960; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 614, 1962

The present genus has been considered to be a member of Valsaceae, Melanconidaceae or Melogrammataceae in classic mycology (SACCARDO, 1882, WINTER 1887, ELLIS & EVERHART 1892). Later it was placed in Diaporthaceae (WEHMEYER 1926a, GILMAN et al. 1957). However, MUNK (1953, 1957) and DENNIS (1960) transferred it to Pseudosphaeriales which was considered to be a fungous group having bitunicate ascus. On the other hand, MÜLLER and ARX (1962) again included it as a member of Diatrypaceae, a group having unitunicate ascus. The author supports MUNK's and DENNIS' opinion based on data applying to the structure of ascus and germination of ascospore in several Japanese materials of *Valsaria*. *Valsaria* collected by the author has bitunicate ascus and germinated in a budding way; in other words, ascospore bore many blastospores. Such type of germination is common in some groups of Pseudosphaeriales but has not been known in Diaporthaceae up to the present time. Therefore, the genus *Valsaria* is excluded from Diaporthaceae.

In Japan, three species of *Valsaria*, namely *V. diospyri* SCHW. on *Diospyros*, *V. insitiva* CES. et DE NOT. on *Thea*, and *V. haraeana* SYD. on *Lespedeza*, have been listed (HARA 1954). To the author it is uncertain whether they belong to the present genus or not.

147. ***Valsella*** **FUCKEL**, Symb. Myc. 203, 1869; SACCARO, Syll. Fung. 1 : 158, 1882; ELLIS & EVERHART, N. Amer. Pyren. 517, 1892; WEHMEYER, Amer. Jour. Bot. 13 : 640, 1926; MUNK, Dsk. Bot. Ark. 15(2) : 80, 1953; GILMAN et al., Ia. Sta. Coll. Jour. Sci. 31 : 634, 1957; URBAN, Rozp. Cesk. Akad. Ved, Roc. 68, Ses. 12 : 83, 1958, DENNIS, Brit. cup fungi, 187, 1960

Type species: *Valsella salicis* FUCKEL

Conidial state: *Leucocytospora* HÖHNEL

Valsella is distinguishable from *Leucostoma* only by its multi-spored ascus. Historical review of the genus was mentioned in detail in the genus *Valsa* and *Leucostoma*. Conidial state of the genus is the same as that of *Leucostoma*.

148. ***Valseutypella*** **HÖHNEL**, Ann. Myc. 18 : 71, 1920; URBAN, Acta Musei Nat. Prague 16 (B) : 9, 1960; HUBBES, Phytop. Zeits. 39 : 390, 1960

Type species: *Valseutypella tristicha* (DE NOT.) HÖHNEL

Conidial state: *Leucocytospora* HÖHNEL

This monotypic genus is characterized by its *Diatrype*-like stroma composed of fungous tissue only, stout and long neck, and crust surrounding whole stroma (HÖHNEL 1919, 1920; URBAN 1960; HUBBES 1960). It is quite similar to *Leucostoma* HÖHN., but is differentiated from the latter by the structucture of stroma and crust. *Valseutypella trisiticha* (DE NOT.) HÖHN. causes a canker diseases of rose (URBAN 1960, HEBBES 1960) and produces conidial state *Leucocytospora* on culture (HUBBES 1960).

149. ***Valsonectria*** **SPEGAZZINI**, Ann. Sci. Cien. Argent. 12 : 211, 1881; SACCARDO, Syll. Fung. 2 : 519, 1883; LINDAU, Engl. Naturl. Pflfam I, 1 : 362, 1897; PETRAK & SYDOW, Ann. Myc. 34 : 18, 1936; MÜLLER & ARX, Beit. Kryptgfl. Schw. 11(2) : 653, 1962

HÖHNEL (1909) combined *Valsonectria* with *Endothia* FRIES and included it in Diaporthaceae

(HÖHNEL 1917a). However, examination on type species of *Valsonectria* (PETRAK & SYDOW 1936, MÜLLER & ARX 1962) revealed that the fungus would belong to Hypocreaceae and, therefore, *Valsonectria* is excluded from Diaporthaceae.

150. ***Vialaea*** **SACCARDO** See page 175

151 ***Winterina*** **SACCARDO**, Syll. Fung. 14 : 589, 1899; HÖHNEL, Ann. Myc. 16 : 103, 1918; MUNK, Dsk. Bot. Ark. 15(2) : 100, 1953

This indistinct genus may belong to Coronophoraceae, though HÖHNEL (1918) placed it in Diaporthaceae. FITZPATRICK (1923) treated this genus as a synonym of *Calyculosphaeria* FITZP. of Nitschkeaceae (=Coronophoraceae) without any specific detailed information. MÜLLER and ARX (1962) supported FITZPATRICK's treatment. However, *Winterina* SACC. and *Calyculosphaeria* FITZP. seem to be somewhat different from each other in their type of ascospore. Although systematic position of *Winterina* SACC. sensu HÖHN. is still uncertain, it is suggested that *Winterina tuberculifera* ELL. et EV., the type species of the genus, does not belong to Diaporthaceae but to Coronophoraceae.

152. ***Zignoella*** **SACCARDO**, Mich. 1 : 346, 1878; Syll. Fung. 1 : 214, 1882; ELLIS & EVERHART, N. Amer. Pyren. 186, 1892; LINDAU, Engl. Naturl. Pflfam. I, 1 : 403, 1897; MUNK, Dsk. Bot. Ark. 17(1) : 189, 1957; DENNIS, Brit. cup fungi, 210, 1960

This genus may belong to Sphaeriaceae or Ceratostomataceae as *Ceratostomella* and *Ceratosphaeria* mentioned above. Its coriaceous perithecial wall and basal persistent layer of asci and paraphysoid are atypical characters to Diaporthaceae. Therefore, MUNK's treatment of including this genus in Diaporthaccae is not accepted.

In Japan, HARA described a species of this genus as *Zignoella theae* HARA on *Thea* (HARA 1932).

VII. Key to genera of Diaporthaceae

- A_1: Perithecium on leaves
  - B_1: Perithecium without stroma
    - C_1: Perithecium stands erectly within leaf tissue, neck on the top of perithecium
      - D_1: Neck long-protruded from leaf surface
        - E_1: Ascospore one-celled (amerosporae)
          - F_1: Ascus 8-spored ························ *Gnomoniella* (p. 172)
          - F_2: Ascus many-spored ························ (*Rehmiella*)
        - E_2: Ascospore 2-celled
          - F_1: Ascospore septated near lower end (apiosporae) ························ (*Apiognomonia*)
          - F_2: Ascospore septated at median part (didymosporae) ························ *Gnomonia* (p. 162)
        - E_3: Ascospore filiform to long-cylindric (scolecosporae)
          - F_1: On marine algae ························ (*Maireomyces*)
          - F_2: Not on marine algae ························ (*Ophiognomonia*)
      - D_2: Neck non-protruded from leaf surface
        - E_1: Ascospore one-celled (amerosporae) ························ *Phomatospora* (p. 169)
        - E_2: Ascospore filiform to long-cylindric (scolecosporae) ························ *Linocarpon* (p. 158)

C_2: Perithecium horizontally or obliquely lying within leaf tissue, neck lateral or from upperside of perithecium
  D_1: Neck long-protruded from leaf surface
    E_1: Ascospore 2-celled, septum near lower and (apiosporae) ……………………(*Plagiostomella*)
    E_2: Ascospore 2-celled, septum at median part, dumbbell-shaped or double-clavate ……………………(*Pleuroceras*)
  D_2: Neck non-protruded from leaf surface
    E_1: Ascospore 2-celled (didymosporae)
      F_1: Ascospore elliptic to fusoid ……………………(*Plagiostoma*)
      F_2: Ascospore dumbbell-shaped or double-clavate ……………………(*Pleuroceras*)
    E_2: Ascospore filiform to oblong-cylindric (scolecosporae) ……………………(*Plagiosphaera*)
B_2: Perithecium with stroma or clypeus
  C_1: Stroma immersed within leaf tissue
    D_1: Perithecium stands erectly within stroma or leaf tissue neck on the top of perithecium
      E_1: Neck long-protruded from leaf surface
        F_1: Ascospore one-celled (amerosporae) ……………………*Mamianiella* (p. 167)
        F_2: Ascospore 2-celled (didymosporae) ……………………*Mamiania* (p. 173)
      E_2: Neck non-protruded from leaf surface
        F_1: Ascospore one-celled (amerosporae)
          G_1: Perithecium with clypeus
            H_1: Perithecium with conic short ostiole; clypeus above the perithecium, collapsed in later stage ……………………(*Schizoparme*)
            H_2: Perithecium with cylindric neck
              I_1: Clypeus within epidermal layer, thick, plate-like; wall of perithecium and neck light brown ……………………(*Diplacella*)
              I_2: Clypeus around neck and in epiderm, not thickened; wall of perithecium and neck dark-brown to black……………………*Sphaerognomonia* (p. 152)
          G_2: Perithecium with sclerotioid, crust-like stroma ……………………(*Heteropera*)
        F_2: Ascospore 2-celled, septated near lower end (apiosporae)
          G_1: Perithecium entirely embedded within stroma ……………………(*Lambro*)
          G_2: Perithecium with subepidermal clypeus ……………………(*Anisomyces*)
        F_3: Ascospore filiform or long-cylindric (scolecosporae) ……………………(*Ophiodothella*)
    D_2: Perithecium horizontally or obliquely lying within stroma or leaf tissue; neck lateral or from upperside of perithecium
      E_1: Neck long-protruded from leaf surface; ascospore filiform to long-cylindric (scolecosporae) ……………………(*Linospora*)
      E_2: Neck non-protruded from leaf surface
        F_1: Ascospore one-celled (amerosporae)
          G_1: Ascospore with broad hyaline vacuolar area at the central part as if to divide into three cells……………………*Bagcheea* (p. 147)
          G_2: Ascospore not as above ……………………(*Hypospilina*)
        F_2: Ascospore 2-celled
          G_1: Septum near lower end (apiosporae)

H_1: Perithecium entirely embedded within stroma consisting of fungous mycelia and leaf tissue surrounded by distinct black zone ············(*Hypospilina*)
H_2: Perithecium with clypeus effusing epidermal layer on lower and/or upper leaf surface ··································*Stegophora* (p. 149)
G_2: Septum at median part (didymosporae)
H_1: Ascospore elliptic to fusoid
I_1: Cells of ascospore unequal ··(*Plagiostigme*)
I_2: Cells of ascospore equal··(*Plagiophiale*)
H_2: Ascospore dumbbell-shaped or double-clavate ·····························(*Diatractium*)
F_3: Ascospore filiform or long-cylindric (scolecosporae)······················*Linocarpon* (p. 158)
C_2: Stroma subepidermal, then broken through epiderm and almost all superficial
D_1: Ascospore 2-celled (didymosporae)··(*Phylloporthe*)
D_2: Ascospore many-celled (phragmosporae)···(*Phyllocelis*)
A_2: Perithecium on bark or stem
B_1: Perithecium usually without stroma, solitarily embedded within bark tissue
C_1: Blackened zone present within bark and wood ··································*Diaporthe* (p. 62)
C_2: Blackened zone absent
D_1: Ascospore one-celled (amerosporae)
E_1: Perithecium superficial, on marine algae ··(*Maireomyces*)
E_2: Not on marine algae, perithecium with short ostiole·················*Phomatospora* (p. 169)
D_2: Ascospore 2-celled (didymosporae)··(*Sydowiella*)
B_2: Perithecium with stromatic tissue above and/or around it
C_1: Perithecium entirely embedded within well developed and compact stroma
D_1: Stroma entirely circumscribed by blackened zone
E_1: Ascospore one-celled
F_1: Ascospore allantoid (allantosporae)
G_1: Ascus fewer than 8-spores
H_1: Stroma consisting of ecto- and ento-stroma and containing fragmental tissue of substrata ······································*Leucostoma* (p. 124)
H_2: Stroma *Diatrype*-like, without fragment of host tissue ···············(*Valseutypella*)
G_2: Ascus many-spored ··(*Valsella*)
F_2: Ascospore elliptic to fusoid (amerosporae) ·······························*Mazzantia* (p. 154)
E_2: Ascospore 2-celled (didymosporae)
F_1: Blackened zone *Leucostoma*-like ···(*Hercospora*)
F_2: Blackened zone *Diaporthe*-like, stroma *Diatrype*-like ·························(*Diaporthella*)
D_2: Stroma without blackened zone
E_1: Stroma orange to yellow ···*Endothia* (p. 132)
E_2: Stroma gray to blackish
F_1: Ascospore one-celled (Amerosporae) ··(*Gibellia*)
F_2: Ascospore 2-celled
G_1: Septum near lower end (apiosporae) ··(*Anisogramma*)
G_2: Septum at median part (didymosporae)
H_1: Stroma thick and cushion-like, with many perithecia on them ······································(*Savulescua*)
H_2: Stroma immersed within bark tissue······························*Ditopellopsis* (p. 47)

H_3: Stroma superficial, ascospore brown ··························(*Pseudothis*)
F_3: Ascospore many-celled (phragmosporae)··························(*Petrakiella*)
F_4: Ascospore filiform to long-cylindric (scolecosporae)
G_1: Perithecium singly embedded within stroma
ascospore long-cylindric ··························(*Ditopellina*)
G_2: Perithecium irregularly embedded in several layers,
ascospore filiform··························(*Sillia*)
C_2: Perithecium with stroma but not compact, usually loose hyphal
elements only, often lacking either ecto- or ento-stroma
D_1: Blackened zone present within bark and/or wood
E_1: Ascospore one-celled (amerosporae)··························(*Diaporthopsis*)
E_2: Ascospore 2-celled
F_1: Septum near lower end (apiosporae) ··························(*Apioporthella*)
F_2: Septum at median part (didymosporae) ··························*Diaporthe* (p. 62)
E_3: Ascospore many-celled (phragmosporae) ··························(*Phragmodiaporthe*)
D_2: Blackened zone absent
E_1: Ascospore one-celled
F_1: Ascospore allantoid (allantosporae) ··························*Valsa* (p. 99)
F_2: Ascospore elliptic to fusoid (amerosporae)··························*Cryptosporella* (p. 174)
E_2: Ascospore 2-celled (didymosporae)
F_1: Ascospore elliptic to fusoid
G_1: Ascus many-spored, perithecium single, with
clypeus-like stroma above it ··························*Ditopella* (p. 156)
G_2: Ascus fewer than 8-spores
H_1: Ascospore with gelatinous epispore, ascus large, basal,
conidial state *Melanconiopsis* ··························(*Massariovalsa*)
H_2: Ascospore without epispore, ascus small to large
I_1: Ectostroma distinct
J_1: Conidial state on exposed layer, *Melanconium* ··························*Melanconis* (p. 9)
J_2: Conidial state in enclosed locule, *Cytospora* ··························(*Cytomelanconis*)
I_2: Ectostroma scanty, conidial state *Coryneum*
and *Hendersonula*··························*Pseudovalsella* (p. 30)
I_3: Ectostroma variable, conididial state *Fucicoccum*
or related genera ··························*Cryptodiaporthe* (p. 49)
F_2: Ascospore dumbbell-shaped or double-clavate ··························(*Vialaea*)
E_3: Ascospore many-celled
F_1: Septum only transversal (phragmosporae)
G_1: Ascus mono-spored ··························(*Titania*)
G_2: Ascus usually 8-spored
H_1: Perithecium solitarily embedded, with clypeus-like ectostroma around neck ··························(*Phragmoporthe*)
H_2: Perithecium in group, neck collectively erumpent
I_1: Conidial state on exposed layer, *Coryneum* ··························(*Pseudovalsa*)
I_2: Coninidial state in enclosed locule ··························(*Prosthecium*)
F_2: Septum transversal and longitudinal (dictyosporae)··························(*Dictyoporthe*)
E_4: Ascospore long-cylindric (scolecosporae) ··························*Ophiovalsa* (p. 38)

VIII. Index of genera and species

1. Index of genera

2. Index of species

IX. **Host index**

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XI. Explanation of plates

Plate I

A～E: *Melanconis stilbostoma* (FR.) TUL.
- A: Perithecial and conidial pustules on *Betula verrucosa.* ×2
- B: Perithecial stroma on *B. maximowicziana.* ×25
- C: Ascus showing apical ring on its tip, on *B. maximowicziana.* ×500
- D: Conidial stroma on *B. maximowicziana.* ×25
- E: Conidia on *B. maximowicziana.* ×500

F～I: *Melanconis marginalis* (PECK) WEHM. on *Alnus crispa* subsp. *maximowiczii.*
- F: Perithecial and conidial pustules. ×1.8
- G: Perithecial stroma. ×50
- H: Ascus. ×500
- I: Alpha conidia and small, hyaline beta conidia. ×500

Plate II

A～F: *Melanconis itoana* sp. nov. on *Betula ermanii.*
- A: Perithecial and conidial pustules. ×1.5
- B: Perithecial stroma. ×25
- C: Ascus showing apical ring at the tip. ×500
- D: Conidial pustules and spore-horns. ×1.5
- E: A part of conidial layer, acervulus. ×130
- F: Conidia. ×500

G～I: *Melanconis spodiaea* TUL. on *Castanea crenata.*
- G: Perithecial pustules. ×1.8
- H: Perithecial stroma. ×25
- I: Asci and ascospores, one ascus having coloured ascospores and the other having hyaline ascospores. ×500

Plate III

A～E: *Melanconis juglandis* GRAVES on *Juglans ailanthifolia.*
- A: Perithecial pustules. ×1.2
- B: Perithecial stroma. ×15

C: Ascus having uniseriate ascospores and apical ring. ×500
D: Conidial pustules. ×1.2
E: Conidia. ×500

F～I: *Melanconis pterocaryae* sp. nov. on *Pterocarya rhoifolia.*
F: Perithecial and conidial pustules. ×25
G: Perithecial stroma. ×50
H: A part of conidial layer, acervulus. ×130
I: Conidia. ×500

Plate IV

A～C: *Melanconis microspora* sp. nov. on *Castanea crenata.*
A: Perithecial and conidial pustules. ×1.2
B: A part of stroma having a perithecium beneath the conidial layer, acervulus. ×130
C: Conidia. ×500

D～H: *Pseudovalsella thelebola* (FR.) HÖHN.
D: Perithecial and pycnidial pustules on *Alnus inokumai.* ×1.2
E: Perithecial stroma on *A. glutinosa.* ×35
F: Ascus and ascospores, one of which has two septa, on *A. glutinosa.* ×370
G: Pycnidial stroma on *A. glutinosa.* ×50
H: Conidia having three septa on *A. glutinosa.* ×500

Plate V

A～E: *Pseudovalsella modonia* (TUL.) comb. nov. on *Castanea crenata.*
A: Perithecial and conidial pustules. ×1.2
B: Perithecium formed beneath the conidial layer, acervulus. ×90
C: Asci and ascospores. ×500
D: Acervulus. ×150
E: Conidia. ×500

F～H: *Pseudovalsella tetraspora* sp. nov. on *Betula maximowicziana.*
F: Perithecial and conidial pustules. ×1.8
G: Perithecial stroma. ×25
H: Ascus having four spores. ×370

Plate VI

A, B: *Pseudovalsella tetraspora* (continued)
A: Conidial stroma. ×50
B: Conidia. ×500

C～H: *Ophiovalsa suffusa* (FR.) PETR.
C: Perithecial and conidial pustules on *Alnus hirsuta* var. *tinctoria.* ×1.5
D: Perithecia with confluent neck at the central part, on *A. hirsuta.* ×35
E: Ascus containing fascicular ascospores, on *A. hirsuta.* ×500
F: Ascospore on *A. hirsuta.* ×500
G: Conidial layer on *A. incana.* ×50
H: Conidia on *A. inokumai.* ×500

Plate VII

A～F: *Ophiovalsa betulae* (TUL.) PETR.
A: Perithecial pustules on *Betula platyphylla* var. *japonica.* ×1.5

B: Perithecium peeled from the bark of *B. platyphylla* var. *japonica*. ×90
C: Asci and ascospores on *B. maximowicziana*. ×500
D: Conidial pustules on *B. maximowicziana*. ×1.5
E: Conidial stroma on *B. pubescens*. ×25
F: Conidia on *B. pubescens*. ×500

G∼I: *Ophiovalsa femoralis* (PECK) PETR.
G: Perithecial pustules on *Alnus glutinosa*. ×1.5
H: Perithecial stroma on *Sorbus commixta*. ×50
I: Ascus on *A. inokumai*. ×500

Plate VIII

A∼C: *Ditopellopsis sophorae* sp. nov. on *Sophora japonica*.
A: Perithecial pustules. ×1.5
B: Perithecial stroma. ×25
C: Ascus having uniseriate ascospores. ×500

D∼I: *Cryptodiaporthe castanea* (TUL.) WEHM. on *Castanea mollissima* (D) and *C. crenata* (E–I).
D: Perithecial and pycnidial pustules. ×1
E: Perithecial stroma. ×75
F: Asci. ×500
G: Pycnidial stroma having allantoid conidia. ×150
H: Allantoid conidia. ×500
I: Part of inner layer of pycnidium forming ovoid conidia. ×500

Plate IX

A∼E: *Cryptodiaporthe raveneliana* (THUM. et REHM) comb. nov.
A: Perithecial pustules on *Quercus serrata*. ×1.2
B: Perithecial stroma on *Q. serrata*. ×50
C: Pycnidial pustules on *Q. mongolica* var. *grosseserrata*. ×1.8
D: Pycnidial stroma on *Q. mongolica* var. *grosseserrata*. ×50
E: Elliptic and allantoid conidia. on *Q. mongolica* var. *grosseserrata*. ×500

F∼I: *Cryptodiaporthe acerinum* REID et CAIN on *Acer palmatum* var. *matsumurae*.
F: Perithecial pustules. ×1.8
G: Perithecial stroma. ×25
H: Ascus. ×500
I: Ascospores showing echinulation. ×500

Plate X

A, B: *Cryptodiaporthe aubertii* (WEST.) WEHM. on *Sorbus alnifolia*.
A: Perithecial pustules. ×1.8
B: Perithecial stroma. ×35

C, D: *Cryptodiaporthe aculeans* (SCHW.) WEHM. on *Rhus javanica*.
C: Perithecial pustules. ×1.5
D: Ascus and ascospores. ×500

E∼I: *Diaporthe eres* NJT.
E: Perithecial pustules on *Amorpha fruticosa*. ×1.8
F: Perithecial formed under the bark of *Clerodendron trichotomum*. ×1.8
G: Perithecial stroma on *Hypericum galioidea*. ×150

H: Pycnidial pustules on *Juglans regia* var. *orientes*. ×1.8

I: Pycnidium on *Alnus hirsuta* var. *sibirica*. ×150

Plate XI

A～E: *Diaporthe conorum* (DESM.) NIESSL.

- A: Perithecial pustules on *Cryptomeria japonica*. ×2
- B: Perithecium formed beneath the decomposed pycnidium, on *Larix leptolepis*. ×90
- C: Pycnidial pustules and spore-horns on *L. leptolepis*. ×1.2
- D: Pycnidial pustules on a cone of *L. dahurica* var. *koreana*. ×2.5
- E: Pycnidial stroma on *Metasequoia glyptostroboides*. ×150

F～I: *Diaporthe medusaea* NIT.

- F: Perithecial pustules showing long hair-like necks, on *Morus alba*. ×1.5
- G: Perithecial stroma on *M. alba*. ×50
- H: Pycnidial pustules formed on the canker lesion around the bud, on *Populus euramericana* I-476. ×1.3
- I: Pycnidial stroma on *P. davidiana* x *P. canescens*. ×150

Plate XII

A, B: *Diaporthe arctii* (LASCH) NIT. on *Edgeworthia papyrifera*.

- A: Perithecial pustules. ×1.2
- B: Perithecia formed under the bark. ×3

C～H: *Diaporthe santonensis* SACC.

- C: Perithecial pustules on *Populus deltoides*. ×2
- D: Perithecial stroma on *P. deltoides*. ×90
- E: Pycnidial pustules on *P. maximowiczii*. ×1.5
- F: Spore-horns on *P. deltoides*. ×1.7
- G: Pycnidial stroma on *P. deltoides*. ×90
- H: Alpha and beta conidia. ×400

I, J: *Diaporthe spiculosa* (ALB. et SCHW.) NIT. on *Rhus verniciflua*.

- I: Perithecial pustules. ×1.5
- J: Perithecial stroma. ×50

Plate XIII

A～C: *Diaporthe oncostoma* (DUBY) FUCK. on *Elaeagnus umbellata*.

- A: Perithecial pustules. ×1.5
- B: Perithecia formed beneath the empty pycnidium. ×50
- C: Ascus. ×500

D～F: *Diaporthe larseniana* MUNK on *Abies veitchii*.

- D: Perithecial pustules. ×1.5
- E: Perithecium surrounded by a blackened zone. ×50
- F: Asci showing apical ring at the tip. ×500

G: *Diaporthe evonymi* on *Euonymus sieboldianus*; Perithecia formed under the bark (upper) and blackened zones formed within wood (lower). ×1.5

H, I: *Diaporthe dubia* NIT. on *Acer palmatum*.

- H: Perithecial pustules. ×1.2
- I: Perithecial stroma. ×35

Plate XIV

A: *Diaporthe varians* (Curr.) Sacc. on *Acer palmatum* var. *amoenum*; Perithecial stroma. ×75

B, C: *Diaporthe pustulata* (Desm.) Sacc. on *Acer palmatum* var. *amoenum.*
  B: Perithecial pustules and blackened zone on wood. ×1.7
  C: Perithecial stroma. ×50

D～F: *Diaporthe detrusa* (Fr.) Fuck. on *Hydrangea paniculata.*
  D: Perithecial pustules. ×1.5
  E: Perithecium formed beneath an empty pycnidium. ×50
  F: Asci showing apical ring at the tip. ×500

G～I: *Diaporthe melanocarpa* Dearn. on *Betula platyphylla* var. *japonica.*
  G: Perithecial pustules. ×1.5
  H: Perithecial stroma. ×35
  I: Asci and ascospores. ×500

Plate XV

A, B: *Diaporthe padi* Otth on *Malus sieboldii.*
  A: Perithecial pustules. ×1.5
  B: Perithecial stroma. ×35

C～E: *Diaporthe impulsa* (Cke. et Pk.) Sacc. on *Sorbus commixta.*
  C: Perithecial pustules. ×1.5
  D: Perithecial stroma. ×15
  E: Ascus and ascospores. ×500

F～H: *Diaporthe amorphae* Ell. et Ev. on *Maackia amurensis* var. *buergeri.*
  F: Perithecial pustules. ×1.7
  G: Perithecial stroma. ×35
  H: Ascus. ×500

I, J: *Valsa kitajimana* sp. nov. on *Zelkowa serrata.*
  I: Perithecial pustules. ×3
  J: Perithecial stroma. ×90

Plate XVI

A～E: *Valsa paulowniae* Miyabe et Hemmi on *Paulownia tomentosa.*
  A: Perithecial pustules on bark surface. ×1.8
  B: Masses of perithecia under the bark, many perithecia being aggregated in one stroma. ×2.5
  C: Perithecial stroma showing well developed ectostroma. ×25
  D: Pycnidia formed under the bark, one to two pycnidia being aggregated in one stroma. ×2.5
  E: Pycnidial stroma. ×90

F～I: *Valsa ceratosperma* (Tode ex Fr.) Maire.
  F: Perithecial pustules on *Forsythia suspensa.* ×1.5
  G: Perithecial stroma on *Castanea crenata.* ×25
  H: Pycnidial pustules on *Malus pumila.* ×1.8
  I: Pycnidial stroma on *Betula lenta.* ×50

Plate XVII

A～E: *Valsa abietis* Fr.

- A: Perithecial pustules on *Chamaecyparis obtusa*. ×1.5
- B: Perithecial stroma on *Larix leptolepis*. ×25
- C: Pycnidial pustules and spore-horns on *Chamaecyparis lawsoniana*. ×1.2
- D: Pycnidial stroma on *Picea sitchensis*. ×25
- E: Conidia on *Cryptomeria japonica*. ×500

F～I: *Valsa sordida* Nit.

- F: Perithecial pustules on *Populus grandis*. ×1.5
- G: Perithecial stroma on *P. koreana* x *P. trichocarpa*. ×50
- H: Pycnidial pustules on *P. maximowiczii*. ×1.2
- I: Pycnidial stroma on *P. maximowiczii*. ×90

Plate XVIII

A, B: *Valsa germanica* Nit.

- A: Perithecial pustules on *Populus trichocarpa*. ×2.3
- B: Perithecial stroma on *Populus* sp. ×50

C～F: *Valsa salicina* (Pers. ex Fr.) Fr.

- C: Perithecial pustules on *Populus maximowiczii* x *P. nigra*. ×2
- D: Perithecial stroma on *P. alba*. ×25
- E: Ascus and ascospores on *P. alba*. ×500
- F: Pycnidial stroma on *Pseudotsuga taxifolia*. ×90

G～J: *Valsa ambiens* (Pers. ex Fr.) Fr.

- G: Perithecial and pycnidial pustules on *Prunus yedoensis*. ×1.2
- H: Perithecial stroma on *Morus alba*. ×35
- I: Ascospores on *P. yedoensis*. ×500
- J: Pycnidial stroma on *P. yedoensis*. ×25

Plate XIX

A～D: *Leucostoma kunzei* (Fr.) Munk.

- A: Perithecial pustules on *Cryptomeria japonica*. ×1.5
- B: Perithecial stroma on *Pinus densiflora*. ×35
- C: Pycnidial pustules on *P. densiflora*. ×1.5
- D: Pycnidial stroma on *Larix leptolepis*. ×90 (Photo. by T. Uozumi)

E～H: *Leucostoma nivea* (Hoffm. ex Fr.) Höhn.

- E: Perithecial pustules on *Populus maximowiczii*. ×1.5
- F: Perithecial stroma on *P. maximowiczii*. ×50
- G: Pycnidial pustules on *P. alba*. ×1.8
- H: Pycnidial stroma on *P. alba* x *P. davidiana*. ×50

Plate XX

A～E: *Leucostoma persoonii* (Nit.) Höhn.

- A: Perithecial pustules on *Alnus* sp. ×1.8
- B: Perithecial stroma on *Alnus* sp. ×15
- C: Asci and ascospores on *Sorbus commixta*. ×500
- D: Pycnidial pustules on *A. incana*. ×1.5
- E: Pycnidial stroma on *A. incana*. ×130

- F, G: *Leucostoma massariana* (DE NOT.) HÖHN. on *Sorbus commixta.*
  - F: Perithecial pustules. ×1.2
  - G: Perithecial stroma. ×15

Plate XXI

- A, B: *Endothia singularis* SHEAR et STEV.
  - A: Perithecial pustules on *Quercus serrata.* ×1.2
  - B: Perithecial stroma on *Castanea crenata.* ×75
- C～E: *Endothia radicalis* (SCHW. ex FR.) CES. et DE NOT.
  - C: Perithecial pustules on *Quercus salicina.* ×1.2
  - D: Perithecial stroma on *Q. serrata.* ×90
  - E: Pycnidial stroma on *Carpinus japonica.* ×50
- F～I: *Endothia havanensis* BRUNER.
  - F: Perithecial pustules on *Quercus variabilis.* ×6/5
  - G: Perithecial pustules on exposed root of *Q. serrata.* ×1.2
  - H: Perithecial stroma on *Pyrus pyrifolia* var. *culta.* ×90
  - I: Perithecium peeled from the bark of *Q. serrata.* ×90

Plate XXII

- A～G: *Endothia parasitica* (MURR.) P.J. et H.W. AND. on *Castanea crenata* (B–G) and *C. mollissima* (A).
  - A: Perithecial pustules. ×1.5
  - B: Perithecial stroma. ×90
  - C: Perithecium peeled from the bark. ×80
  - D: Asci and ascospores. ×310
  - E: Pycnidial pustules and spore-horns. ×2.5
  - F: Pycnidial stroma. ×90
  - G: Mycelial fan formed under the bark. ×1.2
- H～J: *Endothia macrospora* KOBAYASHI et ITO on *Castanopsis cuspidata* var. *sieboldii.*
  - H: Perithecial pustules. ×1.2
  - I: Perithecial stroma. ×50
  - J: Pycnidial pustules and spore-horns. ×2

Plate XXIII

- A, B: *Endothia nitschkei* OTTH.
  - A: Perithecial pustules on *Larix leptolepis.* ×1.2
  - B: Perithecial stroma on *Rhus javanica.* ×50
- C, D: *Endothia tetraspora* KOBAYASHI on *Castanopsis tschonoskii.*
  - C: Perithecial pustules. ×1.5
  - D: Perithecial stroma. ×90
- E～H: *Bagcheea albo-maculans* (FUKUI) HINO et KATUMOTO on *Castanopsis cuspidata* var. *sieboldii.*
  - E: Spots on the upper leaf surface. ×1.5
  - F: Spots on the lower leaf surface. ×1.5
  - G: Perithecium. ×210
  - H: Ascus having four ascospores which have wide vacuolate area at the central part with a vertical linear band. ×500

Plate XXIV

A～C: *Stegophora oharana* (NISIKADO et MATUMOTO) PETR. on *Ulmus parvifolia*.
- A: Spots constituted from crust and stroma; upper (left) and lower (right) leaf surface. ×2
- B: Perithecium with a neck bearing from the upper side. ×2
- C: Acervulus. ×210

D～F: *Sphaerognomonia haraeana* sp. nov. on *Cryptomeria japonica*.
- D: Perithecial pustules. ×1.5
- E: Perithecium. ×130
- F: Ascus and ascospores. ×500

G～I: *Ditopella kajiana* HARA on *Oryza sativa*.
- G: Perithecial pustules. ×1.5
- H: Perithecium. ×130
- I: Ascospores. ×500

Plate XXV

A～C: *Mazzantia yukawana* (HINO et KATUMOTO) comb. nov. on *Sasa hirtella*.
- A: Stroma on leaf sheath. ×2
- B: Perithecial stroma. ×130
- C: Pycnidial stroma. ×130

D, E: *Mamianiella coryli* (BATSCH) HÖHN. on *Corylus sieboldiana*.
- D: Perithecia on the upper (left) and the lower (right) leaf surface. ×1.5
- E: Perithecial stroma. ×130

F～I: *Linocarpon cariceti* (BERK. et BR.) PETR. on *Molinia japonica*.
- F: Perithecial pustules. ×0.8
- G: Perithecial with ostiole bearing from the upper side of wall. ×210
- H: Ascus containing fascicular ascospores. ×500
- I: Ascospore having two septa. ×500

Plate XXVI

A～D: *Linocarpon muroianum* HINO et KATUMOTO on *Sasa kurilensis*.
- A: Perithecial pustules. ×2
- B: Perithecia. ×130
- C: Ascus showing small apical ring at the tip and ascospores are contained as a fascicule. ×500
- D: Ascospore having many septa. ×500

E～H: *Gnomonia megalocarpa* (HINO et KATUMOTO) comb. nov. on *Castanea crenata*.
- E: Perithecia on the upper (left) and the lower (right) leaf surface. ×1.5
- F: Perithecium. ×130
- G: Asci having fascicular ascospores. ×500
- H: Ascospores. ×500

I: *Phomatospora punctulata* HINO et KATUMOTO on *Pseudosasa japonica*; perithecial pustules. ×2

J, K: *Phomatospora miurana* HINO et KATUMOTO on *Apios fortunei*.
- J: Spots on leaf. ×1.5
- K: Perithecium. ×370

日本産ディアポルテ菌科（胴枯病菌科）菌類の分類学的研究

小林享夫[1]

要旨

第二次大戦後，林業においては天然林から人工林への切り替えが進められ，急速な造林面積の拡大がなされつつあり，また合理的土地利用あるいは木材利用の多用化にともない，造林樹種もまた増加してきた．一方，その反面において，これら造林地における各種の病害の発生もまた増加の一途をたどり，とくに胴・枝枯性病害による被害が各地で問題となってきた．しかもそれらの病原菌の多くは，わが国ではまだ記録のない新しいものであり，所属未定の状態であって，これら病原菌の分類同定ないし病原性の検討が，戦後の樹病の分野における目標のひとつであった．本論文はこれら胴・枝枯性病菌のなかのひとつの主要な群をなしている *Diaporthe* 属と，その近縁属菌類について分類学的検討を加えた結果をまとめたものである．内容は大別して3つの部分からなりたつ．

第1は子のう菌類とくに子のう殻菌類（Pyrenomycetes）中における *Diaporthe* 属とその近縁属群の位置づけと範囲の明確化である．Fries（1823）以来今日まで，いわゆる子のう殻菌類の分類体系は，その用いる分類基準の変化にともなって大きな変革をとげてきたが，それとともに *Diaporthe* 菌群の特徴・範囲・位置づけなども，分類学者によって大きな違いがみられる．筆者はここで今までの分類体系の変せん，分類基準の変化をふり返りながら，日本産の資料の調査からえた知識をもとにして，*Diaporthe* 菌群の特徴点を明らかにし，範囲を明確にして子のう殻菌類中における位置づけを行なった．

第2には，このように範囲・位置を明らかにしたディアポルテ菌科に所属する日本産の属および種の同定および再検討の結果を，各属ごとに各論的に記載した．同定に際しては，完全世代の形態による比較のほかに，不完全世代形成の有無あるいはその形態・所属を，属ないし種の類別点として用いるべきであるとの立場から，できうる限り不完全世代を調査し，新鮮な材料によって胞子からの分離培養を行ない，培地上の菌そうの性状・子実体の形態を比較して，完全世代と不完全世代の同根関係の立証につとめ，生活史を明らかにしてこれを判別の一手段とした．

第3には今までディアポルテ菌科ないし目として本菌群に含まれたことのある属について，その所属の当否，独立性についてのべ，それによってディアポルテ菌科菌類の属の検索表をつくった．これは本菌群の範囲・概念について分類学者のあいだにかなりの違いがみられること，またこれら諸家の吟味の対象にならなかった属もあることなどから，それらの属おのおのについてその独立性・所属の当否を論じたものである．もちろん，日本産資料からの知見のみをもっては，本科全属の改廃統合を行なうことはできないが，これら諸属に関する従来の文献を整理し，それらが本科に所属するか否かを判断することはかなりの程度可能であり，また不完全世代の有無などを含めて問題点を整理しておくことは将来の検討のために役立つものと考えられたからである．

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[1] 保護部樹病科樹病研究室長，農学博士

国際命名規約によって権威づけられた Fries の Systema Mycologicum 第 2 巻は 1823 年の出版であるが，この中では子のう菌類の属および種の数は微々たるものである．そのご 19世紀はいわば菌類の調査探索時代であって，おびただしい数の子のう殻菌類の種や属が発見記載された時代である．そしてようやく 19 世紀末にいたって，これらの属や種を整理し分類体系をうちたてる試みがなされた．これら菌学者の用いた目，科の名称・範囲などにはたがいに違いはあるが，分類の手段として用いた類別基準はいずれも共通しており，基本的な考え方はほとんど同じであるといえよう．子のう殻菌類についてその基準をみると，子のう殻が基質すなわち枝・葉に表生するか埋生するか，単生か群生か，色が黒いか，赤・黄などの鮮やかな色か，固いか柔らかいか，子座組織をともなうか否か，子のう殻壁があるかないか，などによって目や科が区分され，またおもに子のう胞子の細胞の数・形・着色の有無・付属糸の有無などによって属や種が分けられる．

この時代における代表的な Lindau (1897) の分類体系によって，*Diaporthe*, *Valsa* などの近縁諸属をみると「子のう殻は樹皮内に埋生，群生し，子座を有し，中央に集まる頸をもって表面にでる，柄子殻世代をもつ」という特徴のもとにバルサ菌科 (Valsaceae) にまとめられ，10 属が収められている．

しかし 20 世紀にはいってからこのような分類体系にたいして，子のうの形成過程，子のうや子のう殻の構造の重要性がしだいに認められ，子のう菌類の分類に用いられる特徴が次々と提出されてきた．

Höhnel (1917a) は *Diaporthe* などの諸属にたいし，「子のう殻内に子のうが異なる高さに配列充満する，子のうの膜は薄く，頂部の膜のみ厚く，そこに apical ring という特有の構造をもつ，子のう胞子は無色」という特徴のもとに Lindau のバルサ科，グノモニア科 (Gnomoniaceae) などから 29 の属を集めて，新たにディアポルテ菌科 (Diaporthaceae) を設けた．そしてソーセージ形の子のう胞子をもつ属をバルサ亜科，その他の型の子のう胞子をもつ属をディアポルテ亜科と 2 亜科に分けた．

ここで Höhnel は，それまでの子座の有無，子のう殻の単・群生，葉に生ずるか樹皮に生ずるかなどの表面的特徴をすてて，子のう殻の内部構造や子のうの構造に重点をおいて科をまとめたもので，子座をもち樹皮内に群生するバルサ菌科と，子座を欠き葉に単生するグノモニア菌科とを初めて同一菌群に結合した．残念ながら Höhnel は翌 1918 年にこの新しい考え方をすて，バルサ亜科の諸属をディアポルテ菌科から分離して，他の多くの科の中から集めた子のう胞子ソーセージ形の属すべてと一緒にして新しい科 Allantosphaeriaceae をつくった．これは胞子の形態に重点をおく Saccardo (1882〜1931) の考え方に逆行したものであるが，20 世紀前半はいわば試行錯誤の時代でもありやむをえないものと思われる．

一方，アメリカでは 1920 年ころから Wehmeyer が Höhnel (1917a) のディアポルテ菌科や近縁科の属をとりあげ，生活史を重視する考え方にたって，完全世代の形態に加えて不完全世代の形態・所属をあわせて比較検討し，1926 年に Höhnel のディアポルテ菌科の概念を訂正した見解を発表した．Wehmeyer (1926a) はここで子のう胞子の着色の有無は属の類別基準にはならないと主張し，また Lindau らが Melanconidaceae においた大部分の属を吸収し，Höhnel (1918) の Allantosphaeriaceae からバルサ亜科を分離しディアポルテ菌科に再結合した反面，グノモニア菌科の属をふたたび切り離した．Wehmeyer はこの 2 亜科にたいし，バルサ亜科は *Cytospora* に代表される複雑多室性の柄子殻世代をもち，ディアポルテ亜科は単純な柄子殻もしくは分生子堆をもつことで区別される，と特徴づけた．

1932 年に Nannfeldt はそれまでに提出された多くの分類基準を取捨選択して，まったく新しい分類体系を発表した．Nannfeldt の用いた大きな分類基準は子のう殻の内部構造と子のうの構造である．彼の分類体系は古典分類体系における真正子のう菌類の 2 つの亜綱である Pyrenomycetes と Discomycetes

(子のう盤菌類）とを一緒にして，新たに子のうの構造，形成過程によって根本的に再編成したもので，きわめて画期的な試みであった。NANNFELDT によれば，真正子のう菌類は大別して2群に分けられる*.ひとつは子のうの膜が 2 重であり，典型的には子のう殻壁をつくらず子座組織中に子のうを生ずる室をつくるもので，Ascoloculares（子のう室菌類または複膜子のう菌類）という亜綱にまとめられ，旧子のう殻菌類の大半が収められた。第2群は，子のう膜が一重で，典型的には子のうと側糸からなる子実層 hymenium をつくるもので，Ascohymeniales 亜綱（子実層菌類または単膜子のう菌類）にまとめられ，旧子のう盤菌類と，子のう殻菌類の残った属がふくまれる。

NANNFELDT はここでディアポルテ菌科の菌類が典型的な子実層をつくらず子のうが早い時期に子のう殻壁から離れて殻内を不規則に充満する点を重視し，2 亜科をそれぞれ Diaporthales と Valsales とそれぞれ独立目に昇格した。しかしこのふたつの目の区分は，子のう胞子の形の違いにあるとのべているにすぎず，詳しい説明はなされていない。

1950 年ごろから 20 世紀前半における個々の属や種あるいは科の再検討をもとにして，子のう菌類の分類体系づけに関する論文・著書が相次いで公表されている。そこではおのおの多少の修正点はあるが，基本的な考え方はほぼ NANNFELDT のそれを受けついでいるといってよいであろう，

GÄUMANN (1949) は NANNFELDT の Diaporthales と Valsales を統合してひとつの目 Diaporthales とし，2 科 Diaporthaceae と Valsaceae とをおいた。

一方 MILLER (1949) は Sphaeriales（球殻菌目）群の再検討の結果をまとめ，*Diaporthe* とその近縁菌群は Sphaeriales の中のひとつの科 Diaporthaceae とすべきであると主張した。

LUTTRELL (1951) は子のう殻内部構造とくに子のう形成過程における細胞学的核学的研究の review を行ない，NANNFELDT の分類体系を修正した見解を発表した。かれは GÄUMANN 同様，*Diaporthe* 菌群をディアポルテ菌目とし，ディアポルテ菌科のほかに，新たに Melanosporaceae をおいた。これは Hypocreales（肉座菌目）の中から子のう殻内部構造が *Diaporthe* に類似するものをまとめて移したものである。さらにかれは少々疑わしいがと前おきして Ceratostomataceae をここにふくめている。

MUNK (1953・1957) は MILLER と同じく *Diaporthe* 菌群を Sphaeriales の中のひとつの科 Diaporthaceae と考えたが，その中に Rhamphorioideae, Melogrammatoideae の 2 亜科を新たにもうけディアポルテ亜科とともに 3 亜科とした。

GILMAN ら (1957, 1959) は，多少の属の追加を除いては，WEHMEYER (1926a) の考え方をそのままうけついだ

DENNIS (1960) はイギリス産子のう菌類にもとづき分類体系を発表したが，かれのディアポルテ菌科は一方では LUTTRELL や MUNK の Melanosporaceae, Rhamphorioideae, Ceratostomataceae を除外し，さらにソーセージ形子のう胞子をもつバルサ亜科をも除外し，他方では新たに Amphisphaeriaceae の諸属を統合するという，きわめて特異な概念をもつが，その理由についてはほとんどのべられていない。

ARX と MÜLLER は子のう殻菌類の属の再吟味を行ない 1954 年に単細胞の，1962 年に 2 細胞の属をかれらの分類体系にしたがって配列記載した。はじめかれら（ARX & MÜLLER 1954）は *Diaporthe* 菌群をひとつの目 Diaporthales としバルサ科とディアポルテ科の 2 科をおいたが，のち（MÜLLER & ARX 1962)

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* NANNFELDT は3群にわけたが，そのひとつ Plectoascales は現在では他の群にふくませる考え方が強く，また他にくらべると小さい群であるので，実質的には2群としてのべる。

これを Sphaeriales の中のひとつの科 Diaporthaceae とし前の 2 科をそれぞれ亜科とした．一方この *Diaporthe* 菌群から *Cryptosporella* 属とその近縁属を分離し独立の科 Cryptosporellaceae を設けた．

以上のべたように，*Diaporthe* とその近縁菌群は，Höhnel (1917a) が新しい考え方をもってディアポルテ菌科を設けて以来，多くの菌学者によってその範囲，位置づけ，特徴についてのべられているが，子のう菌類中におけるその位置，概念にはきわめて幅広い変動がみられる．筆者はこれら菌学者の考え方をふり返り，また一方日本産の属の形態的特徴のはあくから，ディアポルテ菌群を，子のう菌類，Ascohymeniales，Sphaeriales の中のひとつの科とするのが適当であると考え，科名としては Höhnel が 1917 年に設けた Diaporthaceae の内容を修正して採用するのが適当であるとの結論に達した．Höhnel 以来行なわれてきた子のう胞子の形態によりバルサ亜科とディアポルテ亜科の 2 群に分ける考え方は，これらの属のあいだの類縁性から不自然であると考えこれを廃した．また Melanosporaceae，Ceratostomataceae，Amphisphaeriaceae などの諸属は本菌科からは除外すべきものと考え，さらに最近分離独立された Cryptosporellaceae はその形態，生活史から独立性に乏しいと考え，本菌科に再結合した．

このような立場で本菌科菌類を特徴づける分類基準は以下のとおりである．

1．子のうの膜は一重である．

2．子のう頂部に apical ring を有し，ヨードには青染しない．

3．子のうは早い時期に形成母層を離れ，子のう殻内を自由に不規則に充満する．

4．側糸 (paraphyses) はない．つまり 3 の特徴とあわせてディアポルテ菌科菌類は典型的な子実層をつくらない．

5．子のう殻の孔口は子のう殻と同時につくられ，あとから殻壁が溶けて穴があくものではない．孔口の内壁に無色の細い糸状体 periphyses をもつ．

6．子のう殻壁はほぼ同じ大きさのやや扁平厚膜細胞からなり，頸の部分では縦に長く平行的に，子のう殻の部分では同心状に配列する．

このような特徴によってまとめられた本科菌類は，子のう殻の形成状態，頸の形態，子座の有無，子座の形態，子のう胞子の形，細胞数などのいわゆる表面的特徴によって属が分けられる．しかしこれらの特徴は寄主植物の違い，樹皮，葉など形成部分の違い，外部環境（温・湿度）の違いなどによって変化し，固有の特徴とはならない場合がしばしばある，また胞子の隔膜の有無，着色の有無，形なども一応の区別点ではあるが，これも決定的ではない場合が多い．したがって，これらの特徴による属の区分はなお流動的といってよく，不完全世代の形態・所属を加えた総合判断を必要とするものと考える．

たとえば *Endothia* 属のタイプ種は単細胞ソーセージ形の子のう胞子をもつが，他の幾つかの種は 2 細胞楕円形の子のう胞子をもっている．しかし，これらの種は子のう胞子の形と細胞数の違いを除いては，他の形態的特徴にまったく差がなく，また同一の不完全世代をもつことから，Shear ら (1917) の考え方を採用し，いずれも同一属に所属せしめた．また，ソーセージ形の子のう胞子で特徴づけられる *Valsa* 属の中には，ソーセージ形から楕円形までの変異をしめす種があり，2 細胞の子のう胞子の属とされている *Gnomonia* や *Pseudovalsella* の中には 4 細胞の胞子をもつ種もふくまれる．これらはいずれも不完全世代を含めた総合判断によって，それぞれの属の一員とされたものである．子のう胞子の形によって亜科を分けることが不自然であるのは，以上の例からも明らかであろう．

原 (1954) によれば，日本および周辺極東地域において日本人研究者の努力によって記録された菌類の数

は，およそ 7,300 種にのぼるという．しかし，ディアポルテ菌科に所属する菌類は少なく，日本菌類目録(1954) に 12 属 62 種が，有用植物病名目録 (1965) に 15 属 35 種が記録されている．これらの中にはわが国における分布の疑わしいもの，属名変更を必要とするもの，種の独立性に乏しいものも含まれている．筆者は新鮮な材料によって主として木本植物に生ずる本科菌類の分類同定を行なうとともに，草本植物を含め今までわが国で記録されたこれらの種の再検討を行ない，現在まで 21 属 77 種の本科菌類を同定した．この中には 7 新種，5 種の新組合せ，41 の本邦未記録種が含まれる．本文においてはこれらの属および種個々についての形態の記述を行なったが，ここでは省略し，日本産の属の名および種の数，ならびに不完全世代の所属を以下に列記する．

1. *Melanconis* TUL.　7 種 (新種 3)．不完全世代 *Melanconium*.
2. *Pseudovalsella* HÖHN.　3 種 (新種 1，新組合せ 1)．不完全世代 *Hendersonula* および *Coryneum*.
3. *Ophiovalsa* PETR.　4 種 (新組合せ 1)．不完全世代 *Disculina*.
4. *Ditopellopsis* REID et BOOTH.　1 種 (新種)．不完全世代不明．
5. *Cryptodiaporthe* PETR.　5 種 (新組合せ 1)．不完全世代 *Fusicoccum*, *Discella* など．
6. *Diaporthe* NIT.　19 種．不完全世代 *Phomopsis*.
7. *Valsa* FR.　9 種 (新種 1)．不完全世代 *Cytospora*, *Cytophoma* および *Cytosporina*.
8. *Leucostoma* HÖHN.　4 種．不完全世代 *Leucocytospora*.
9. *Endothia* FR.　7 種．不完全世代 *Endothiella*.
10. *Bagcheea* MÜLL. et MEN.　1 種．不完全代不明．
11. *Stegophora* SYD.　1 種．不完全世代 *Cylindrosporella*.
12. *Sphaerognomonia* POTEB.　1 種 (新種)．不完全世代不明 ．
13. *Mazzantia* MONT.　1 種 (新組合せ)．不完全世代 *Mazzantiella*.
14. *Ditopella* DE NOT.　1 種．不完全世代不明．
15. *Linocarpon* SYD.　2 種．不完全世代不明．
16. *Gnomonia* CES. et DE NOT.　4 種 (新組合せ 1)．不完全世代 *Discula*.
17. *Mamianiella* HÖHN.　1 種．不完全世代不明．
18. *Phomatospora* SACC.　2 種．不完全世代不明．
19. *Gnomoniella* SACC.　1 種．不完全世代不明．
20. *Mamiania* CES. et DE NOT.　1 種．不完全世代不明．
21. *Cryptosporella* SACC.　3 種．不完全世代 *Fusicoccum*.

なお現在までわが国で報告された種のうち，種名変更ないし異名として処理されたものを以下に列記する．

Cryptospora theae HARA (1919) → *Ophiovalsa theae* (HARA) KOB.

Cryptodiaporthe konseiensis KOBAYASHI (1962) → *Pseudovalsella thelebola* (FR.) HÖHN.

Diaporthe theae HARA (1920) → *Diaporthe eres* NIT.

Diaporthe moriokaensis SAWADA (1952) → *Diaporthe dubia* NIT.

Phomopsis cephalotaxi SAWADA (1950) → *Phomopsis occulta* (SACC.) TRAV.

Valsa mali MIYABE et YAMADA ap. IDETA (1903, 1909) → *Valsa ceratosperma* (TODE. ex FR.) MAIRE

Valsa theae HARA (1919) → *Valsa ceratosperma* (TODE ex FR.) MAIRE

Valsa cryptomeriae KITAJIMA (1918) → *Valsa abietis* FR.

Valsa cryptomeriae HARA (1918) → *Valsa abietis* FR.

Valsa cryptomeriaecola HARA (1925) → *Valsa abietis* FR.

Valsa sugifolia HARA (1918) → *Valsa abietis* FR.

Valsa chamaecyparisii HARA (1918) → *Valsa abietis* FR.

Valsa japonica MIYABE et HEMMI (1916) → *Valsa ambiens* (PERS. ex FR.) FR.

Valsa moricola YENDO (1927) → *Valsa ambiens* (PERS. ex FR.) FR.

Valsa cephalotaxi SAWADA (1950) → *Valsa friesii* (DUBY) FUCK.

Leucostoma persoonii (NIT.) TOGASHI (1930) → *Leucostoma persoonii* (NIT.) HÖHN.

Endothia fluens (SOW.) SHEAR et STEV. → *Endothia radicals* (SCHW. ex FR.) CES. et DE NOT.

Endothia tropicalis SHEAR et STEV. → *Endothia havanensis* BRUNER

Endothia japonica KOBAYASHI et ITO (1956) → *Endothia nitschkei* OTTH

Phomatospora yukawana HINO et KATUMOTO (1959) → *Mazzantia yukawana* (HINO et KAT.) KOB.

Ophiobolus graminis SACC. → *Linocarpon cariceti* (BK. et BR.) PETR.

Ophiochaeta graminis (SACC.) HARA → *Linocarpon cariceti* (BK. et BR.) PETR.

Gnomonia setacea var. *megalocarpa* HINO et KATUMOTO (1968) → *Gnomonia megalocarpa* (HINO et KAT.) KOB.

Gnomonia albo-maculans FUKUI (1933) → *Bagcheea albo-maculans* (FUKUI) HINO et KATUM.

Gnomonia oharana NISIKADO et MATUMOTO (1929) → *Stegophora oharana* (NISIK. et MATUM.) PETR.

Mamiania coryli (BAT.) CES. et DE NOT. → *Mamianiella coryli* (BAT.) HÖHN.

なおわが国でディアポルテ菌科の種として記載された *Diaporthe take* HARA (1913), *Valsa mori* SAWADA (1952, 1959), *Vialaea bambusae* HARA (1913), *Gnomonia hsienjencheng* HINO et KATUMOTO (1958) および *Sydowiella azukiae* HINO et KATUMOTO (1966) の5種は，タイプ標本あるいは記載の検討から，いずれも Diaporthaceae から除外された．

以上が日本産ディアポルテ菌科菌類の分類同定の概要である．

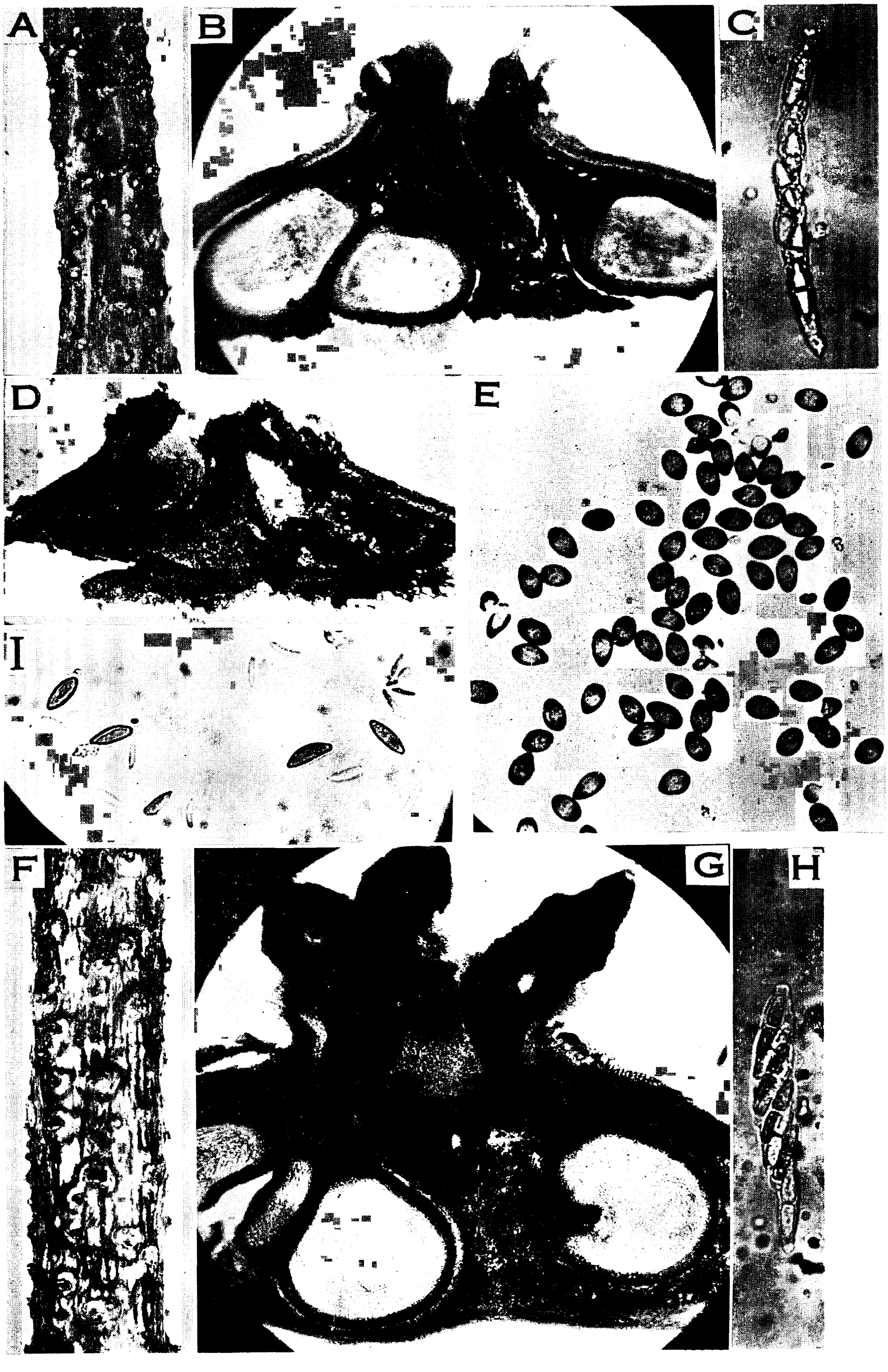
最後に今まで本科の属として記録された多くの属の独立性あるいは本科に所属することの当否を，日本産の種類の形態的特徴のはあくを基礎としながら，主として文献によって論議し，問題点を整理して本科菌類属の検索表を作製した。これら150余属個々についての論議は省略して，この検討を通じて浮んできた本科の属の分類上の問題点をのべる．

まず第1は，本科の中に今後再統合あるいは分割される可能性のある属があることである．前にのべたように，本科の属の区分は子のう胞子の形・細胞数，子座の有無などの表面的特徴によって行なわれている．筆者は種ないし属の類縁性ないし異同は，特に不完全世代との関連性を重視すべきであるとの WEHMEYER の考え方に賛成する立場から再吟味を行なっているが，日本産70余種の検討からもこのことはいえるものと考える．たとえば，*Gnomonia* とその近縁属はほとんど1属1種ぐらいに細分化されているが，それらの不完全世代が同一属に所属することが立証されれば再統合しうる属もある．また *Cryptodiaporthe* や *Pseudovalsella* のようにその中にかなり異なる不完全世代をもつとされている属では，それら

の生活史がはっきり立証されたあかつきには，幾つかの属に分割されうるものと考えられる．

第 2 には，本科の属相互間の類縁性および他科の菌類との近縁関係を背景とする発生学的考察である．近年発表された子のう菌分類体系書の中にはこの点について見解をのべているものがある．しかし，本科菌類においては生活史すなわち不完全世代の明らかでないものがきわめて多いこと，子のう形成過程を追跡した細胞学的核学的研究がきわめて少ないことから，本科の属相互間の類縁性，他科との関係など発生学的論議をするに足る資料はまだないと考え，本科諸属の生活史を明らかにすることが当面必要であることを指摘したにとどめた．

なお，今までに知られている限り，本科菌類においてその不完全世代に線菌目 (Molniliales) をもつ種類はなく，分生子堆菌目 (Melanconiales) あるいは柄子殻菌目 (Sphaeropsidales) のいずれかに所属する．また Sphaeropsidales に所属するものでは，不規則多室性の柄子殻もしくは不完全柄子殻をつくる属に所属し，*Phyllosticta*, *Coniothyrium* などに代表される典型的な球形・単室の単純な柄子殻をつくるものはないようである。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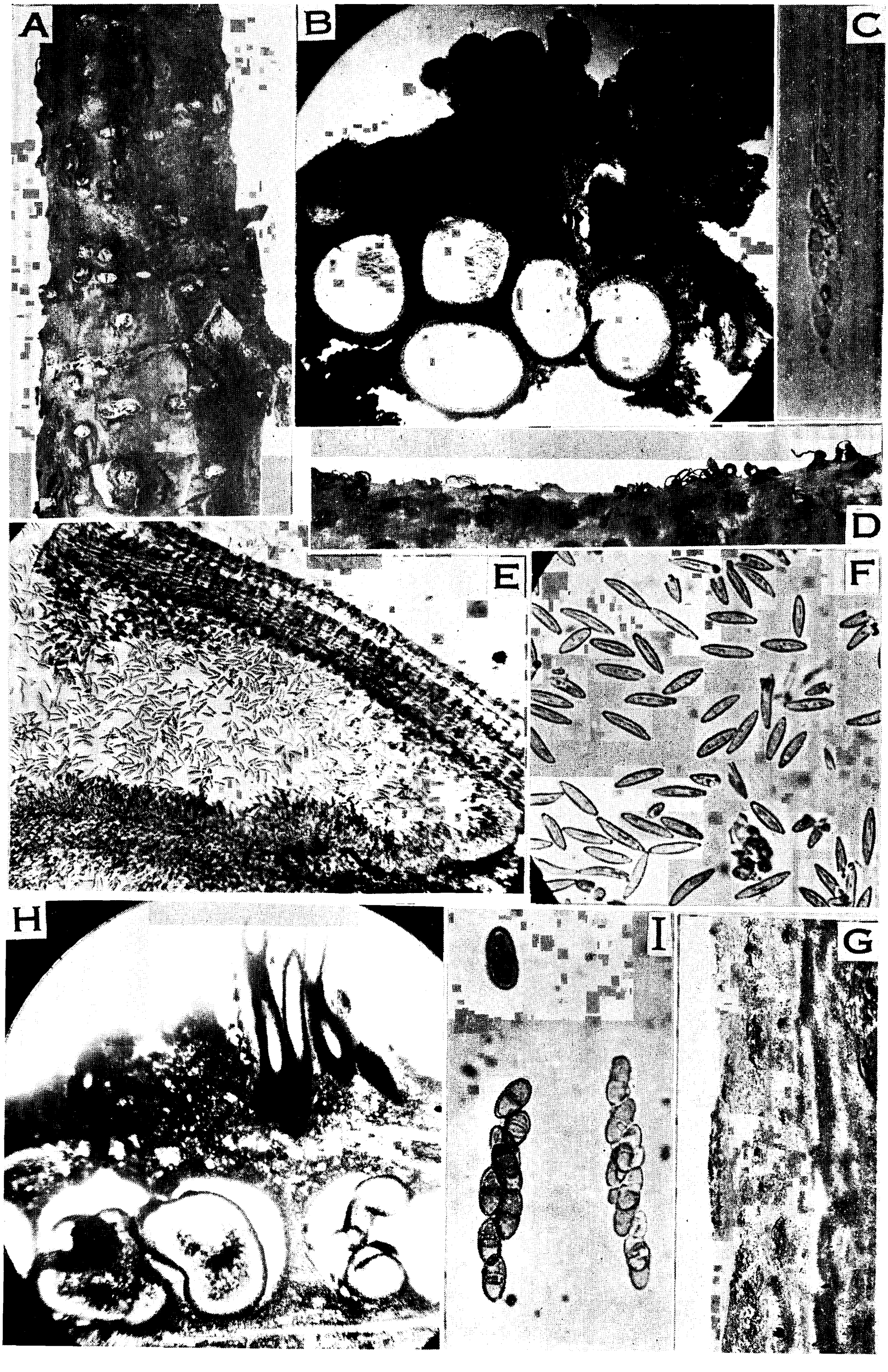
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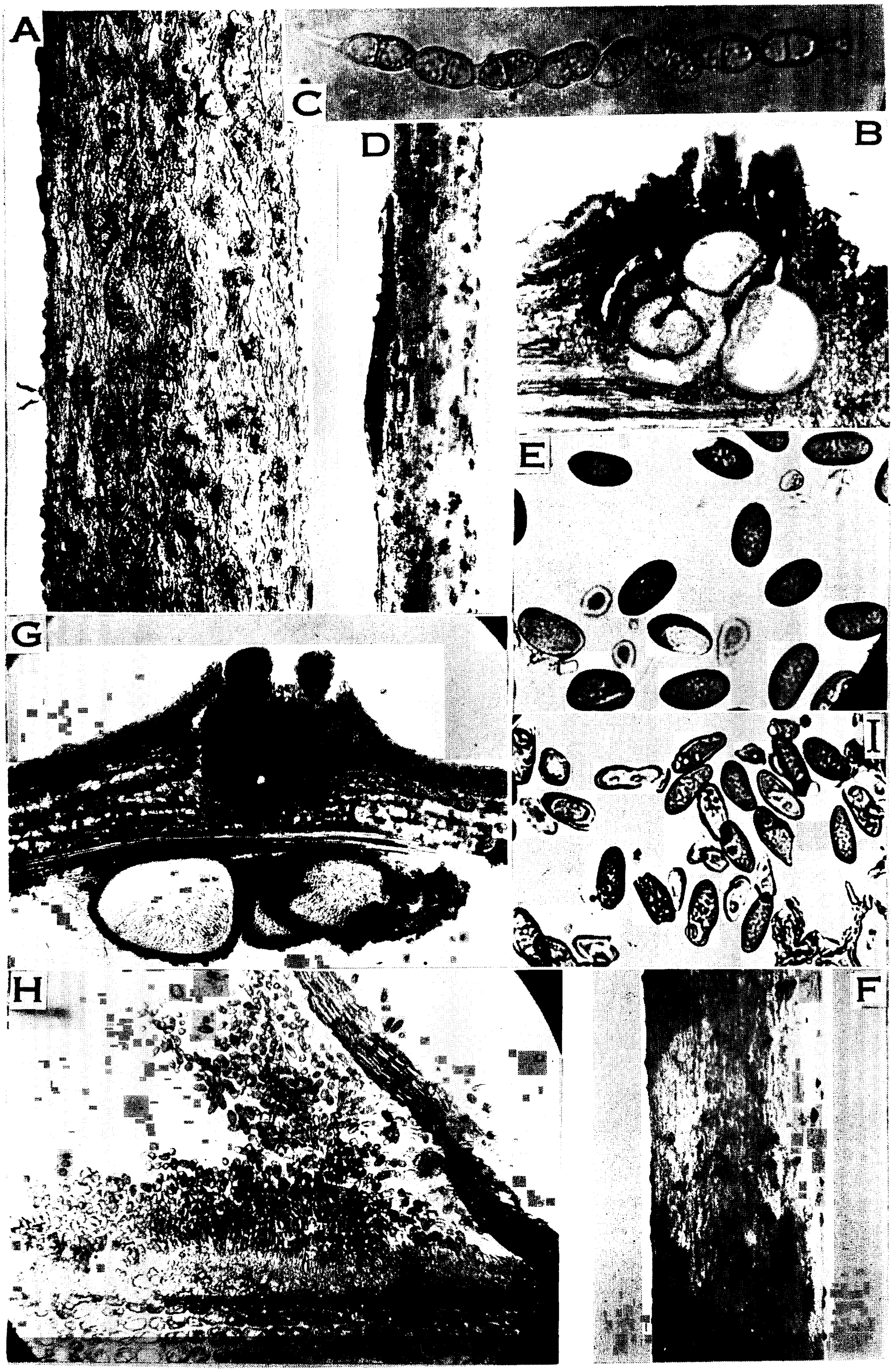
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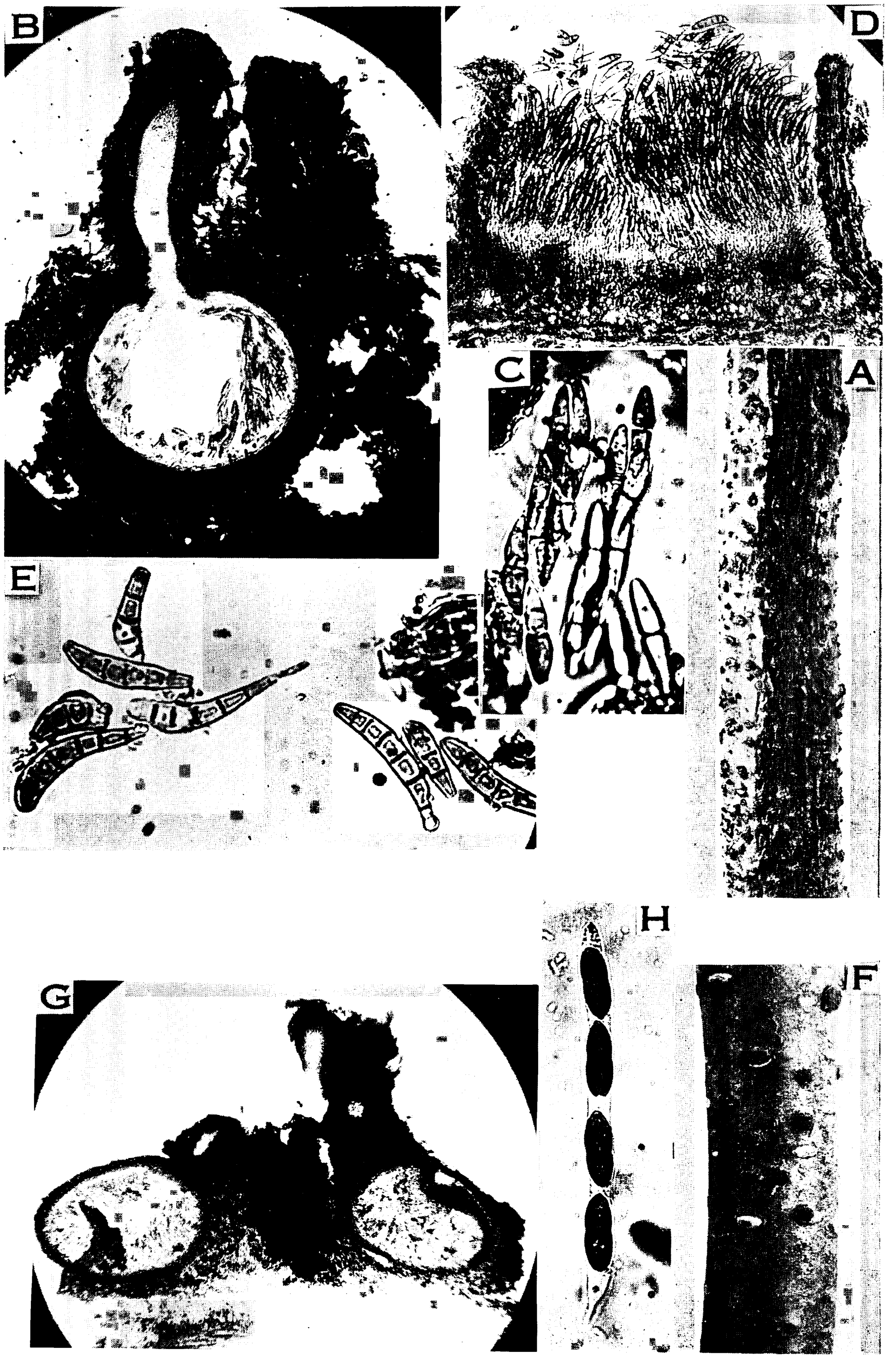
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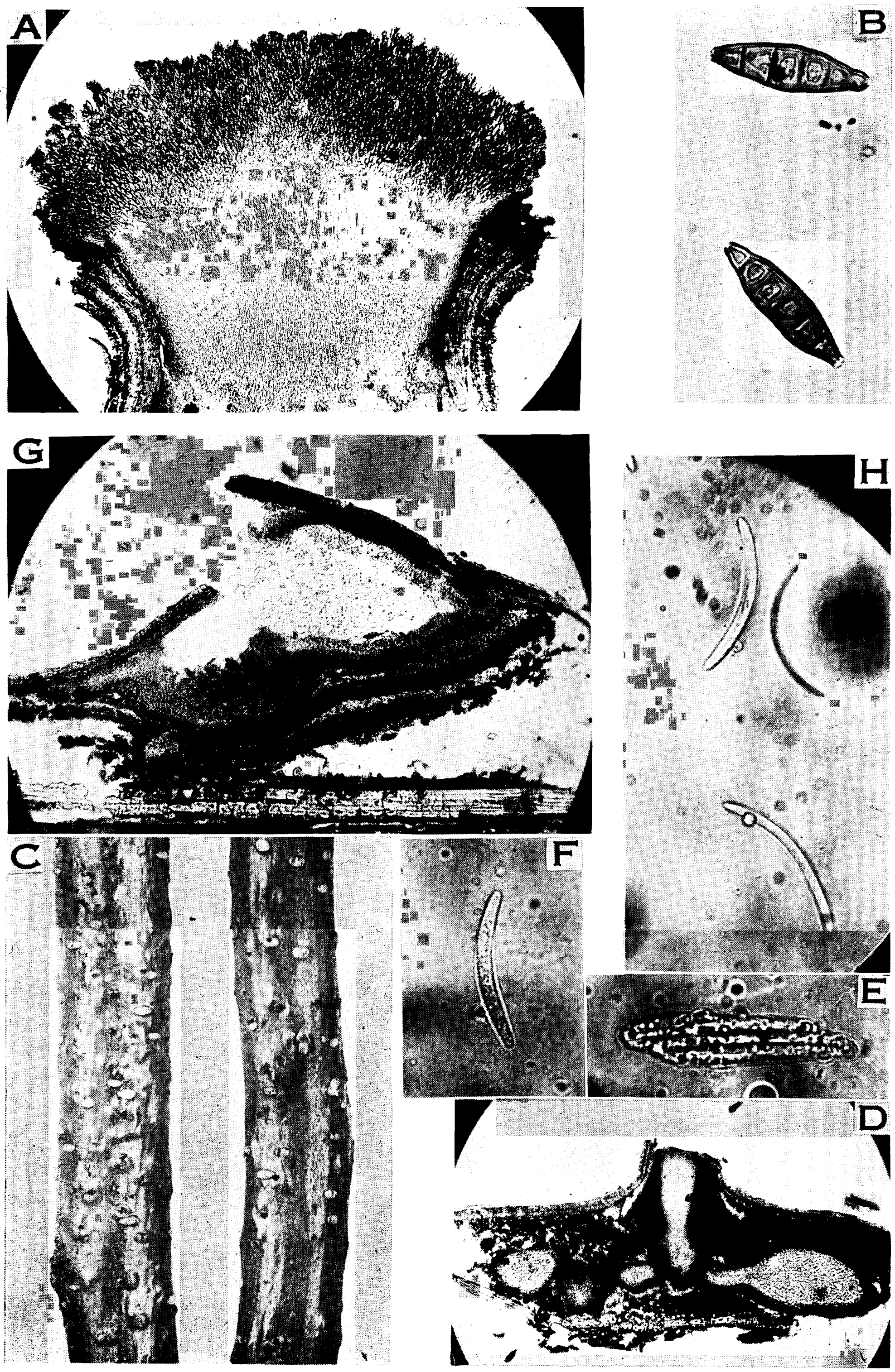
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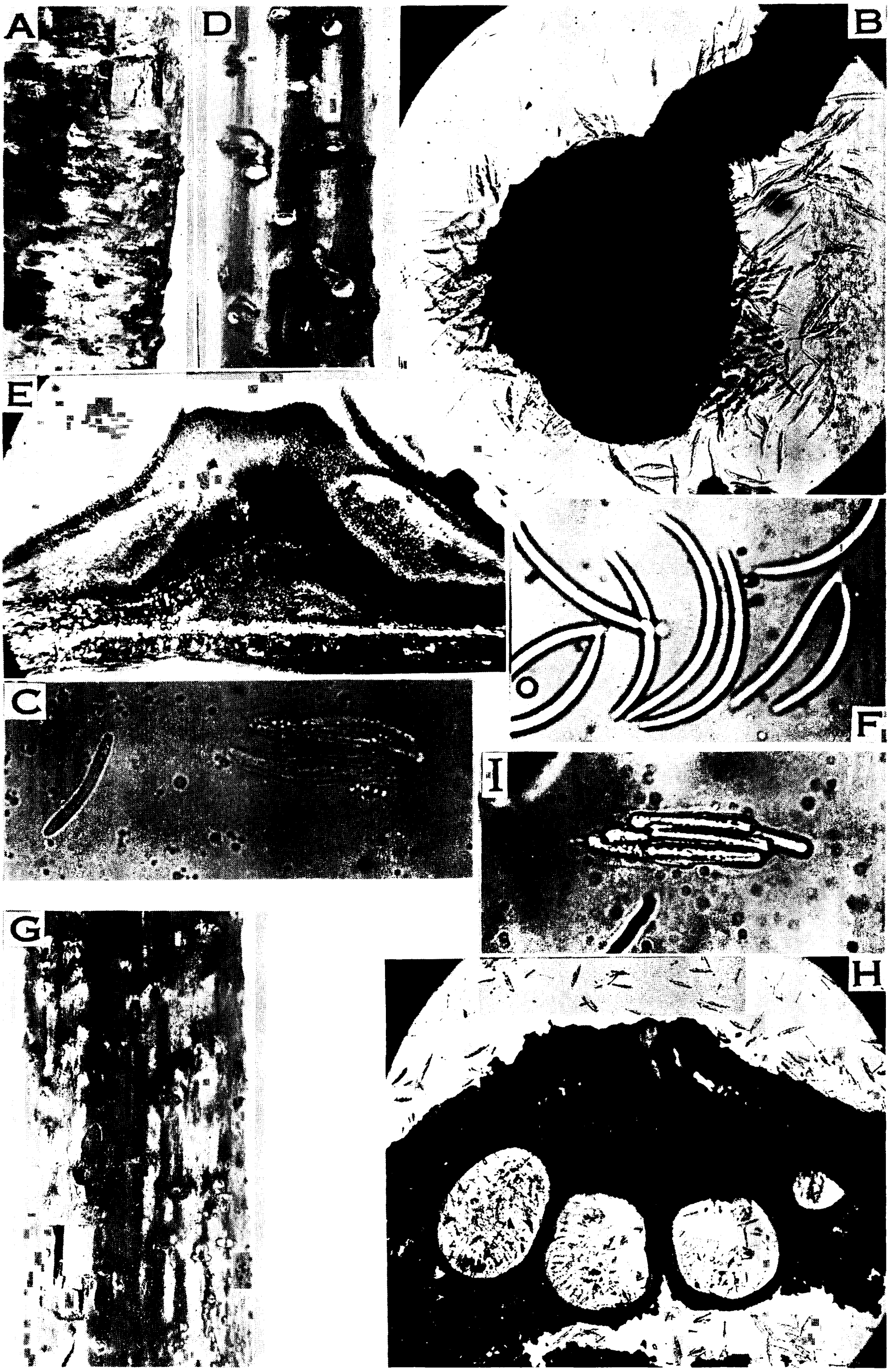
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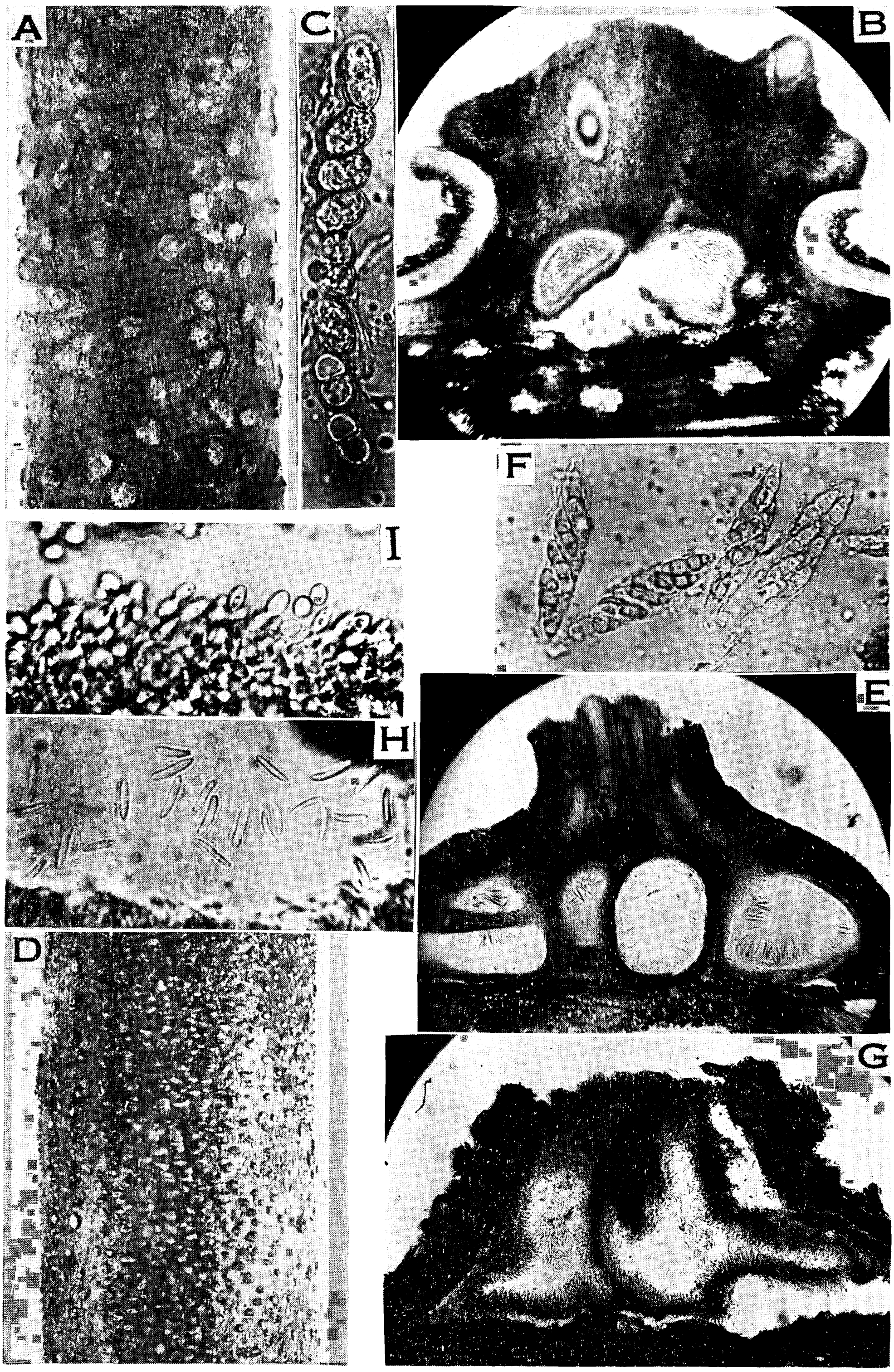
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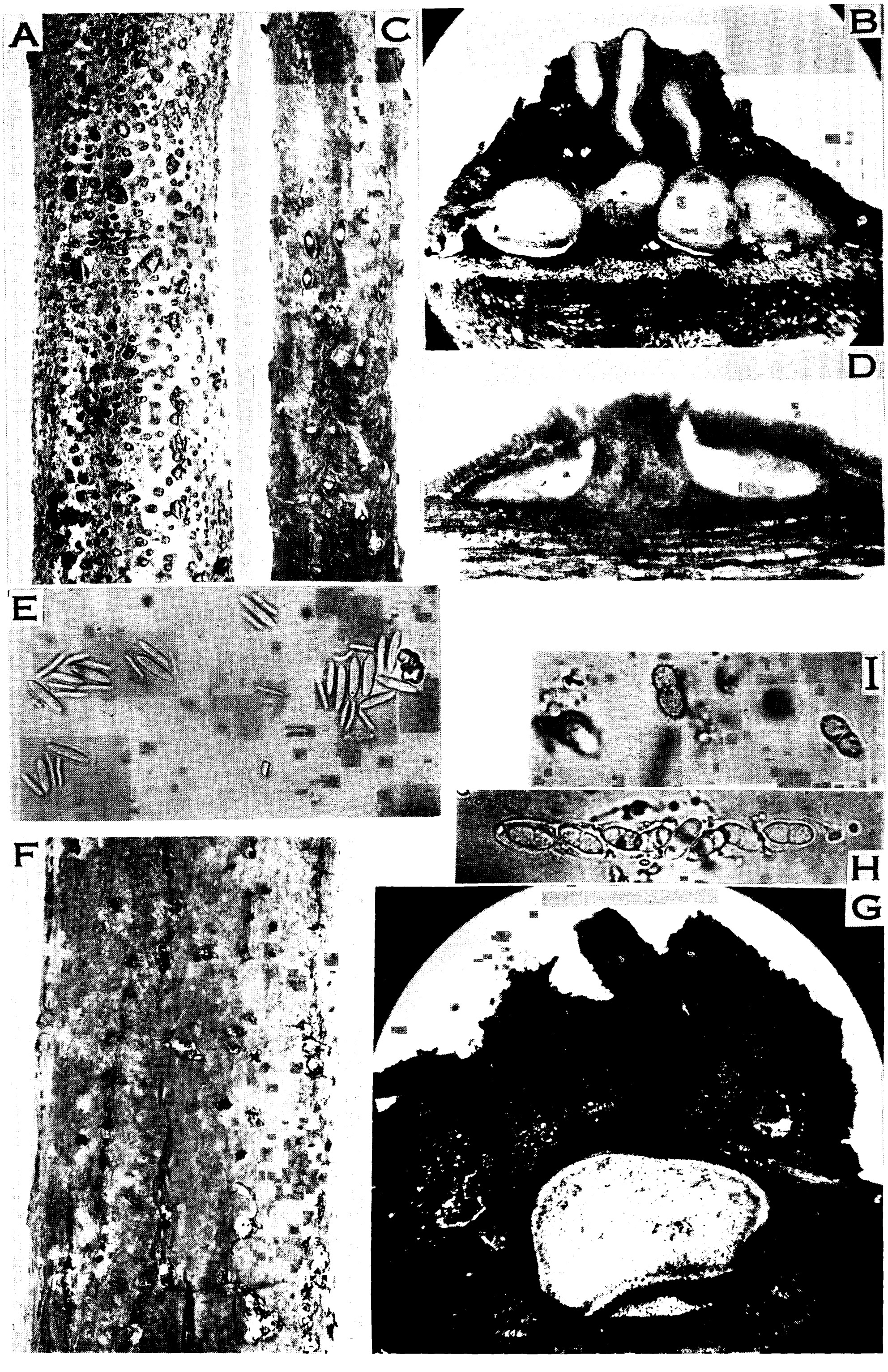
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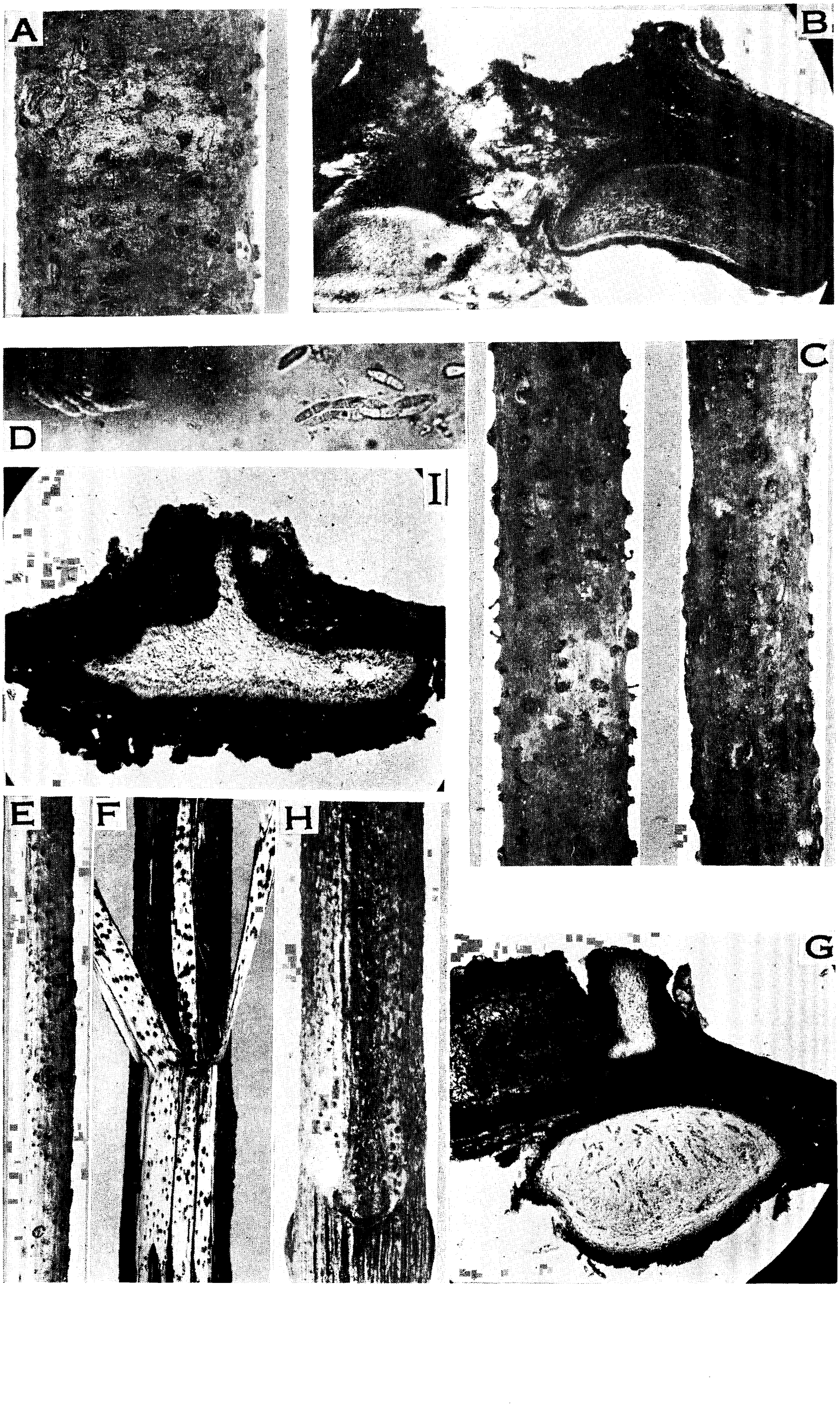
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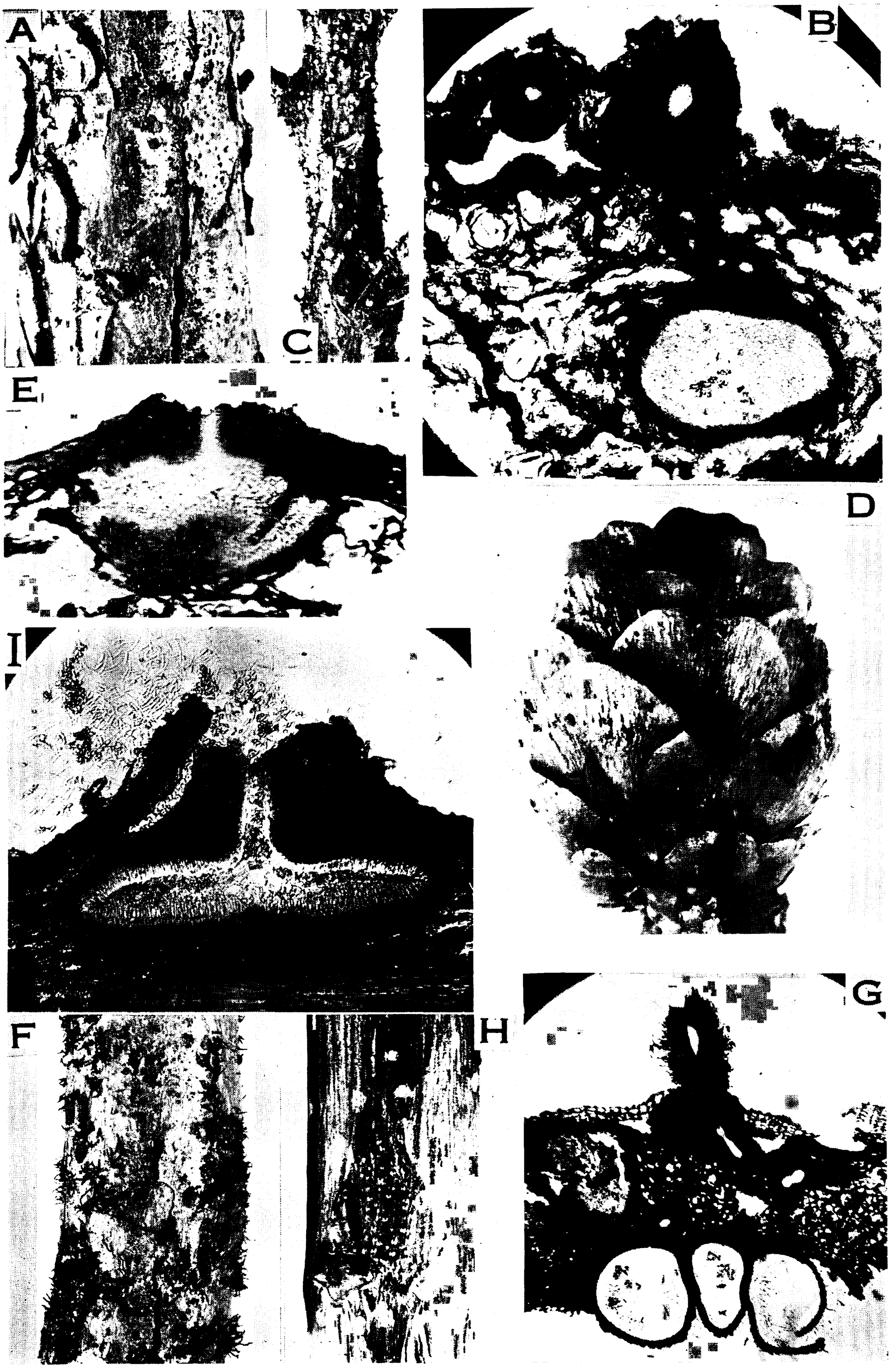
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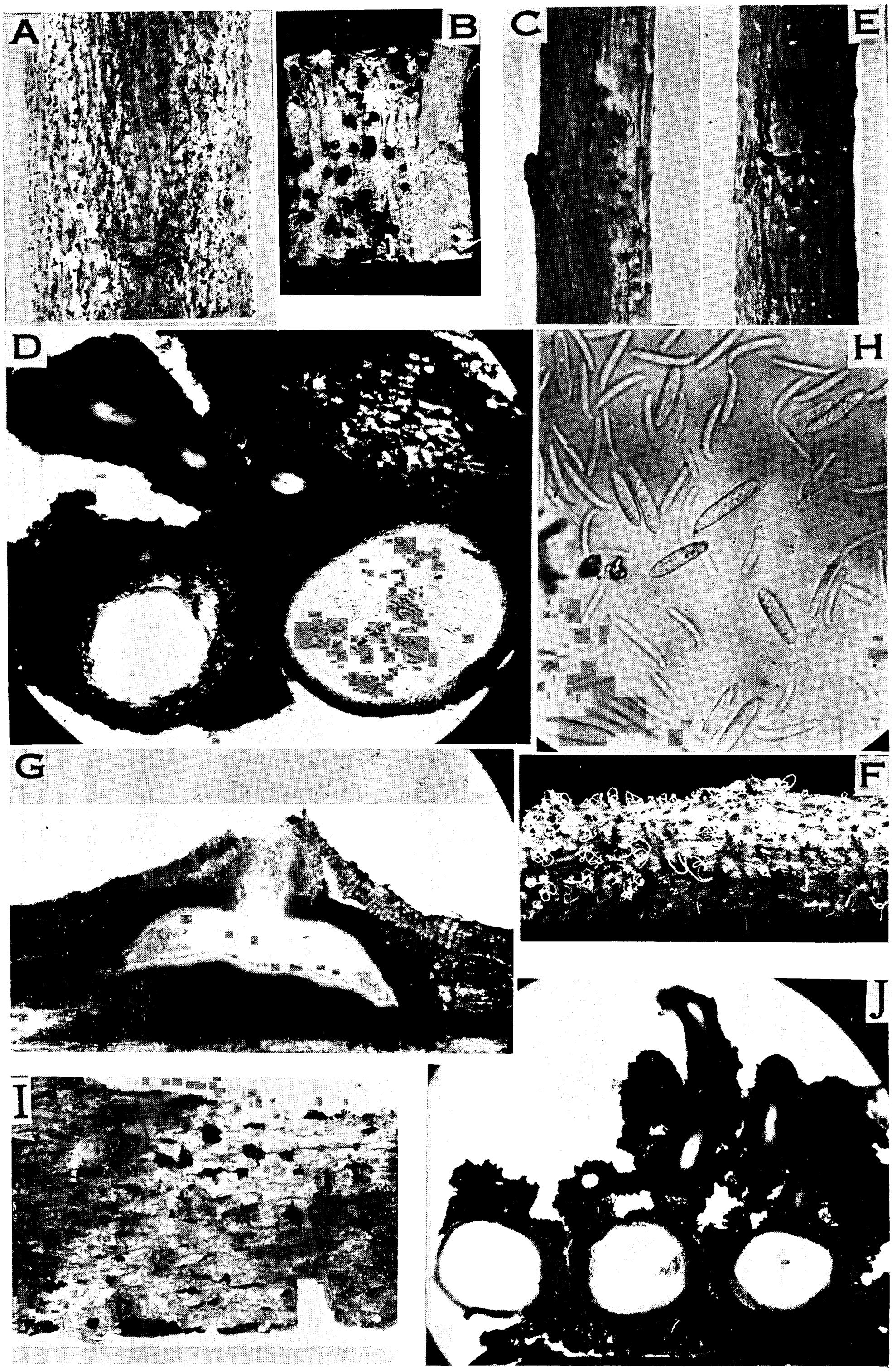
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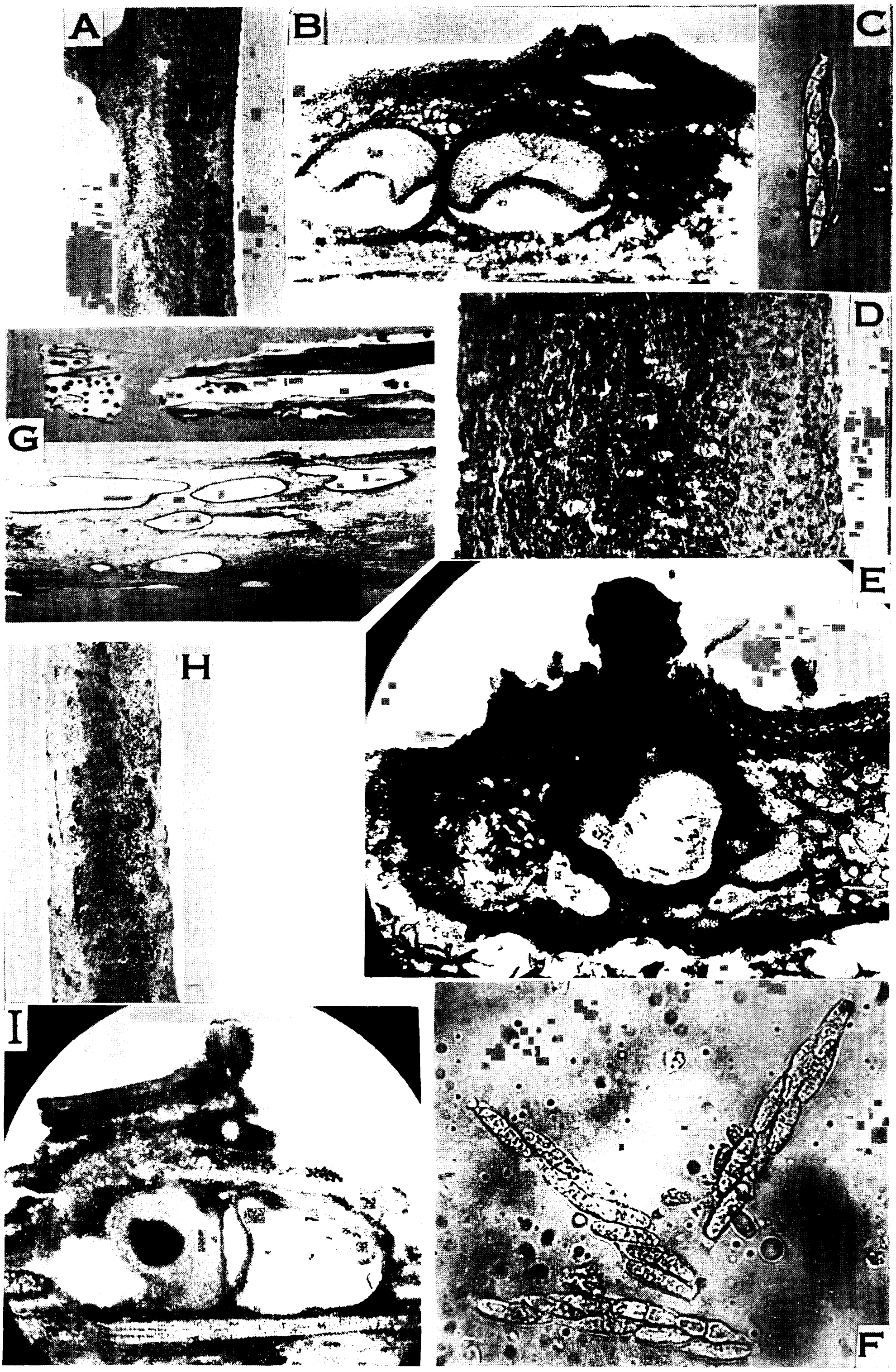
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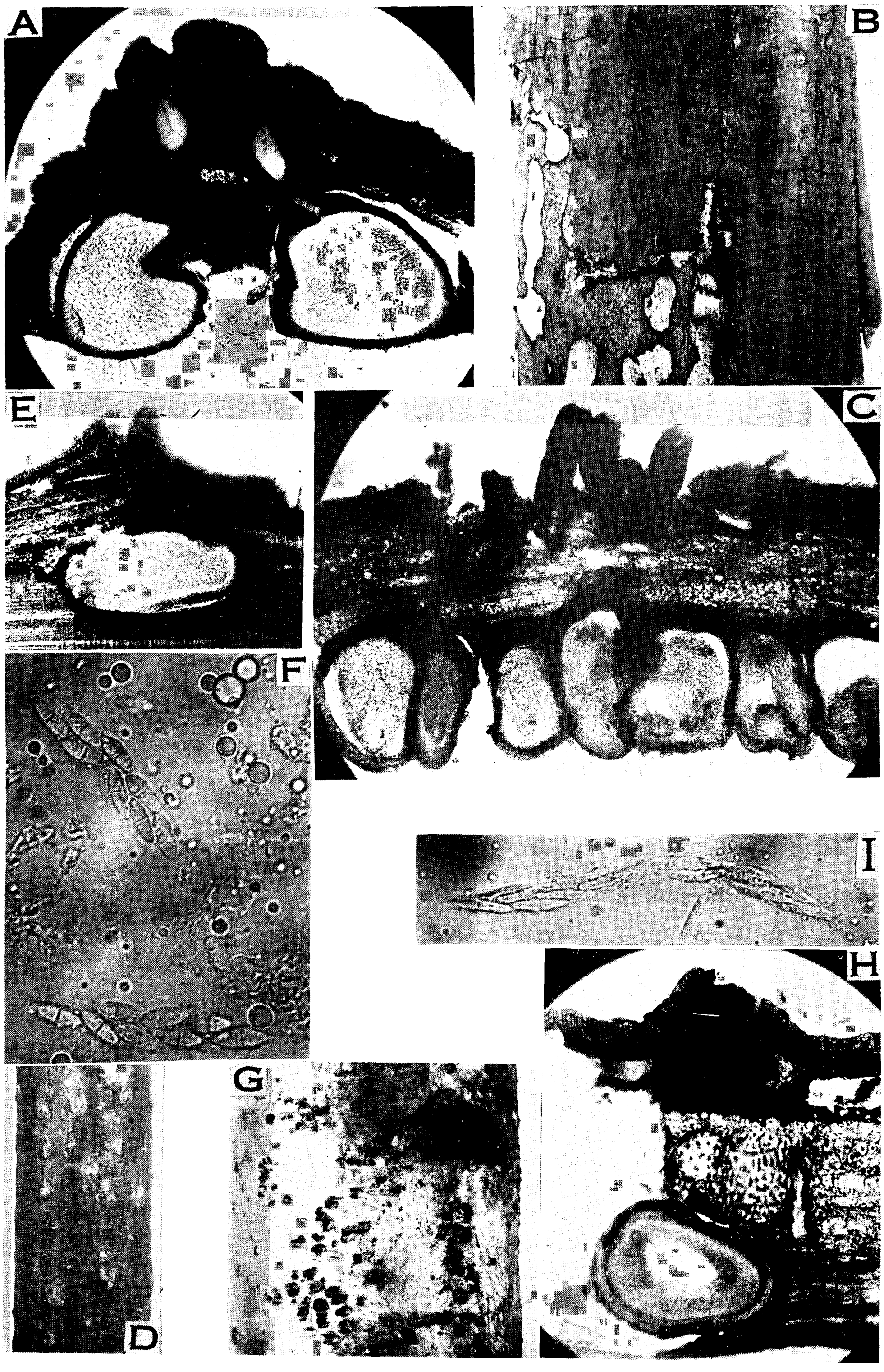
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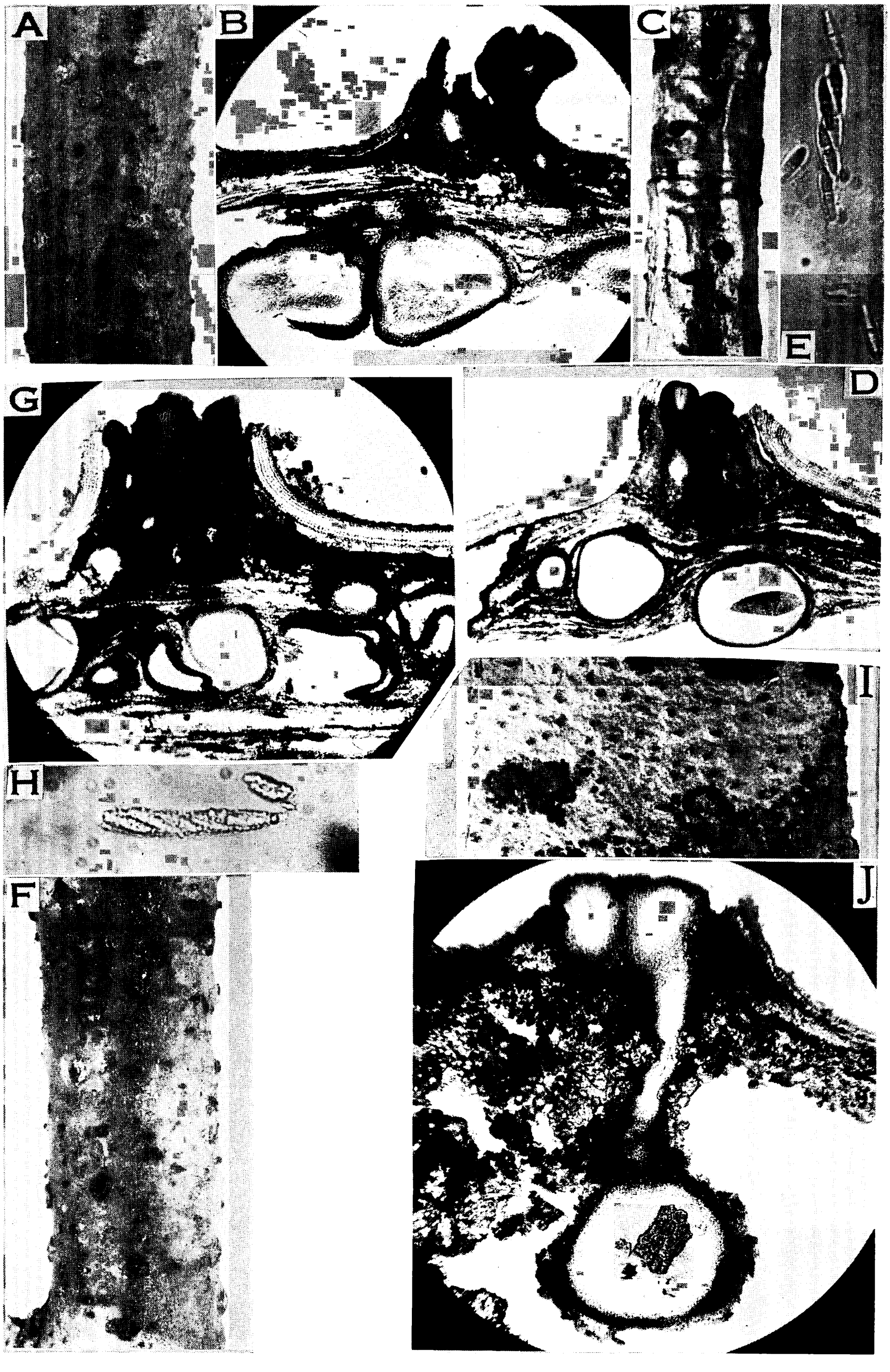
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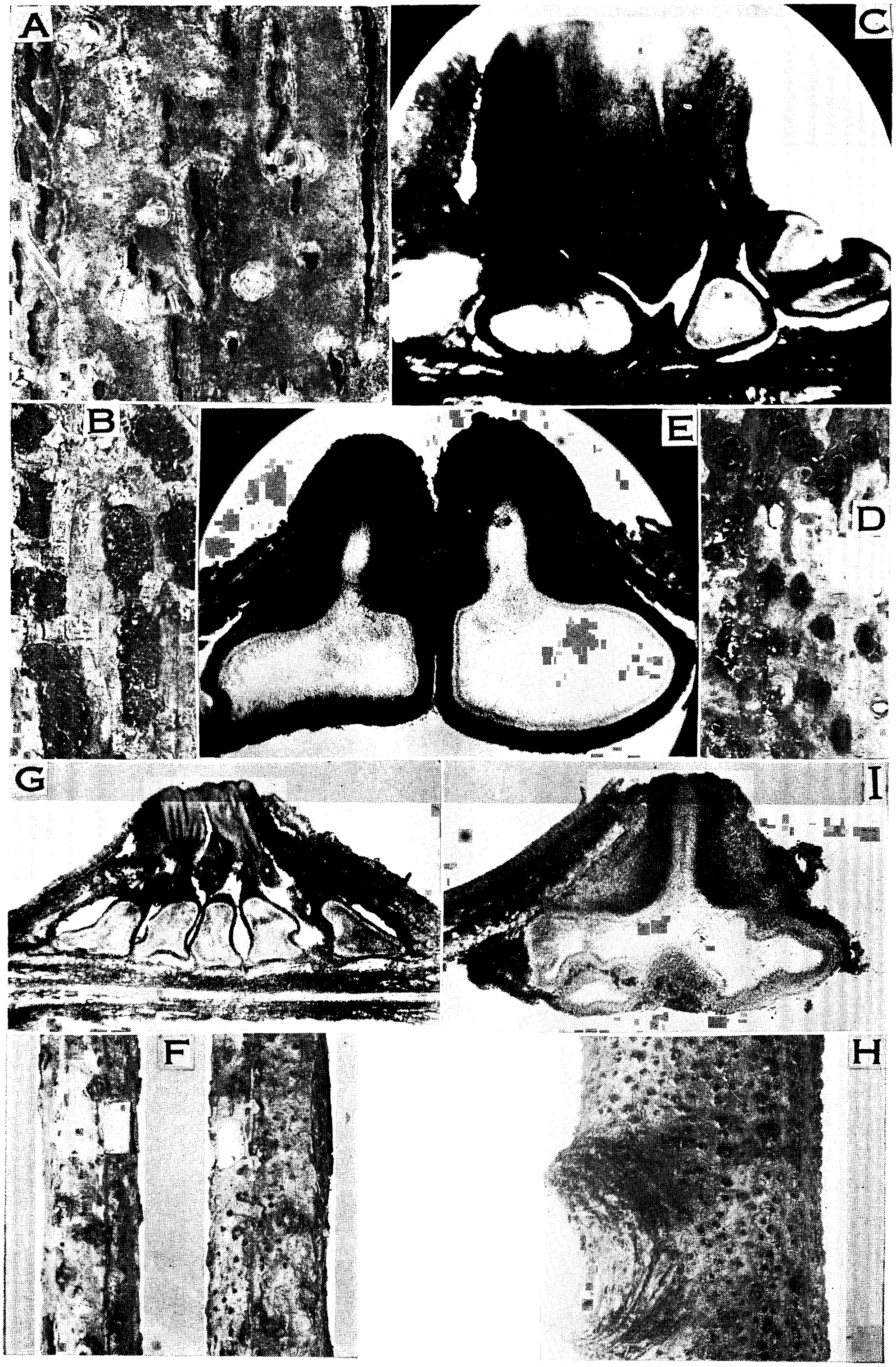
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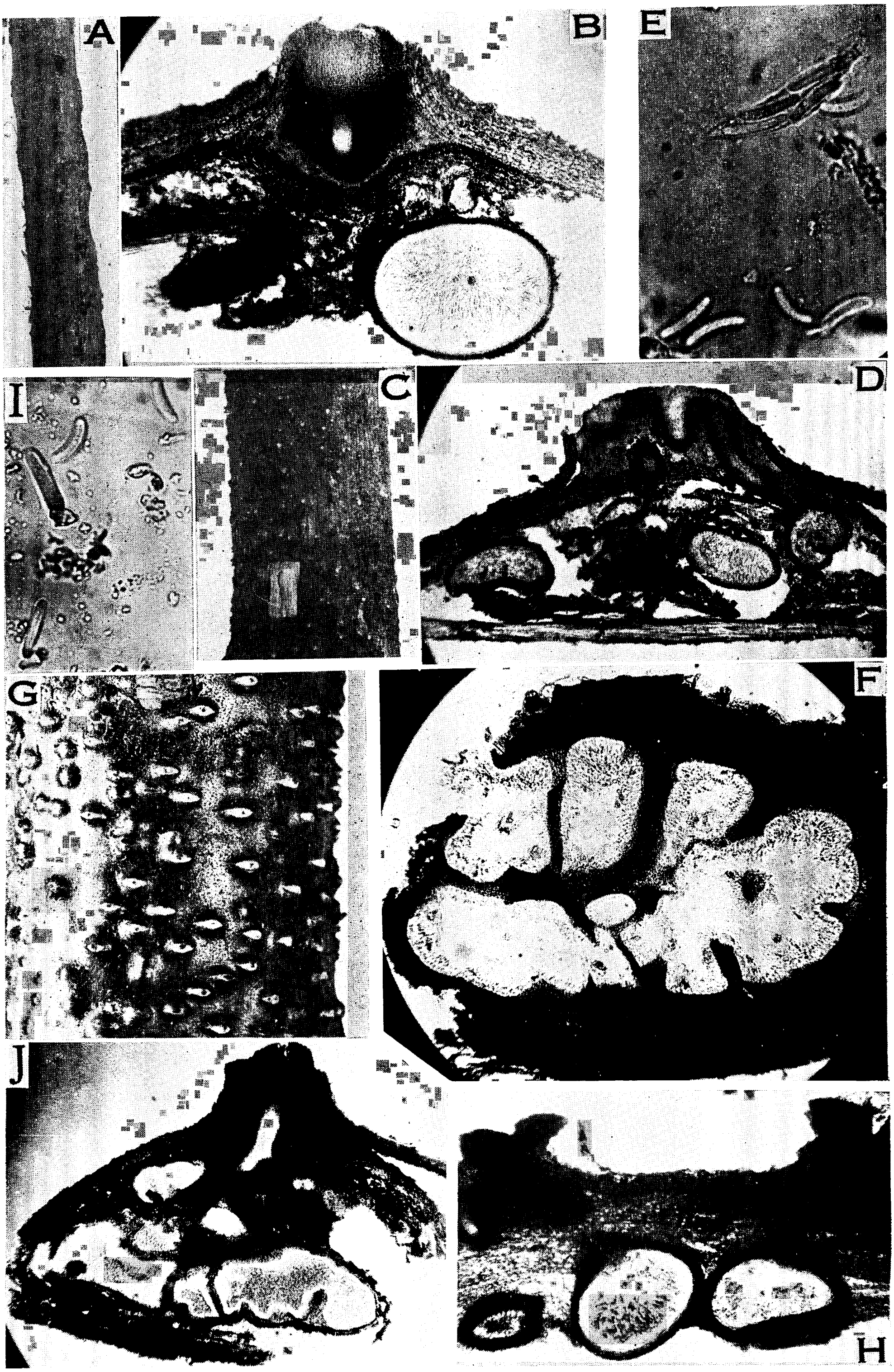
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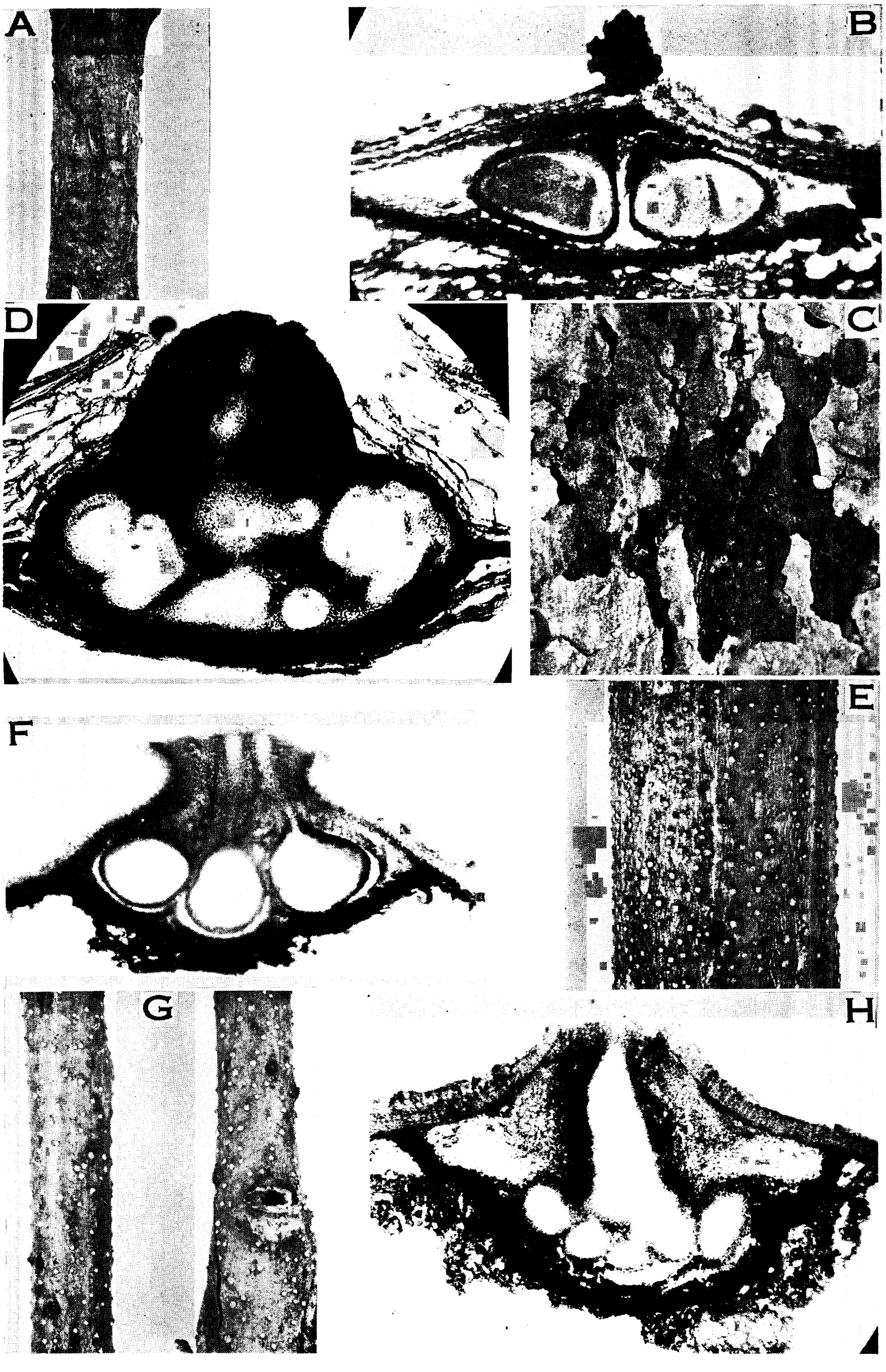
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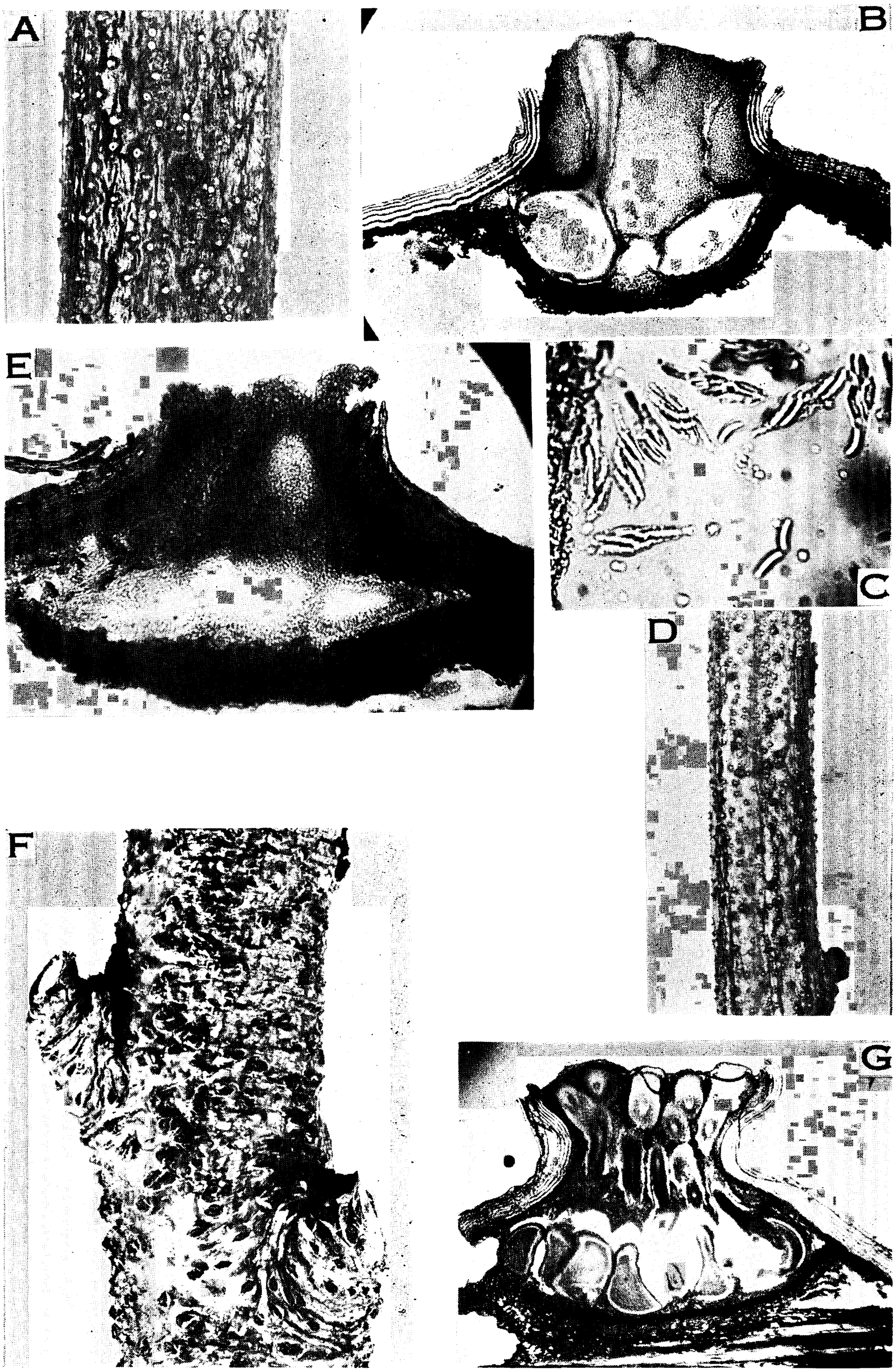
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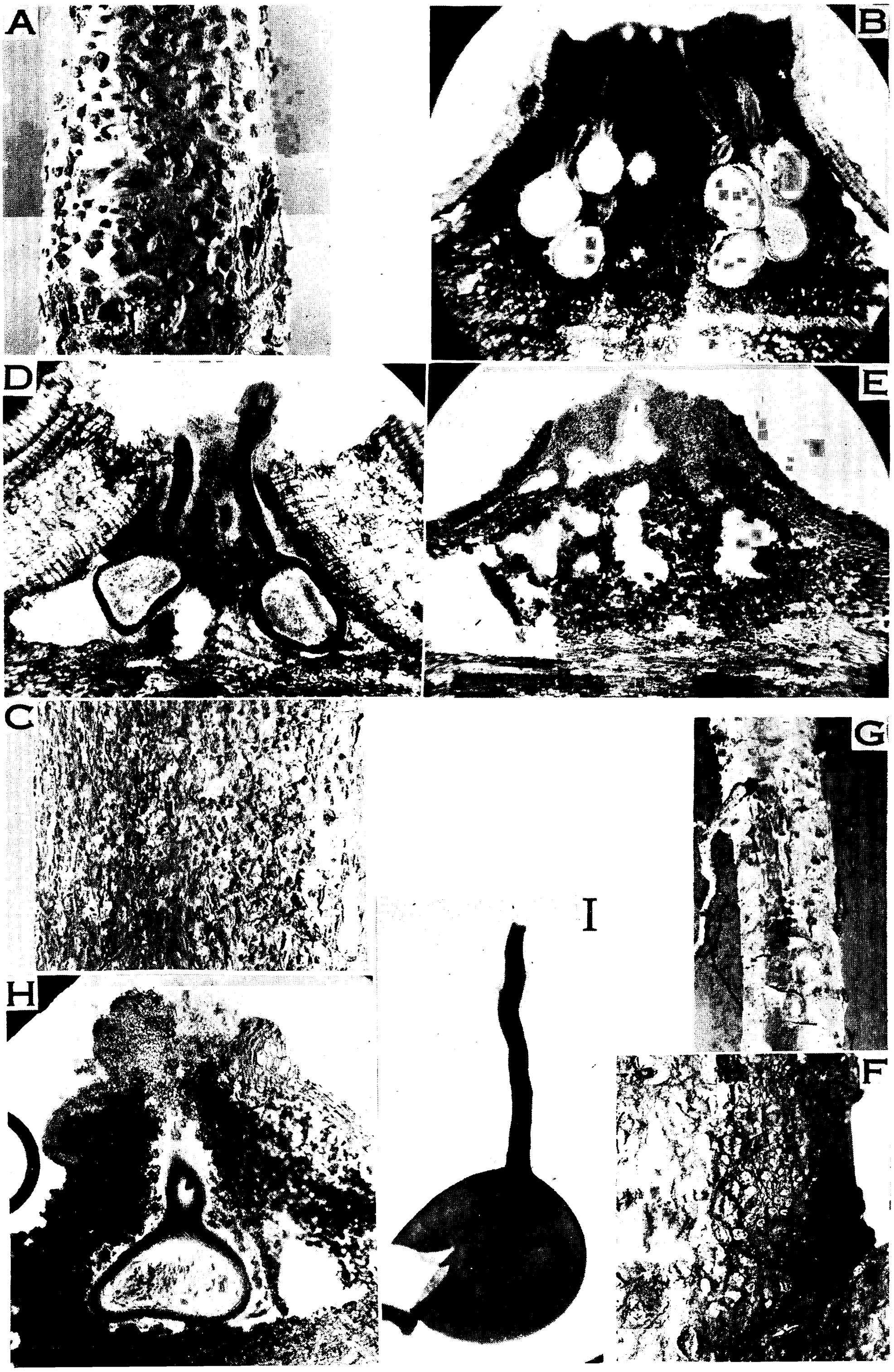

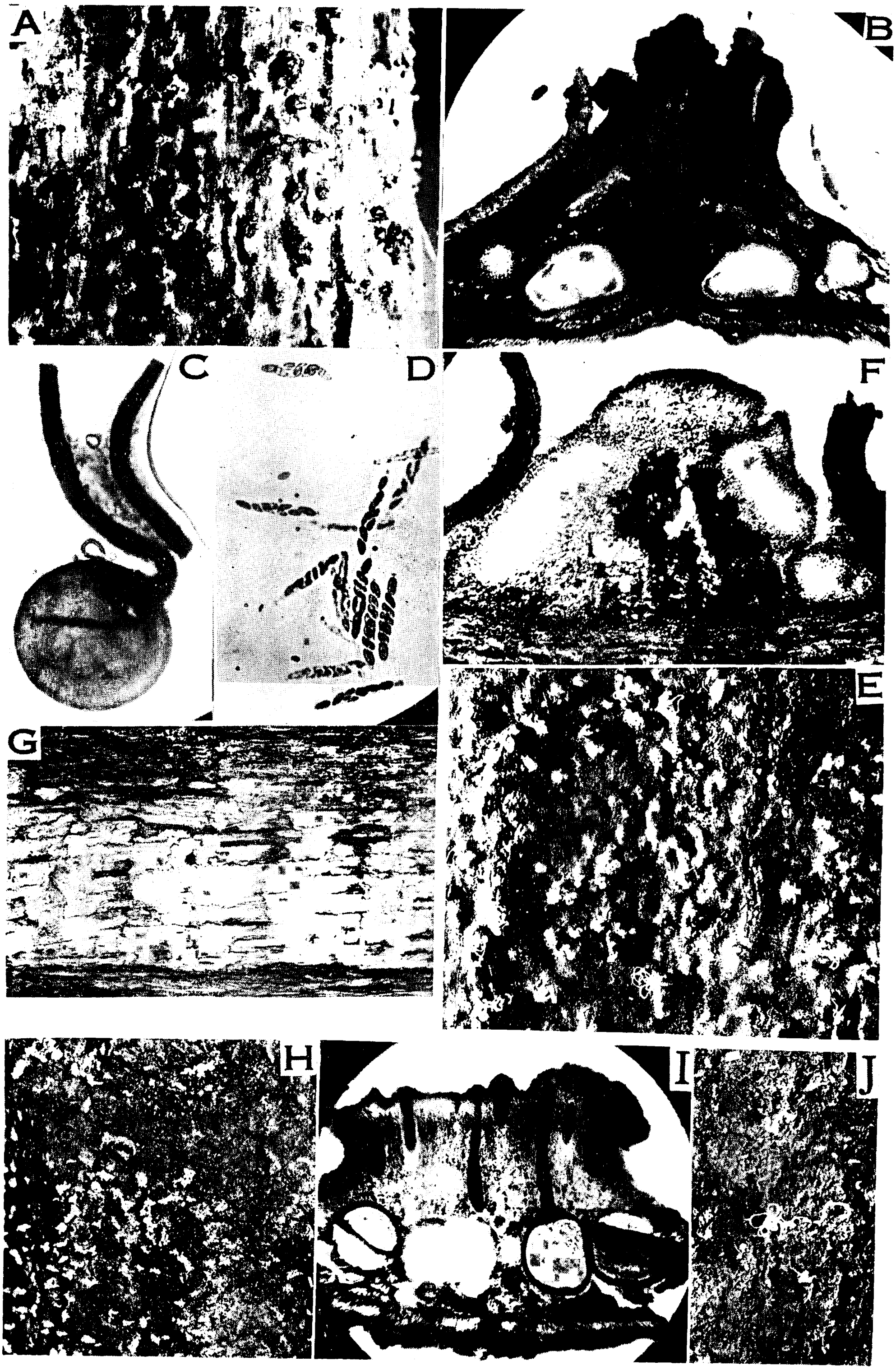
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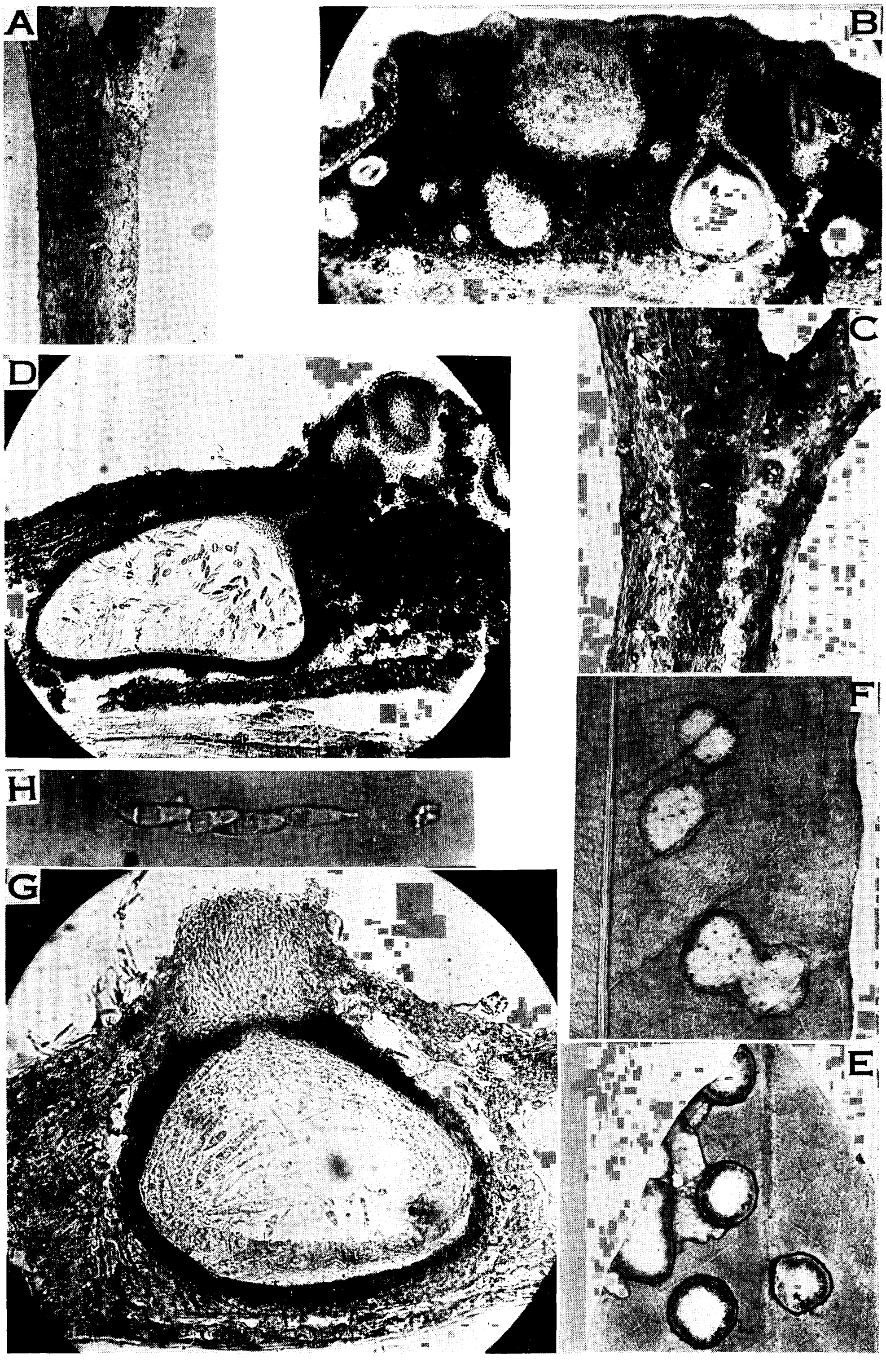
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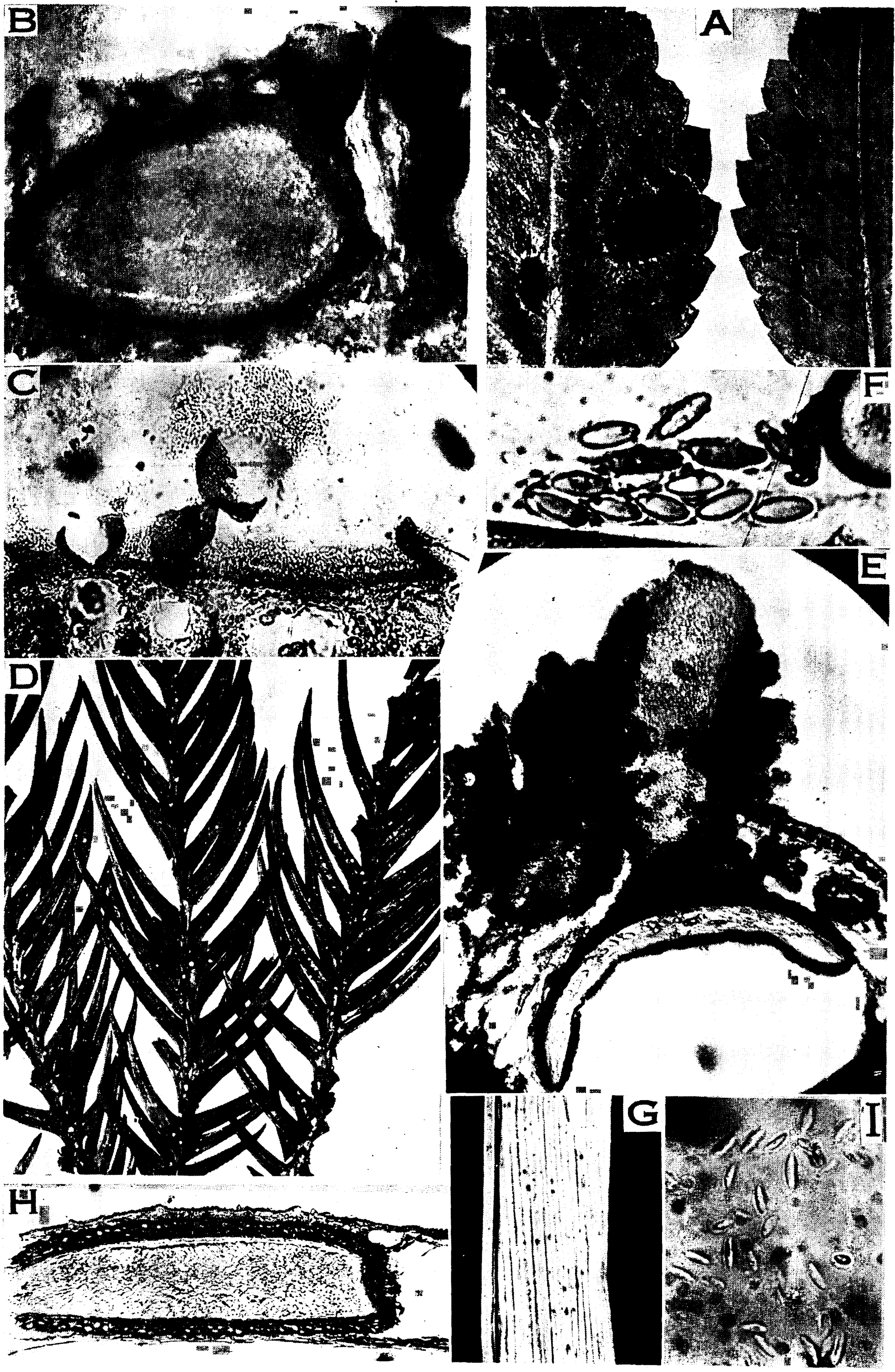
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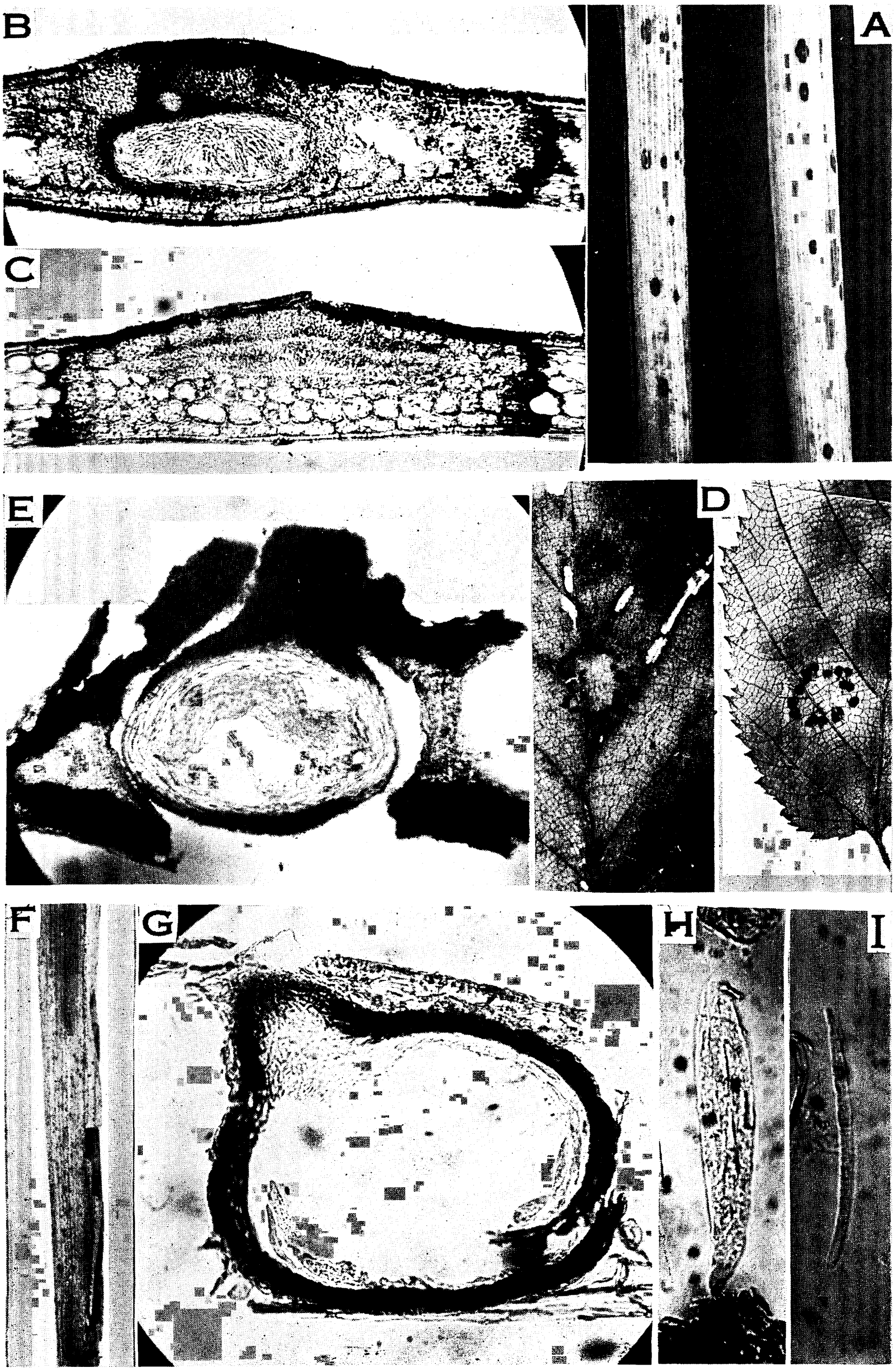
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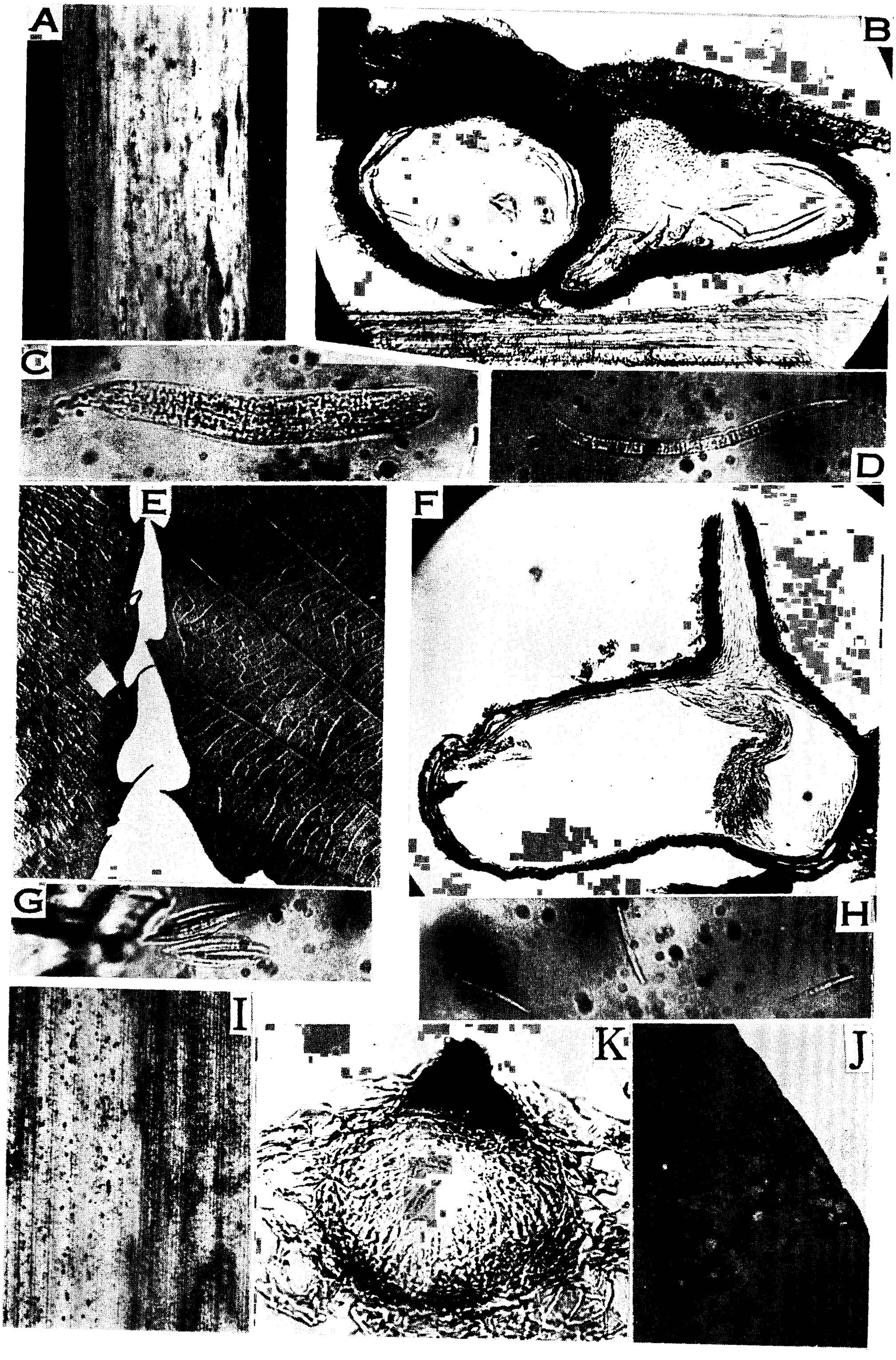
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