

NOTES ON MYXOMYCETES IX
THE GENUS *LICEA* IN THE NETHERLANDS

N. E. NANNENGA-BREMEKAMP

(*Doorwerth*)

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ABSTRACT

So far ten species of *Licea* and one variety have been found in the Netherlands, of these four are new, viz. *L. testudinacea*, *L. chelonoides*, *L. marginata* and *L. sinuosa*. *L. pusilla* var. *pygmaea* is a new record for the Netherlands. The species are grouped in three subgenera: *Orcadella* opening by means of a lid, *Licea* opening along preformed lines held together by interlacing knobs, and *Pleomorphe* opening irregularly or by an apical slit. A key to the species found in the Netherlands, all of which are figured, is given.

As in my previous papers dealing with Myxomycetes from the Netherlands, the specimens of the species dealt with are preserved either in my private herbarium, in that of the Botanical Museum and Herbarium of the State University, Utrecht or in both; of some species duplicates have been sent to other Botanical Institutes and Herbaria.

I am very grateful to Prof. Dr. G. W. Martin for sending me specimens and valuable advice, to the British Museum and Kew Herbarium for the opportunity to study their unique collections, to Dr. R. Santesson for sending me specimens from the Institute of Systematic Botany of the University of Uppsala in loan and some in exchange for specimens from the Netherlands, to Dr. M. Kraft and Prof. Dr. C. Baehni † for lending me specimens from Meylan's collections preserved in the Musée Botanique Cantonal, Lausanne and the Conservatoire et Jardin Botaniques, Geneva.

The genus *Licea* Schrader in the delimitation which it received from Martin, consists of several groups of which some had previously been regarded as distinct genera, viz. *Hymenobolina*, *Orcadella* and *Kleistobolus*.

That the type species, *L. pusilla* Schrader and its nearest allies, viz. *L. minima* Fr. and *L. castanea* G. Lister form a well defined group, has hitherto been overlooked. The sporangia of these species, which are here brought together in the subgenus *Licea* are remarkable in possessing an irregular network of ridges: the latter are the lines along which dehiscence will take place, and they enclose a varying number of angular plates, and are connected by interlacing knobs or pegs; these knobs and pegs make the lines of dehiscence look like a zipper; however, once open they remain, of course, open. The dehiscence itself is irregular; usually a cup is left with bluntly angular, more or less stellately spreading lobes; in larger sporangia the central plates become wholly disconnected and drop away.

In the group of species formed by *L. parasitica* (Zukal) G. W. Martin, *L. operculata* (Wingate) G. W. Martin and *L. kleistobolus* G. W. Martin the dehiscence takes place by means of a lid (subgenus **Orcadella** Nannenga-Bremekamp); to this subgenus, therefore, belong the species formerly included in the genera *Orcadella* Wingate, *Kleistobolus* Lippert and *Hymenobolina* Zukal; the type is *L. operculata* (Wingate) G. W. Martin.

-- A third group is represented by *L. biforis* Morgan, *L. tuberculata* G. W. Martin, *L. fimicola* Dearness et Bisby, *L. tenera* Jahn, *L. pedicellata* (Gilbert) Gilbert and *L. variabilis* Schrader; in these the dehiscence takes place either by an apical slit or irregularly (subgenus *Pleiomorpha* Nannenga-Bremekamp). A Latin diagnosis of the subgenus follows:

Subgenus **Pleismorpha**, nov. subgenus *Liceae*, a subgenere *Licea* absentia rimarum reticulatarum et a subgenere *Orcadella* absentia operculi recedens, fructificatione interdum ad plasmodiocarpum vergente, rima apicali vel irregulariter dehiscente cognoscendum.

Typus: *L. variabilis* Schrader.

Key to the *Licea* species occurring in the Netherlands.

1. a. Dehiscence by means of an orbicular lid 2
 Subgenus *Orcadella*
- b. Dehiscence along preformed lines into angular plates,
 provided at the margin by interlacing knobs or pegs 3
 Subgenus *Licea*
- c. Dehiscence either by means of an apical fissure or irregu-
 larly Subgenus *Pleiomorpha* 8
2. a. Sporangia sessile *L. parasitica*
- b. Sporangia on a stalk at least twice its height *L. operculata*
3. a. Spores smooth *L. castanea*
- Spores minutely warted or spinulose to coarsely warted 4
4. a. Peridium brilliant red-brown (burnt sienna) by transmitted
 light. Spores in mass ferruginous *L. minima*
- b. Peridium yellow-brown, orange-brown or olivaceous by
 transmitted light. Spores in mass dark-brown to black 5
5. a. Spores by transmitted light rosy to red-brown, rather
 coarsely warted. *L. chelonoides*
- b. Spores by transmitted light olivaceous, yellow-brown or grey 6
6. a. Spores grey with a conspicuous pale area *L. testudinacea*
- b. Spores yellow-brown or olivaceous, without a paler area 7
7. a. Spores (14)15-16(20) μ in diam. *L. pusilla* var. *pusilla*
- b. Spores (10)12-13 μ in diam. *L. pusilla* var. *pygmaea*
8. a. Fructifications laterally compressed, sometimes plasmodio-
 carpous, black with a thin yellow line along the apex
 *L. sinuosa*
- b. Fructifications not laterally compressed, without a yellow
 line at the apex 9
9. a. Fructifications sporangiate, minute and depressed, usually
 with a dark ring round the base. Spores nearly smooth, pale
 *L. marginata*

- b. Fructifications sporangiate or more often plasmodiocarpous, larger than in the preceding species and never with a dark ring round the base. Spores conspicuously spinulose . . .
 *L. variabilis*

Notes on the *Licea* species occurring in the Netherlands.

Licea parasitica (Zukal) G. W. Martin; fig. 1.

3535 (slide only), on apple bark; 3560, 3562 and 3672, on horse-chestnut bark; 3551 and 3614, on beech bark; 3676, 3741, 5126 and 5141, on lime bark; 5159, on oak bark; 5616 a-d U and 5670, on elm bark; 3850 and 4032, on coniferous bark (lid not evident); 4132 (slide only), on bark of *Prunus laurocerasus*; all developed in moist chambers. Plasmodium yellowish.

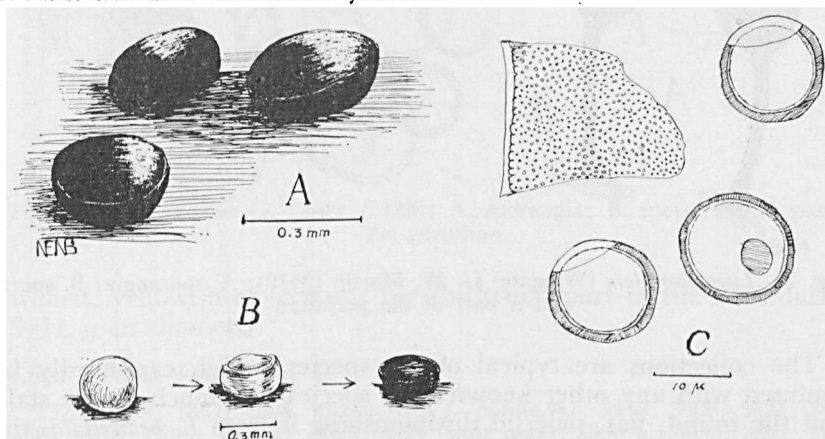


Fig. 1. *Licea parasitica* (Zukal) G. W. Martin (5616 d); A, sporangia; B, development of the sporangium; C, spores, one young with (pink) inclusion; to the left a part of the peridium.

In the second supplement (*Acta Bot. Neerl.* **13**: 131. 1964) to my "Annotated List of Myxomycetes found in the Netherlands" I replaced this name in accordance with a remark made in a paper by Dr. R. Santesson (*Svensk Bot. Todskrift* **42**: 46. 1948) by the combination *L. singularis* (Jahn) G. W. Martin, on the ground that *L. parasitica* was considered to be a nomen confusum. However, in a subsequent paper in the same journal (**58**: 121. 1964) Dr. Santesson re-established *L. parasitica*, "as the alterations of the international rules made in 1959 now make it possible to maintain it."

Whether this species may be regarded as a parasite (it was described as parasitic on lichens), is dubious, as the sporangia are often formed on bark quite a distance away from any lichens. The young sporangia appear as small (up to 0.3 mm in diam.), yellowish, gelatinous balls; these balls turn brown when the spores are formed, but the lid is recognizable already before these gelatinous balls solidify into the mature sporangia. Newly formed spores have a rosy inclusion which disappears after a few days. The spores when fresh are slightly larger than in the dry mature state, i.e. 15 μ , shrinking to 13-14 μ in diameter; they are olivaceous grey, quite smooth,

with a thick wall, which, however, has a large thin-walled portion, the germination area; this shows in the spores when viewed by transmitted light as a conspicuously paler area.

Licea operculata (Wingate) G. W. Martin; fig. 2.

3419 U; 3437; 3532; 3655 (slide only); 3706 (slide only); 4398; 5123. All developed in moist chambers on bark taken from an old living lime tree known as the "kapelleboom", Kasteelweg, Doorwerth. Plasmodium brownish-yellow.

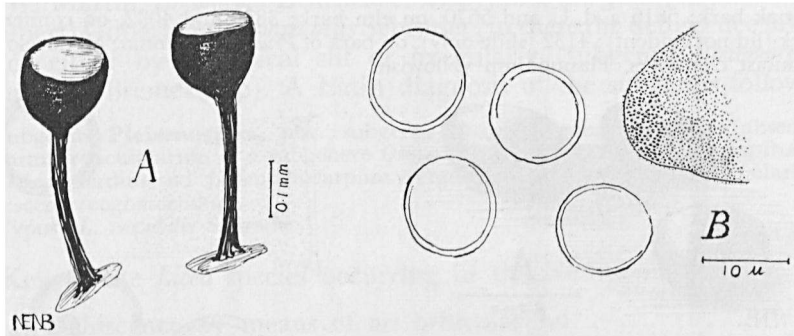


Fig. 2. *Licea operculata* (Wingate) G. W. Martin (3419); A. sporangia; B. spores and a part of the peridium.

The collections are typical of the species, which can hardly be confused with any other known *Licea* species, the much longer stalk and the round, flat, pale lid distinguishing it from *L. pedicellata*, the only other stalked one. The pale, rather shiny lid is conspicuous in perfectly developed specimens; in others, which did not develop in optimal (moist) conditions, the wall is blackish-opaque all over, and the lid inconspicuous or lacking. The peridium is minutely and densely warted on the inner side; the cup is covered with a layer of mucous and granular matter making this dull black. The total height of the sporangium is about 0.5 mm; spores smooth, 10–13 μ in diameter.

Licea castanea G. Lister; fig. 3.

2542 U; 2548; 3181; 3653; 3657; 3738; 5128; 5258; 5630. All on bark of elm, both living and dead, in winter and early spring; no. 2542 in situ; the others developed in moist chambers. Plasmodium yellow-brown.

Nearly all the collections are parts of large colonies composed of hundreds of usually gregarious sporangia. The latter are up to 0.5 mm in diameter, and develop mostly on the inner side of the bark. The sporangia are ochraceous; the spores yellowish in mass. Peridium thin, covered with granular matter, but not noticeably darkened thereby, dehiscing along preformed lines, which show as ridges in the ripe, but as yet unopened, sporangia, and which are decorated by a usually single row of small interlacing knobs. Spores smooth, with thick walls, save for the area of germination, which is thin-

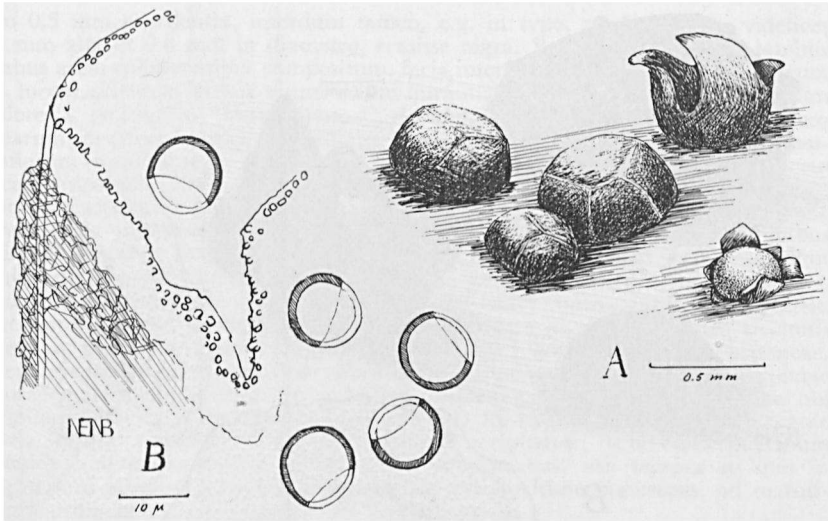


Fig. 3. *Licea castanea* G. Lister (5128); A. sporangia; B. spores and a part of the peridium.

walled, yellowish-olivaceous; the thickened part of the wall darker, 9–11 μ in diameter.

Licea minima Fries; fig. 4.

1328; 1559; 1567; 1594, mixed with *L. pusilla*, U; 3448; 3608; 3621; 3650; 3681; 3701; 3709; 3764 U; 3823; 3824 (slide only); 3830 U; 3835; 3842; 3845; 3846, mixed with *L. pusilla*; 3848; 3852; 3854 U; 3869; 3883 (slide only); 3896, mixed with *L. pusilla*; 3898; 3932; 3936; 3942, mixed with *L. pusilla*; 3956; 3966; 3969; 4014; 4024; 4025; 4027; 4028; 4029; 4053; 4061; 4071; 4104; 4116; 4117; 4118; 4122; 4139; 4151; 4186; 4187; 4188; 4191 U; 4192 (slide only); 4230; 4232; 4252; 4271; 4275; 4276; 4313; 4314; 4316; 4373; 4374 (slide only); 4377 U; 4393; 4432; 4440 (slide only); 4486; 4487; 4609; 4615; 4679; 4769; 4781 U; 4783; 4882; 4940; 5002; 5004; 5008; 5146; 5252; 5562 U; 5624.

Because of its minute size, up to 0.5 mm in diameter, not often found in the field, but developing on diverse kinds of bark taken from living and dead trees as well as on dead wood, if these materials are kept for some time in moist chambers. Plasmodium translucent red-brown; when the plasmodium becomes visible on the substrate, it usually appears in the form of isolated "drops" or of little jelly-like lumps. These are not yet stationary, and move some distance before maturing, as can be shown by drawing, by means of a red crayon, a ring round them; they will sometimes move from their rings, and in passing collect some of the red pigment, which is seen later, in the mature sporangium, on the plates of the peridium.

The sporangia are dark reddish brown to nearly black, small and angular on a contracted base, with prominent undulate, shining ridges marking the lines of dehiscence; sometimes the ridges themselves show a minute transverse undulation, resulting in a crenulate edge when seen under the microscope. Peridium on the outside

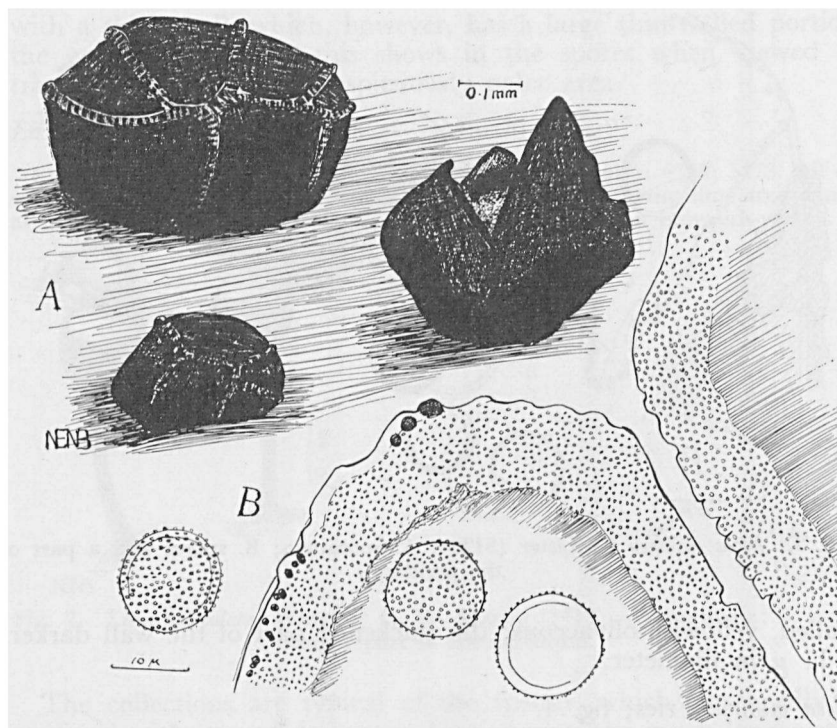


Fig. 4. *Licea minima* Fries (5252); A. sporangia; B. spores (two in surface view and one in optical section) and a part of the peridium.

occasionally smooth, but usually covered with granular matter, except on the ridges, on the inner side usually minutely warted. Dehiscence along the ridges into lobes or plates; the margins of the latter when viewed under the microscope, are often thickened, sometimes crenulate and undulate, with or without interlacing knobs or pegs. However, some knobs or pegs are always to be found on the topmost ridges of the sporangium; these are smaller and usually less densely placed than those found in *L. pusilla* var. *pusilla* (not smaller than those found in var. *pygmaea*). The spores in mass are pale red or ferruginous; seen by transmitted light they are rosy or pale red-brown; if treated with dilute NaOH or KOH, they turn olivaceous grey; they are minutely warted and 10–13 μ in diameter. By means of a handlens it is possible to recognize this species, as it is the only one of this group with a pale ferruginous spore mass. Under the microscope the bright red-brown, burnt-sienna colour of the peridium is another typical feature.

***Licea chelonoides* nov. spec., fig. 5.**

Sporangia gregaria vel sparsa, sessilia, sine hypothallo, e basi constricta oblata, in sectione transversa orbicularia usque ad oblonga et bis longiora quam latiora, magnitudine etiam in colonia singula variabiliora, altitudine raro 0.2 mm, diametro

raro 0.5 mm excedentia, interdum tamen, e.g. in typo, paulo majora, videlicet 0.5 mm alta et 0.8 mm in diametro, remisse nigra. Peridium crassum, e laminis duabus arcte cohaerentibus compositum, facie interna nitidum, saturate brunneum sed lucem orientem versus visum dilute aurantiacum usque ad rubro-brunneum (colore a pictoribus "burnt sienna" denominato). Dehiscencia per reticulum linearum praeformatarum; superficies angulares margine intus serie intumescientiarum implicatarum instructae; in sporangio maturo sed nondum aperto lineae reticulatae ob intumescientiarum seriem apparent ut lirae minutae quae sporangio aspectum angulare dant; superficierum angularium facies interna nunc laevis, nunc minutissime tuberculata; facies externa, ut in speciebus aliquibus aliis ad subgenus hoc pertinentibus, fere usque ad marginem granulata. Post dehiscenciam peridii lobi paulum undulati in positionem verticalem emergentes, casu quo in sporangiis minoribus petalorum facie interna nitidorum speciem praebentes. Sporae in sporangio modo aperto saepe in globum postea siccitatis causa in pulverem dissolventem cohaerentes, per saturam saturate brunneae, lucem orientem versus visae dilute rubro-brunneae vel roseae, globosae, tuberculatae (sporae male evolutae valde irregulariter tuberculatae), pariete area pallida ubi germinatio efficienda est excepta crassiore, (14) 15–18 (19) μ in diametro; sporae lixivia diluta tractatae colorem olivaceum accipientes; tuberculi episorium tegentes faciliter removendi. Plasmodium brunnescens, sub tempus in quo in sporangium mutatur lutescens, postea subrufum et ultime nigrescens, ad maturitatem attingendum menses duas vel tres requirens.

Frequentius in arborum mortuarum ligno et cortice cum ei in vitro in conditione humida longius preservati sunt; specimen typicum (5620) tamen ad vicum Doorwerth in provincia Gelria in pini ligno putrido collectum est.

Type 5620 U, on decaying pine wood, Doorwerth, 9-1-1964. Developed in moist chamber on bark of oak: 3469; 4609; 4778; of Robinia: 4715; of birch: 3692; 3705; 3721; 3558; 3763; of willow: 3764 U; and on beech wood: 4783; on coniferous wood: 3936; 4028; (lichen) 4062; 4409; 4486; 4487.

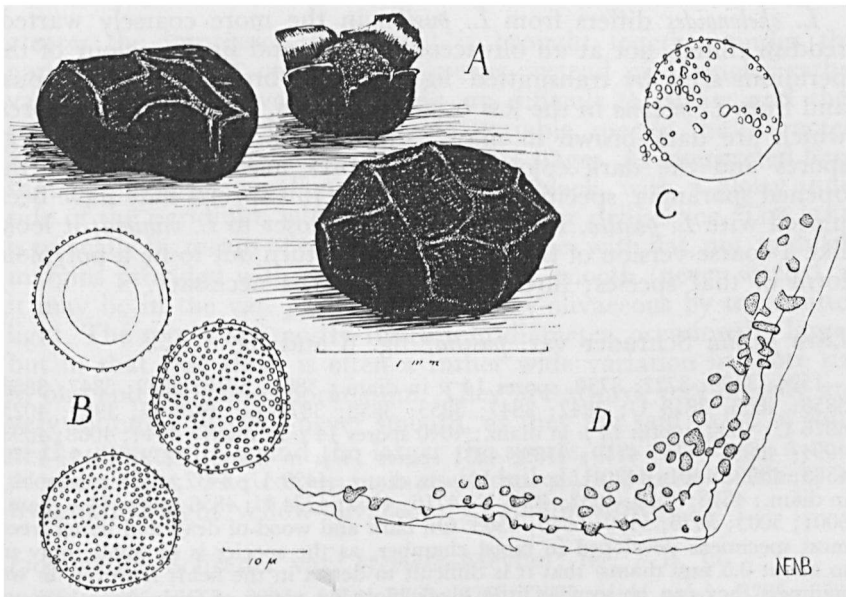


Fig. 5. *Licea chelonoides* Nannenga-Bremekamp (5620, type); A. sporangia; B. normal spores (two in surface view and one in optical section); C. irregularly developed spore; D. a part of the peridium.

Sporangia scattered or gregarious, sessile; without hypothallus, oblate, in outline circular to twice as long as broad, on a constricted base, rather variable in size, even in one colony 0.5 mm × 0.8 mm; total height usually not exceeding 0.5 mm; 0.2 mm in the type; dull black. Peridium thick, double; the two walls closely adhering; glossy, very dark brown on the inner side, by transmitted light orange to red-brown (burnt sienna); the lobes of the dehiscing sporangia slightly undulate. Dehiscence along performed lines decorated on the inner side by a band of interlacing knobs; in the unopened ripe sporangium these lines are visible as minute ridges giving the sporangium a somewhat angular appearance; the inner peridium is sometimes smooth, sometimes very minutely warted; the outer is granular nearly up to the lines of dehiscence, as in the other species of this group. On opening the spores often adhere in a ball, which on drying desintegrates into spore powder, as described by Fries for *L. minima*: "sporidia grumosa . . ."; this is a common occurrence in liceas of this group. The lobes of the sporangia stand erect in opened sporangia, giving them a petaloid appearance; they show a glossy inner surface. Spores in mass dark-brown, by transmitted light pale red-brown or rosy, globose, densely (in abnormal developments not densely, but very unevenly) warted; wall thickened on one side, leaving a pale area for germination, (14) 15–18 (–19) μ in diameter. The spores turn olivaceous in dilute NaOH or KOH; the warts on the epispore seem to rub off easily. Plasmodium brown, turning yellow when the sporangia take shape, then reddish and ultimately black; it takes a long time to mature; two to three months is no exception.

L. chelonoides differs from *L. pusilla* in the more coarsely warted, reddish tinted, not at all olivaceous, spores and in the colour of the peridium seen by transmitted light (orange-brown, not olivaceous) and from *L. minima* in the less bright peridium, and the larger spores, which are dark brown in mass. Although on account of the large spores and the dark colour of the spores massed together in the opened sporangia, specimens belonging to this species may have been placed with *L. pusilla*. I consider it to be closer to *L. minima*; it looks like a coarse version of the latter and may turn out to be a polyploid form of that species; further investigation is necessary.

Licea pusilla Schrader var. *pusilla*; fig. 6 and fig. 7 A.

1594; 3409; 3722; 3730, spores 14 μ in diam.; 3805; 3818; 3842; 3847; 3853; 3858; 3805; 3818 U; 3842; 3847; 3853; 3858; 3870 U; 3928 U; 3959; 4025; 4026 U; 4030, spores 14 μ in diam.; 4040 spores 14 μ in diam.; 4044; 4068; 4093; 4094; 4099; 4115; 4119; 4189; 4231 spores 14 μ in diam.; 4272; 4315; 4379; 4383; 4399; 4401; 4420 U spores 14 μ in diam.; 4429 U; 4432; 4531 spores 14 μ in diam.; 4616; 4620; 4633; 4663 U; 4716; 4767; 4774 U; 4856 spores 14 μ diam.; 5001; 5003; 5470; 5490; 5540; 5585. On bark and wood of dead and living trees; most specimens developed in moist chamber, as the species is so small (only up to about 0.5 mm diam.) that it is difficult to detect in the field; however, in wet summers they can be seen as little black blobs on pieces of fairly smooth, much decayed pine wood. Plasmodium opaque, dirty white or pale grey.

The large range in spore size, viz. from 14 to 20 μ in diameter,

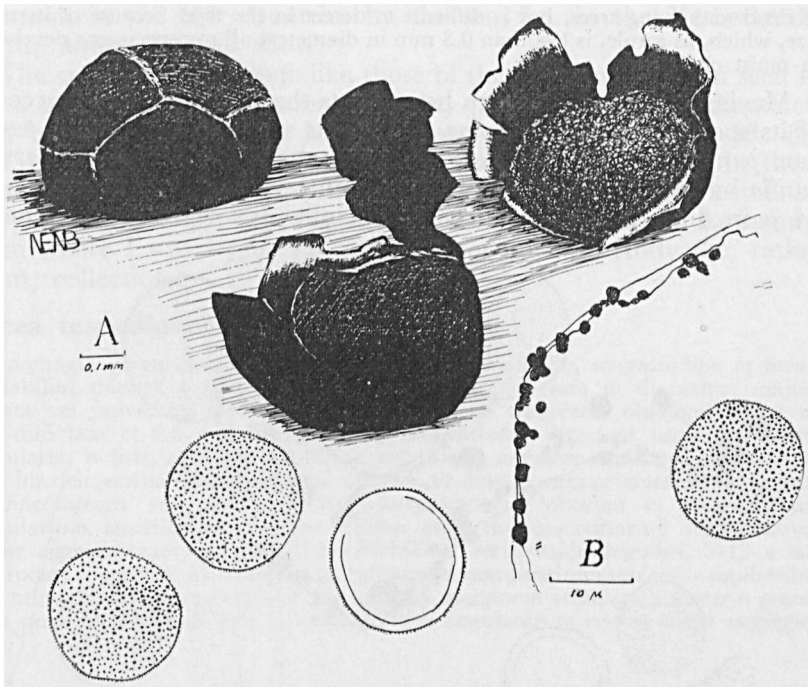


Fig. 6. *Licea pusilla* Schrader var. *pusilla* (4716); A. sporangia; B. spores (three in surface view and one in optical section) and a part of the peridium.

creates the impression that what is brought together under this name, might be a collection of species instead of a single, rather variable one. However, the forms are difficult to isolate and they seem therefore to be long to a single, variable, species, the characters merging into one another by intermediate stages. As interpreted here, the sporangia are small, nearly or quite black, with a glossy inner side of the peridium, which can be seen after dehiscence. The latter is typically by means of curiously angular lobes with flat, not undulate margins provided with rather large knobs, smooth (never warted, as it may be in the var. *pygmaea*) and yellow-olivaceous by transmitted light. The spores are mostly 15–16 μ in diameter, occasionally larger, but in that case there is often a rather wide variation in spore size in one and the same sporangium. They are always very densely and very minutely warted, never smooth, as they are said to be in some of the monographs, and the larger the spores, the smaller as a rule, are the warts. The colour in mass is dull dark brown to black, by transmitted light yellow-olivaceous to yellow-brown.

Licea pusilla Schrader var. *pygmaea* Meylan; fig. 7 B, C.

3461; 3495; 3668; 3731; 3752; 3765; 3766; 3783 (slide only); 3785; 3792; 3813; 3819 U; 3959 (slide only); 3968; 4024; 4040; 4041; 4042; 4043; 4045; 4046; 4095; 4124; 4140; 4274 U; 4383; 4430; 4445; 4531; 4572; 4644; 4674; 4751; 4752 U; 4772; 4780 (slide only); 5041; 5118. Develops on bark and wood

of dead and living trees, but is difficult to detect in the field because of its small size, which, as a rule, is less than 0.3 mm in diameter; all my specimens developed in moist chambers.

Meylan's variety, although he suggests that it probably, on account of its spore size (c.f. *L. minima*) and of its spore colour (c.f. *L. pusilla* var. *pusilla*), merits specific rank, is connected to *Licea pusilla* var. *pusilla* by forms with spores which are intermediate in size, i.e. about $14\ \mu$ in diameter. I have seen a specimen (ex Herbarium Geneva)

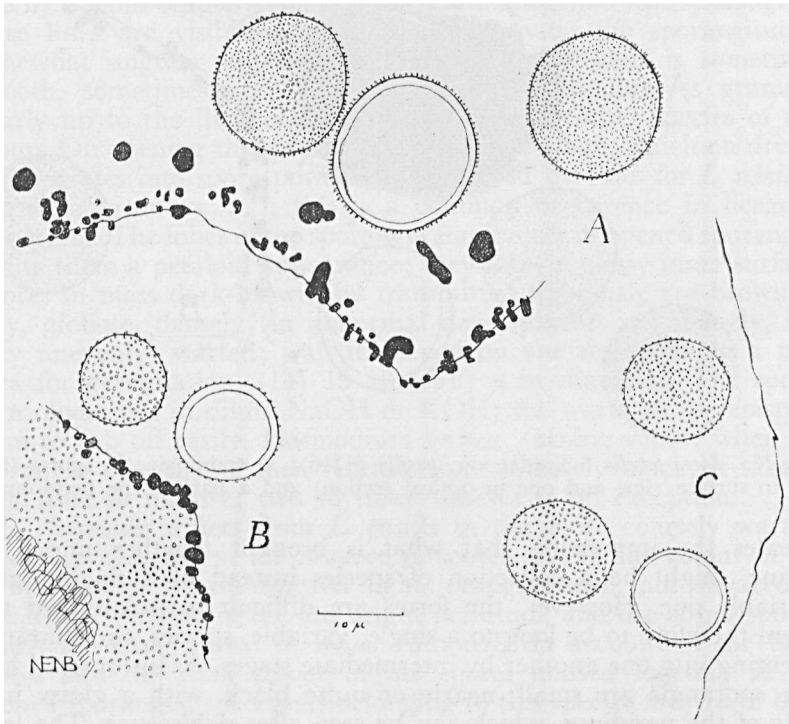


Fig. 7. Spores and parts of the peridium of *Licea pusilla* Schrader; A. of the var. *pusilla* (4189); B. of the var. *pygmaea* Meylan (3813); C. dito (3785).

from Iowa, sent by Prof. Dr. G. W. Martin to Dr. C. Meylan, with spores $14\ \mu$ in diameter, which bears the annotation; "*Licea pusilla* Schrader var. *pygmaea* Meylan forma". However these intermediate specimens are not as common and possibly do not occur on as high altitudes as *L. pusilla* or as its variety. Incidentally Meylan finds *Licea pusilla* usually with spores of $17\ \mu$ and over, so that the gap between the species and the variety as he knew it, is wider then it appears to be in the Netherlands, where the spores of *L. pusilla* var. *pusilla* average $15\text{--}16\ \mu$ in diameter, only a few having larger spores, but these usually have smaller ones as well, giving the impression of a disturbed growth.

Meylan records the variety from 1200–1400 m altitude only, but it is by no means confined to mountainous regions, and is quite

common in the low countries by the sea, i.e. in the Netherlands, as the above list will show.

The spores are in colour like those of the var. *pusilla*, when seen in mass as well as by transmitted light, (10–) 12–13 μ in diameter, and minutely warted. As Meylan wrote (Bull. Soc. Vaud. 58: 89. 1933) the marging of the lobes is less strongly warted than in those of the var. *pusilla*. My specimens are quite like those collected by Meylan and now preserved in the herbaria at Geneva and Lausanne, from where I was kindly given the opportunity to study the, rather scant, collections.

***Licea testudinacea* nov. spec.; fig. 8.**

Sporangia gregaria vel sparsa, sessilia, sine hypothallo, magnitudine et forma variabilia; minora e basi applanata subglobosa, 0.1 mm in diametro; majora oblata vel pulvinata, 0.15 mm alta, in sectione transversa oblonga, usque ad 0.2 mm lata et 0.8 mm longa; omnia saturatissime brunnea usque ad nigra, angularia, a liris undulatis nitidis in superficies angulares minores divisa et in liris his dehiscentia. Peridium facie interna nitidum, lucem orientem versus visum brunneoluteum vel pallide brunneo-aurantiacum, loborum et superficierum angularium superiorum margine ultima cum intumesceniarum implicatarum dense aggregatarum, magnitudine variabilium serie valde regulari, 5–13 μ lata instructa; superficierum angularium inferiorum margine intumesceniarum similioribus sed minus dense aggregatis munita; zona ad marginem adjuncta a materia granulata quae in speciebus aliis in superficierum angularium centro dense aggregata

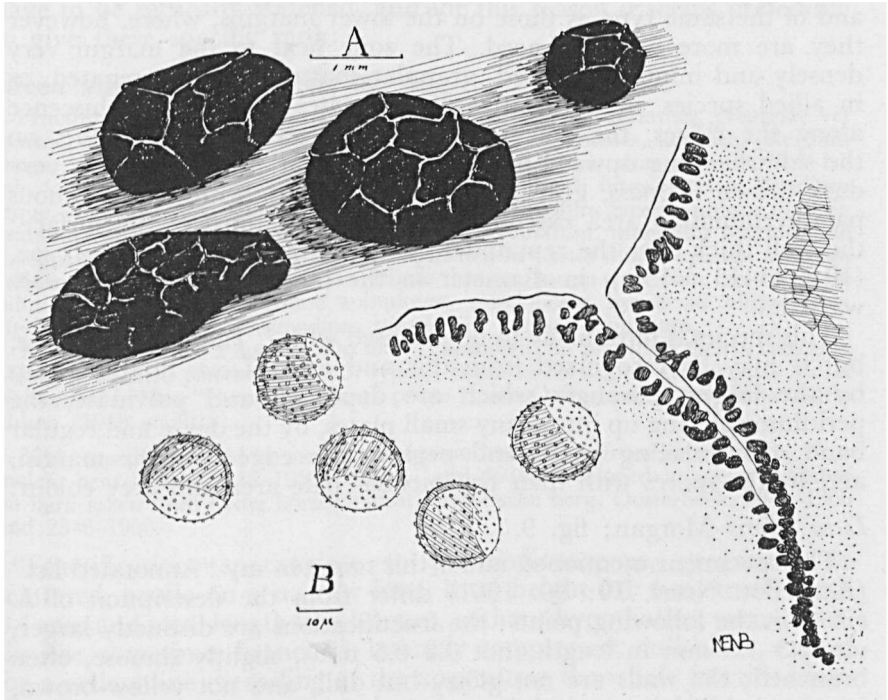


Fig. 8. *Licea testudinacea* Nannenga-Bremekamp (3472, type); A. sporangia; B. spores and a part of the peridium.

est densissime et minutissime tuberculata. Dehiscencia per liras; superficiebus angularibus superioribus dejectis superficies angulares laterales erigentes. Sporae per saturam saturatissime brunneae, lucem orientem versus visae griseae, area ubi germinatio effecta est et qua superficiei circiter tertiam partem obsidet tamen pallidiore et tenuiore, in typo 12-13 μ in diametro, in speciminibus aliis (10) 11-13 (15) μ in diametro, minute tuberculatae.

Frequentius in arborum mortuarum ligno et cortice cum ei in vitro in conditione humida longius preservati sunt.

3472 type U, on bark of dead apple in moist chamber, 10-10-1959; 3478 (slide only); 3489 U; 3491; 3493; 3538; 3593; 3607 (slide only); 3608; 3623 (slide only); 3722; 4635; 4640; 4620; 4641; 4713; 4714; 4751; 4755; 4780, all on bark of dead apple; 3675 (slide only); 3723 and 3736, on dark of lime; 3730; 3731; 3754 and 3791, on bark of willow; 3781; 3813; 3822; 4917, on bark of oak, and 3635, on bark from an unidentified dead trunk, all developed in moist chambers.

Sporangia gregarious or scattered, sessile, without hypothallus, varying in size and shape, the small ones subglobose on a flattened base, 0.1 mm in diameter, the larger ones oblate to pulvinate 0.15 mm high and 0.2 by 0.8 mm in diameter; very dark brown to black, angular, divided into rather small plates by undulate, glossy ridges, along which the dehiscence takes place. Peridium shiny on the inner side, brownish-yellow or pale brownish-orange by transmitted light, the margins of the upper lobes and plates with a very regular (more regular and compact than in the allied species) band of interlacing knobs on the very edge; the band composed of densely massed knobs and pegs and 5-13 μ broad, the knobs and pegs varying in size, and of the same type as those on the lower margins, where, however they are more widely spaced. The zone next to the margin very densely and minutely warted, granular matter being aggregated, as in allied species, in the centres of the plates and lobes. Dehiscence along the ridges, the apical plates falling away and the lobes on the sides bending upward into a perpendicular position. Spores very dark brown in mass, grey by transmitted light, with a conspicuous pale germination area extending over about a third of the surface; the wall thick over the remainder; 12-13 μ in diameter in the type, (10-) 11-13 (-15) μ in diameter in the other specimens minutely warted.

This species is most likely to be confused with *L. pusilla* var. *pygmaea*, but it may be recognized from this and other *Liceas* of this group by the larger sporangia which are depressed and pulvinate, the peridium splitting up into many small plates, by the dense and regular band of interlacing knobs and pegs on the edge of their margin, and by the spores with their conspicuous pale area and grey colour.

Licea biforis Morgan; fig. 9.

The specimens mentioned under this name in my "Annotated list" (Acta Bot. Neerl. 10: 90. 1961) differ from the description of *L. biforis* in the following points: the fructifications are distinctly larger, viz. 0.5-1.5 mm in length (not 0.2-0.5 mm), slightly sinuose, often branched; the walls are not glossy but dull, and not yellow-brown, but nearly black because of the covering of granular matter; the latter leaves only a narrow yellow zone uncovered along which the dehiscence

will take place. The peridium, where free of granular matter, is not opaque but translucent, almost colourless and lacks the few rather large warts which are found in specimens of *L. biforis* from the U.S.A.; instead the peridium is densely and minutely warted, the warts varying in size, but never approaching that of the warts found on

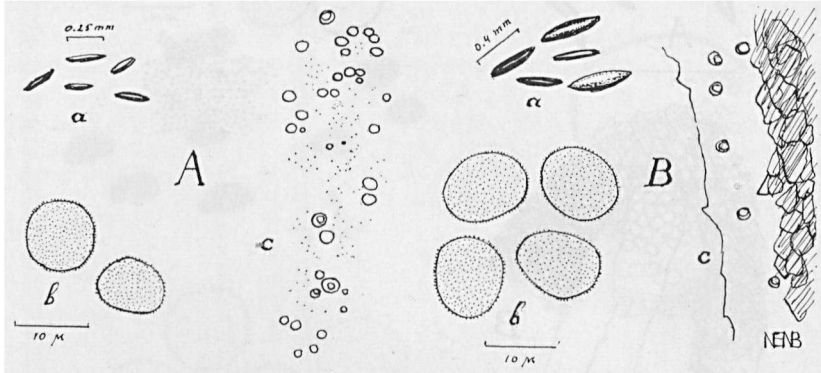


Fig. 9. *Licea biforis* Morgan; A. (Iowa, 4705): a. sporangia, b. spores, c. a part of the peridium; B. (Iowa, 3229): a, b and c as in A.

U.S.A. specimens. If we wish to include the specimens of the Netherlands as a variety in *L. biforis*, the delimitation of the latter would have to be radically widened, and for this reason it seems preferable to give these specific rank:

***Licea sinuosa* nov. spec.; fig. 10.**

Fructificationes a sporangiis usque ad plasmodiocarpus variantes, gregariae vel sparsae, e basi angustata sessiles, sine hypothallo, vermiformes, sinuosae, interdum etiam ramificatae, lateraliter paulo compressae, 0.1 mm altae et latae, 0.5–1.5 mm longae, remisse nigrae sed apice linea longitudinali lutea notatae. Peridium tenue, vix coloratum, pellucidum, linea dehiscientiae solum excepta ubique materia granulata obtectum, minutissime sed dense tuberculatum, tuberculis magnitudine inaequalibus. Dehiscencia per fissuram apicalem in partes duas aequales, ad basin adhaerentes. Sporae per saturam dilute luteae, lucem orientem versus visae dilutissime luteae, minutissime spinulosae, subglobosae usque ad ellipsoideae, 10–11 μ in diametro: Plasmodium saturate et remisse brunneum.

Reperta in cortice fago viva in loco "Plasmolen" in provincia Gelria crescente ablato et in vitro preservato (3613, typus), etiam in cortice ab arbore viva *Aesculi hippocastani* in loco "Hemelsche Berg" prope vicum Oosterbeek in provincia Gelria ablato (3918 et 4018).

3613, type, developed in moist chamber on bark taken from living beech, Plasmolen, near Mook, 7–12–1959; 3918 U and 4018, developed in moist chamber on bark taken from living horsechestnut, Hemelsche berg, Oosterbeek, 30–5–1960 and 23–6–1960.

Fructifications sporangiate to plasmodiocarpous, gregarious to scattered, sessile on a narrow base, total height 0.1 mm, total width 0.1 mm and total length 0.5–1.5 mm, without hypothallus, vermicular, sinuose, sometimes branched, laterally compressed, dull black, except for a yellow line extending at the apex along the whole fructification. Peridium thin, almost colourless, transparent, covered, save along the line of future dehiscence, with granular matter, very minutely

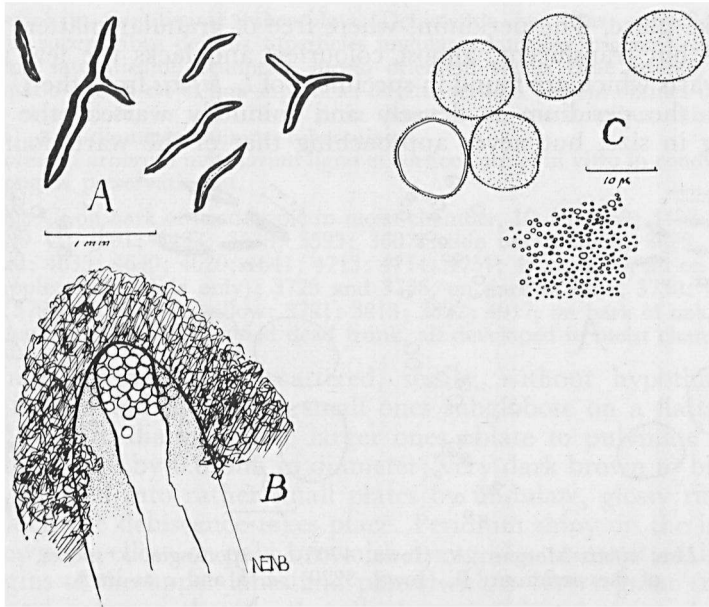


Fig. 10. *Licea sinuosa* Nannenga-Bremekamp (3613, type); A. sporangia; B. part of the sporangium more strongly enlarged; C. spores (four in surface view and one in optical section) and a part of the peridium.

and very densely warted on the inner side, the warts unequal in size, but all of them minute; dehiscence by a longitudinal fissure, dividing the sporangium into two equal parts, which remain attached to the base. Spores pale yellow in mass, very pale yellow by transmitted light, very minutely spinulose, subglobose to shortly ellipsoidal and 10–11 μ in diameter. Plasmodium dark, opaque brown.

***Licea marginata* nov. spec.; fig. 11.**

Sporangia sparsa vel in colonias parvas aggregata, sessilia, sine hypothallo, oblata, subglobosa vel ellipsoidea, basi plerumque annulo tenebroso, e materia granulata a sporangio ipso excreta composito et praesertim in sporangiis novellis et humidis conspicuo circumdata, circ. 0.25 mm alta, 0.1 mm lata et 0.1–0.2 mm longa, remisse nigra. Peridium tenue, pellucidum, laeve, lucem orientem versus visum luteo-brunneum, plerumque materia mucosa in qua sordes captae sunt et a qua sporangii color obscurus effectus est obtectum. Dehiscencia per fissuram apicalem; in sporangiis veterioribus et depletis peridii valvulae incurvatae. Sporae per saturam brunneae, lucem orientem versus visae primum dilutissime roseae, postea dilute luteo-brunneae, globosae; episporium tenue, minutissime, dense et fragiliter spinulosae, 10–13 μ in diametro. Plasmodium nunc hyalinum, nunc saturate brunneum.

Reperta in vitro in cortice ablato ab arboribus vivis, e.g. ab ulmo crescente in Wolfheze, provincia Gelria, 3309, typus.

3309, type, developed in moist chamber on bark taken from living elm, Wolfheze, 1–6–1959; 3448, lime, Doorwerth; 3646 and 3710 (slides only), elm, Wolfheze; 3743, willow, Heelsum; 3755, (slide only) willow, Heelsum; 4321 (slide only) lime, Doorwerth; 5016, horse-chestnut, Oosterbeek; 5608, 5615 U and 5631, elm, Wolfheze; all specimens were obtained in moist chambers on bark taken from living trees.

Sporangia scattered or gregarious in small colonies, sessile, without hypothallus, depressed, ovoid or subglobose, usually with a dark rim of excreted granular matter around its base, which is especially conspicuous in fresh moist specimens. Total height about 0.25 mm, 0.1 by 0.2 mm in diameter, dull black. Peridium thin, translucent,

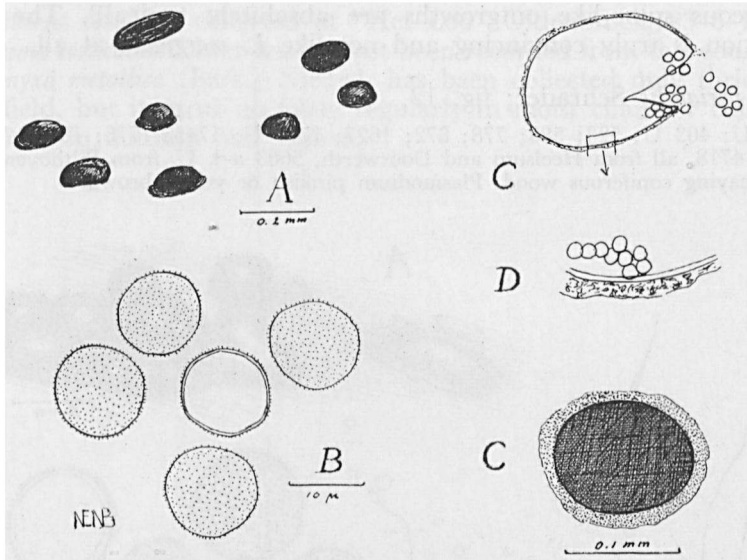


Fig. 11. *Licea marginata* Nannenga-Bremekamp (3309, type); A. sporangia; B. spores (four in surface view and one in optical section); C. complete sporangium as seen by transmitted light and in optical section; D. part of the sporangium wall with adjacent spores in optical section (more strongly enlarged).

smooth, yellowish-brown by transmitted light, usually coated with an envelope of slime which is granular with included dirt, which causes the dark colour of the sporangium. Dehiscence by an apical slit; walls curled inward in old empty specimens. Spores in mass brown, pale rosy when fresh; by transmitted light very pale rosy when fresh, very pale yellowish-brown in older specimens, globose; wall thin, very minutely, very densely and very delicately spinulose, 10–13 μ in diam. Plasmodium hyaline or dark brown.

This minute species is easily overlooked, but when detected not difficult to identify; the dark ring around the base of the sporangium is peculiar and striking; the thin-walled spores and the small black sporangia too are characteristic.

In my "Annotated list" (Acta Bot. Neerl. 10; 92; 1961) the above cited specimens were compared to *L. fimicola*, because of the minute size of the sporangia and the likeness of the spores to those depicted in "The Myxomycetes" by Macbride and Martin, 1934 Plate XV, fig. 380. Part of the substrate of the type specimen of *L. fimicola* was sent to me, but thereon was only a habitually somewhat similar contamination of a round-spored *Pilobolus*. As the spores of this

Pilobolus are exactly like the spores depicted in the cited figure, it seems likely that these have indeed been the models for it. However, in the next figure, fig. 381, true *L. fimicola* spores are given. In a letter concerning this species, Prof. Dr. Martin wrote me: "*Licea fimicola* is a very distinctive species. The erect spindle-shaped, shining black sporangia and the very large spores with the characteristic fugaceous spine-like outgrowths are absolutely typical". The description is truly convincing and not like *L. marginata* at all.

Licea variabilis Schrader; fig. 12.

59 U; 403 U; 523; 588; 778; 872; 1627; 1710 U; 1745; 1776; 1872; 2239; 2498; 4718, all from Heelsum and Doorwerth, 5663 a-k U, from Bilthoven; all on decaying coniferous wood. Plasmodium pinkish or yellow-brown.

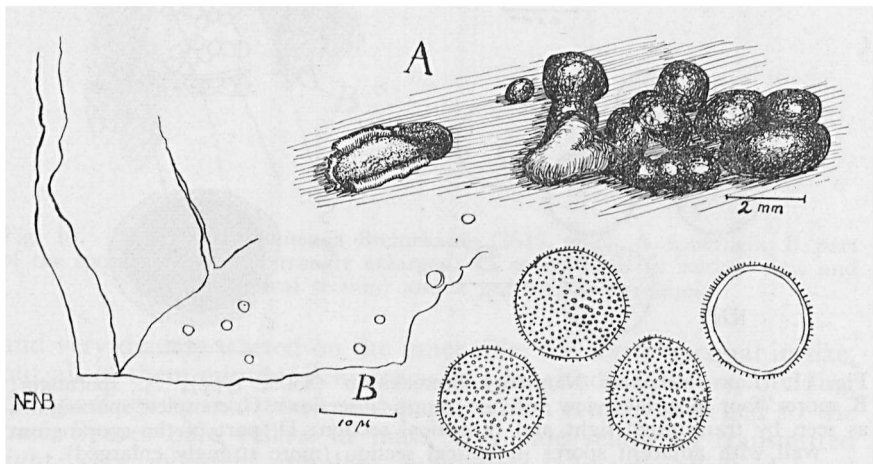


Fig. 12. *Licea variabilis* Schrader (5563 b); A. sporangia; B. spores (three in surface view and one in optical section) and a part of the peridium.

This species may be found on much decayed coniferous wood after periods of wet weather. There is a likeness to *Reticularia liceoides* (G. Lister) Nannenga-Bremekamp n. comb. (*Enteridium liceoides* G. Lister), with which it may occur mixed, as in a specimen from Uppsala, Sweden (Dr. Santesson no. 14510), and with *Dianema corticatum* Lister. However, both these species have clustered spores, and *Dianema* a capillitium as well, although the latter may be scantely developed. When, in well developed specimens, the sporangia have slipped out of their granular outer layer, or when the latter has been washed away, and only the shining inner peridium is left, there is a resemblance to *Calomyxa metallica* (Berk.) Nieuwl. too. Specimens of that species, at least those found in this country, are never so tortuously plasmodiocarpous as some of the *Licea variabilis* fructifications, nor as large as these (*L. variabilis* is the largest known *Licea* measuring 1–10 mm in length), while capillitium is always, and usually abundantly, present; in fresh specimens moreover the spores of *Calomyxa* are rosy, not pale olivaceous. When dry weather prevails

during the maturation period of this *Licea*, the thin inner peridium and the mucous, granular outer layer adhere tightly, and dry into a rather tough covering, under which the spores may have had time to complete their development or have dried into a useless hard crust. Spores spinulose, (10) 12–13 μ in diameter.

Of *Reticularia liceoides* there is only one record from the Netherlands (Karstens no. 529) collected at "Het Loo" Oldenbroek, 23–6–1946. *Dianema corticatum* Lister has not yet been recorded from this country; *Calomyxa metallica* (Berk.) Nieuwl. has been collected only thrice in the field, but it turns up fairly regularly in moist chamber cultures on bark in autumn and winter.