The genus Lachnellula forms a rather natural group of macroscopically very similar species growing exclusively on bark, more rarely wood or resin of conifers. One of them, *L. willkommii*, is well-known as a possible cause of Larch canker. Species concepts in the genus are still in a nonsatisfying condition due to lack of adequate descriptions of several taxa, and little information on specimen from remote areas. The present key contains ca. 30 more or less accepted taxa (29 species and 1 variety), all growing on conifers. The list of species names contains further 3 unclear and 17 excluded taxa (on angiosperm substrates). These are not treated in the key.

The present key is the result of intense personal studies on mainly fresh living specimens. It takes care of some often neglected characters like croziers, iodine reaction in Lugol's solution, and ascospore guttulation in the living state. Many data and references of literature available to the author are incorporated. The idea is to continuously complete this key by additional information and results, and by further literature. The reader is encouraged to inform the author about errors or missing data. Ecological data (distribution, host range, phenology) need to be completed, as well as morphological data. No records from Africa (incl. Macaronesia) and S-America were available.

**Abbreviations:**

- **Reagents:** CR = Congo Red in NH4OH, CB = cotton blue in lactic acid or lactophenol, H2O = tap water, IKI = strong Lugol's solution (≈1 % I2, ≈2 % KI, in H2O), KOH = potassium hydroxide ≈5 %, MLZ = Melzer's Reagent (≈1 % I2, ≈2 % KI, 50% H2O, 50 % chloral hydrate), NH4OH = ammonium hydroxide
- **Lipid:** LB = lipid body ("oil drop"), relative lipid content of ascospores (LC): 0 = without lipid (eguttulate), 1 = ≈3 % oil content, 2 = ≈10 %, 3 = ≈25 %, 4 = ≈50 %, 5 = ≈80 % (maximum possible lipid content)
- **Iodine reaction:** BB = blue at any iodine concentration, RB = blue at low, red at high iodine concentration, RR = red at any iodine concentration

**General remarks:**

**Apothecia:**

[Lachnellula abietis]
Capitotricha bicolor

L. subtilissima (inamyloid form)
L. calyciformis
L. resinaria var. calycina
L. resinaria var. resinaria
L. splendens
L. mugonicola

L. laricis (Mongolia)
*L. flavovirens*

*L. fuscosanguinea* (above: dry state, right: same group rehydrated)

*L. arida* (Mongolia)
**Shrinking effect:**

Dead cells (asci, spores, sterile elements) are often considerably smaller compared to living ones. This shrinkage can easily be demonstrated in fresh material when applying lethal media. In herbarium material, however, the sizes of the dead cells differ only slightly among the used media (H₂O, KOH, MLZ etc.). Whenever possible, microfeatures and cell sizes were evaluated in the living state in tap water (for vital taxonomy see BARAL, 1992). Cell sizes in lethal media like KOH or MLZ are often added in order to allow comparison with literature data which are mainly gained from dead material. Since in water mounts both living and dead cells use to occur side by side, simply citing "in H₂O" is insufficient.

- Observed approximate linear shrinkage in *Lachnellula*:
  - Ascus length: 10-20(-30?) %, width: dto.
  - Ascospore length: 5-10 %, width: 5-15 %

**Iodine test:**

**Phenomenon of hemiamyloidity:** Diagnosing hemiamyloidity requires the use of Lugol's solution (= IKI). KOH-pretreatment is not necessary for diagnosing hemiamyloidity of apical rings of asci. Application of IKI to apical rings yields a brownish or purplish-red stain ("type RR"), or sometimes first a blue stain which changes to dirty reddish when the concentration of iodine increases ("type RB"). MLZ gives a negative or only faintly reddish reaction in type RR and RB, or sometimes a faintly blue in type RB, whereas KOH-pretreated material gives a very distinct blackish-blue reaction in both IKI as well as MLZ. KOH-pretreatment is done by applying a drop of 2-5 % KOH for 10 sec (heating not necessary, though recommended in critical cases), ample iodine directly added afterwards by removing as much KOH as possible beforehand. - A faint hemiamyloid reaction (IKI rose, KOH+IKI pale violet) occurs in the ectal excipulum of some species (*L. resinaria, L. calycina, L. laricis*).

<table>
<thead>
<tr>
<th>directly applied</th>
<th>KOH-pretreated</th>
</tr>
</thead>
<tbody>
<tr>
<td>IKI</td>
<td>MLZ</td>
</tr>
<tr>
<td>IKI</td>
<td>MLZ</td>
</tr>
</tbody>
</table>

- inamyloid-
- hemiamyloid
  - RR
  - RB
  - (B)
- euamyloid
  - BB

Example: Hemiamyloid apical rings (type RR) in *Lachnellula laricis* (H.B. 7898)

<table>
<thead>
<tr>
<th>IKI without KOH</th>
<th>MLZ without KOH</th>
<th>IKI after KOH (unheated)</th>
<th>MLZ after KOH (heated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. angustispora (hemiamyloid)</td>
<td>L. calyciformis</td>
<td>L. splendens</td>
<td>L. robusta</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>L. ellisiaina (euamyloid)</td>
<td>L. gallica</td>
<td>L. arida</td>
<td></td>
</tr>
</tbody>
</table>

**Ascus types in Lachnellula (left: with amyloid ring, rest: inamyloid, with thin apical or subapical thickenings)**

<table>
<thead>
<tr>
<th>L. arida</th>
<th>L. calycina, resinaria</th>
<th>L. gallica</th>
<th>L. kamtschatica</th>
<th>L. mugonicola</th>
</tr>
</thead>
</table>

**Hairs in Lachnellula: cell wall hyaline, rarely brown, warts globose, rarely angular-crystalloid**
*L. calycina*

Asci and paraphyses in Lachnellula
**L. resinaria** (horizontal textura porrecta)

**L. calyciformis** (horizontal t. prismatica)

**L. mugonicola** (textura prismatica oriented at 45°)

**Ectal excipulum in Lachnellula**

**L. robusta** (textura globulosa-oblita oriented at 45-90°)
L. robusta

Median section of apothecia showing erumpent growth from beneath outermost bark by pushing off the dark red-brown periderm.

L. splendens

Asci: Although sometimes variable in Lachnellula, the iodine test remains a highly useful tool in ascomycete taxonomy (Baral 1987). Most species of Lachnellula have permanently inamyloid asci (IKI, with or without KOH-pretreatment, always with only very slight apical wall thickenings). This is typical of xerotolerant discomycetes tending to grow as aerophytes. If an IKI-positive, ± thick apical ring is present, this is always of the Calycina-type. In most of these species the iodine reaction is hemiamyloid (type RR or RB, exception: L. ellisiana: BB).

In my paper on Lachnellula (1984) I reported the red reaction but was still unaware of the differences concerning the applied reagents, therefore erroneously wrote "Melzer" and "dextrinoid" instead of "Lugol" and "hemiamyloid". Literature reports of "negative" or "blue" reactions should be re-examined because, without indicating the method, both statements might refer to the same hemiamyloid type of reaction. In herbarium material older than ca. 50-100 years red (RR) reacting rings may have changed to react blue (RB or BB) without being KOH-pretreated.

Dharne (1965) or Dennis (1949) reported only blue versus negative reactions, since they probably used MLZ on KOH-pretreated material. Earlier authors often neglected the iodine test. The presence of an amyloid ring is faintly visible already in water (or KOH) mounts, and was indirectly reported as “enclosing membrane ... not following the contour of the ascus at the apex” (Bingham & Ehrlich, 1943: 106, L. agassizii) without applying iodine.

Variation in the iodine reaction was observed in complexes like L. subtilissima and L. willkommii/occidentalis. In L. occidentalis IKI-positive and IKI-negative mature asci occur often within a single apothecium. Rare deviations from the usual behaviour are known from e.g. L. resinaria (usually IKI-) and L. suecica (usually IKI+). Such variability is very rare in the Helotiales, and probably has, together with the difficult case of hemiamyloidity, caused workers like Cooke (1876) to completely abandon the iodine test. Huhtinen (1993: 194) indicated that 3 different reactions (blue, red, and negative) were reported for L. subtilissima; this is, however, mainly a result of the methods. These phenomena must have escaped Dharne's notice when constructing his key which starts with the iodine test almost at the beginning.
**Tissue:** A hemiamyloid reaction of the gelatinized intercellular matrix of the medullary and ectal excipulum of the apothecial stipes is observed in *L. resinaria* and *L. calycina*, slightly also in *L. laricis*, but so far not in other species of the genus. The same phenomenon is known from the whole ectal excipulum of different species of *Proliferodiscus* and *Perrotia* (see BARAL 1987: 423), a feature which illustrates the relationship of these genera. The observed rose-red IKI-reaction is absent in MLZ, and can be converted by KOH-pretreatment (few min unheated, or few sec heated) into a purplish-violet reaction (in IKI or MLZ) and a bright (greyish-blue) when rinsing the mount with water. Similar red MLZ-reactions reported as "dextrinoid" for the excipula of *Proliferodiscus* species by Haines & Dumont (1983) and Spooner (1987) should be tested for hemiamyloidity.

**Carotenoids:** The yellow LBs in the paraphyses and excipular cells yield a dirty blue-green iodine reaction (IKI or MLZ, independent of KOH-treatment) due to the presence of yellow carotenoids.

**Glycogen:** Glycogen depots in ascospores stain red-brown in both IKI and MLZ (with or without KOH-pretreatment). Such invariably reddish reactions are termed dextrinoid.

**Cell inclusions:**

**LBs in ascospores:** Vital observation is essential when using oil drop patterns (lipid bodies, LBs) for taxonomy, since LBs in dead spores often coalesce to form variable patterns. Secondly, they gradually disappear in post-mature stages (even when the spores remain within the dead asci). A third source of errors is the applied medium: if only dead herbarium material is available, this must be studied in KOH (or NH₄OH) because lipids become nearly invisible (masked) when mounted in media like H₂O, MLZ or CB, but gain in KOH an immensely increased contrast against the surrounding plasma. Such effects of artificial variability influenced e.g. SPOONER (1987: 614) to state the completely unjustified opinion, that spore guttulation is inconsistent and therefore of doubtful taxonomic significance (SPOONER saw only in a few collections some guttulate spores). Not all drops are lipids: LBs are recognized by their strong refractivity in the living plasma (in tap water) and by their insolubility in KOH (BARAL 1992: 357).

LBs in ascospores are nearly always ± small in *Lachnellula*, therefore reports of large drops should refer to artificial coalescence. The only exception known to me is *L. abietis* with 2-4 large LBs in each spore.

--- Bild multigutt. robusta -> 1 large LB ---

LBs in paraphyses and excipular cells: Refractive guttules within sterile tissue of *Lachnellula* are always LBs and mostly yellow-orange due to carotenoids.

--- Bild Paraph. farbig ----

**Glycogen:** This forms one or two large, ± spherical bodies of very low refraction in the living sporoplasm. Glycogen bodies stain red-brown (dextrinoid) in iodine. They are typically surrounded by small LBs by forming a hollow sphere. In KOH they are completely invisible, and the LB-sphere usually becomes disordered.

--- Bild splendens in IKI, mit Nucleus ---

**Nuclei:** In one species (*L. splendens*) nuclei were observed in the living spores (in tap water, the contrast increases when adding small amounts of IKI). The nuclear plasma appears as a transparent unstructured region while the nucleolus is of medium refractivity and adheres to the nuclear membrane.

**Drought-tolerance:** Members of *Lachnellula* are drought-tolerant (xerotolerant), that means they produce their ascocarps on branches that protrude into the air (aerophytes), and dry down rapidly during periods of sunny or dry weather, while during wet times they immediately revive and continue maturation or sporulation. Nevertheless they are often collected on branches with close contact to the ground, as a result of the current method to neglect dry substrates, as a result of the fact that they partly or entirely close their bright yellow-orange hymenium in the faded, dry state (in contrast to a habitually similar basidiomycete growing in the same habitats, *Aleurodiscus amorphus*), thus become very inconspicuous. The mentioned height of the branches above ground level therefore depends on the method of collecting, and further usually neglects branches hanging higher than ca. 2.5-3 m. It is
only half of the truth that they grow as aerophytes "only in forests with especially moist air or rich in snow" (BARAL, 1984: 144), an error that comes from the common opinion that fungi need a permanently moist environment. Some species (e. g. *L. gallica*, *L. calyciformis*, *L. subtilissima*) appear in great number on previously cut larger parts of the crown now lying with only partial contact on the ground, which indicates presence of mycelium within the living substrate (endophytic growth). Within *Lachnellula*, mature asci show the lowest tolerance to drought (min. 6 weeks), ascospores the highest (min. 6 months). Tests on drought tolerance were made according to BARAL (1992: 378).

--- evtl. Bild vom Standort ----

**Phenology:** The given data refer to the Northern hemisphere (mainly Central Europe).

**Croziers:** In many genera of the Helotiales the ascus base is a constant and important character. In *Lachnellula* this was introduced by BARAL (1984) as a valuable additional feature, but there is considerable variation in many of the included species: even when an ascus attains maturity, the lateral protuberance of a cell of the ascogenous hyphae often does not fuse with its cell below while others within an apothecium do so by forming a true crozier. The percentage of such septate or aseptate basal protuberances or "unfinished croziers" varies among the collections. Mainly unfinished croziers were seen in *L. abietis*. Variation between simple septa and croziers is found in species complexes like *L. arida*, *L. subtilissima*, *L. wilkommii*, or *L. calyciformis*. Further material needs to be examined to prove whether or not different taxa should be separated. Consistently present croziers were observed, e. g., in *L. gallica*, *L. robusta*, *L. resinaria* and *L. calycina*. In those species having croziers, nearly all of the croziers are provided with a perforation ("medaillon-shaped", the lateral protuberance forms an arch), and this type of crozier is also known from the closely related genera *Perrotia* and *Trichopeziza*, and also from "*Dasyscyphus* scabrovillosus" which is possibly a *Capitotricha*.

Croziers are generally neglected because of the apparent difficulty to see them. They are best studied in sections of living apothecia. With herbarium material the use of KOH or NH₄OH (best followed by a small drop of CR), and strong squeezing of the mount is recommended.

**Paraphyses:** are unbranched near apex, straight, cylindrical to subcylindrical or sublanceolate; in later stages they frequently form irregular subapical or lateral outgrowths; sometimes they may become ± moniliform. The yellow-orange color of the hymenial discs is due to the carotenoids in the LBs within the paraphyses.

--- Bild Paraphysenformen ----
Anamorph: Ascospore cultures in *Lachnellula* frequently develop an anamorph currently assigned to the genus *Naemospora* Roth ex Kuntze (or Naemaspora?). The microconidia (in the key termed "conidia") are produced in labyrinthiform cavities within small, erumpent, ± yellowish stromata which can sometimes also be found close to the apothecia on the branches.

*LACHNELLULA* P. Karsten 1884
Type: *Lachnellula chrysophthalma* (= *L. suecica*)
≡ *Trichoscyphella* Nannf. (1932)
≡ *Trichoscypha* Boud. (1885) non Hook. (1869)
Type: *Trichoscyphella calycina* (= *L. subtilissima*)

The genus was for a long time restricted to a few globose-spored species. Those with elongate spores were mainly placed in *Dasyscypha* Fuck. and *Lachnella* Fr., and later in *Trichoscyphella* Nannf. Following Dharne (1965), Baral (1984) and Baral & Matheis (2000), the genus is here restricted to conifer-inhabiting species. Dharne's concept is enlarged to include also ± smooth-haired taxa (*L. abietis*, *L. ellisiana*, *L. pseudofarinacea*), and my previous concept is here enlarged to include also taxa with euamyloid apical rings (*L. ellisiana*). A larger number of species on angiosperm plants have been transferred to the genus (Dennis 1962; Kohn 1980, 1981; Spooner 1987) but these differ morphologically and are therefore here removed from the genus (some belong in *Proliferodiscus*, see list of excluded taxa).


**KEY TO WORLD SPECIES OF LACHNELLULA**

1. Hairs or at least outer region of ectal excipulum with distinctly light ochre to dark brown wall pigmentation; apothecia therefore externally distinctly deep ochraceous to dark brown; restricted to subalpine-boreal regions (*?L. angustispora*) ........................................................................................................ 2 (Brown-haired species of Lachnellula)
1. Hairs completely hyaline; apothecia externally pure white-haired, sometimes translucent pale yellowish-reddish, stipe base sometimes dark brown; asci IKI- or IKI+; planar to subalpine-boreal .......................................................................................................................................................................................... 10 (White-haired species of Lachnellula)

Brown-haired species of Lachnellula

2. Sp. spherical, 3.5 µm diam., asci 55-60 x 6-7 µm, apoth. externally rufo-cinereous, disc. fresh pale orange ............................................................... *L. microspora* Ellis & Everh.

2. Sp. ellipsoid-ciborioid-oblong .................................................................

3. Asci IKI deep red (RR): see L. angustispora .......................................................... (→ 34)

4. Spores *(10-)12-17-22 µm long ................................................................. 4

5. Spores 13-22 x (4.4-)5-7 µm, LBs?, overripe 1(-3)-septate, asci †88-125 x 7-12 µm, hairs pale olive-buff, 3-4 µm wide, long hairs with slender apices (1-2 µm), disc bright orange, no anamorph; parasitic ................................................................................. L. pini (Brunch.) Dennis


5. Spores *(10-)12-17(-19) x (3.5-)4-5.5(-6.2) µm, without or with many minute LBs near each end (LC 0-2); asci *80-116 x 9-11.5(-12) µm, †70-90 x 8-11 µm, with septate protuberance or croziers; hairs 140-250 x 3.5-5 µm, pale to light yellowish-reddish-ochre, apically not narrowed, wall †0.3-0.8(-1.3) µm thick; ectal excipulum of horizontal, hyaline, ± gelatinized, textura prismatica-angularis covered by a thin? fox-ochre t. porrecta(-oblita); disc bright egg-yellow-orange (lit.: also blood-red); saprophytic to weakly parasitic ................................................................................. L. fuscosanguinea (Rehm) Dennis


7. Spores †5.5-8 x 2.5-3(-3.5) µm, fusoid-subclavate, with few small LBs; hairs -120 x 2-3.4 µm (Holm: -180 x 4), pale ochraceous, (?)thin-walled; disc deep yellow; asci IKI-, partly with croziers; ectal excipulum, pale ochraceous, texture? ................................................................. L. juniperina (K. & L. Holm) Vesterholt (in Knudsen & Hansen 1996)


7. Spores *3.3-5.5 µm wide, ellipsoid, hairs more brown, with (olivaceous-)ochraceous large warts .............................................................................................................. 8

8. Hairs 100-320 x 4-5 µm, pale to bright fox-ochre to greybrown, ??only slightly tapering towards apex, wall 0.3-0.4 µm thick; spores †6.5-10(-13) x 3.5-5.2 µm with a few minute LBs at each end; asci with croziers or septate protuberances; ectal excipulum of ± strongly gelatinized texture prismatica-obliga (30-90°) partly covered by a fox-ochre t. porrecta-obliga; apoth. 1.5-4.5 mm diam., disc bright yellow-olivaceous-ochraceous; conidia 3 x 1.5 µm ................................................................................. L. flavovirens (Bres.) Dennis

MCCXXXIX) is L. arida!

8. Hairs 100-300 x 4-7(8) \( \mu \text{m} \), light to deep ochre- or reddish-brown, gradually tapering towards the subhyaline apex, wall 0.2-0.8 \( \mu \text{m} \) thick; ectal excipulum text. angularis (prismatic near margin), slightly to strongly gelatinized, cortex deep fox-ochre to red-brown; apothecia 1.5-8 mm, disc bright to deep yellow-orange, dry hysterioid ........... 9

9. Asci arising from simple septa (without or with aseptate protuberances); spores mature without or with a few minute LBs at each end (up to 0.4 \( \mu \text{m} \), LC 0-1), *(7-)7.5-9.5(-10.3) x 4.2-5(-5.5) \( \mu \text{m} \) (*3.8-4.4 \( \mu \text{m} \) wide); paraphyses cylindrical-subclavate; [Lit.: conidia 2-4 x 1.3-1.8 \( \mu \text{m} \); apoth. 1-8 mm diam. .......................................................... L. arida (W. Phillips) Dennis

On bark of twigs [rarely needles] of Larix decidua, L. sibirica, rarely on Pinus, P. mugo, Picea, ± below snow, montane-subalpine, V-IX, Europe (Alps: Saas, Dachstein, Hochschwab, 1700-2000 m), Asia (Himalaya, Mongolia, N-America. Apparently a variable or collective species (see following lead). The characters croziers and spore guttulation are currently neglected and so far unexamined in the type material. The studied material is too scanty to decide whether these characters are variable, or indicative of different taxa. Ref.: Dharme (1965: 136), Müller (1977: 50), Breitenbach & Kränzlin (1981: pl. 229, Saas, Larix, possibly belongs to the form without croziers), Baral (1984: 152; in prep.), Bresadola (1927: pl. MCCXXXIX, as D. flavovirens), Oguchi (1981: 165), Kahr et al. (2009).

9. Asci arising from croziers (in collection from Alps often only with septate protuberances): two forms (?) - spores mature with several LBs up to 1 \( \mu \text{m} \) diam. (LC (1-)2-3), *6-9 x 3.3-4.5 \( \mu \text{m} \); asci with croziers; paraphyses slightly tapering at apex; apoth. 1.5-3.5 mm diam. .......................................................... L. aff. arida

On bark and resin of dry hanging twigs of Abies magnifica, Pseudotsuga, ?P. edulis (?or Juniperus), Midwest of USA (Rocky Mts., 1900-2980 m). Ref.: Baral (in prep.), compare also reports of "arida" by Harkness (1877: 117, n.v.) and Smerlis (1973, n.v.). - spores mature with a few to several minute LBs (LC 0-1, immature 2), *6-9(-10) x 3.5-5 \( \mu \text{m} \); asci with croziers or septate protuberances; paraphyses cylindrical, apoth. 1-8 mm diam. .......................................................... L. aff. arida

On Abies balsamea, Larix, Canada (Alberta), Europe (Alps: Aletschwald). Perhaps only a variant of the preceding.

White-haired species of Lachnellula

10. Spores *(2-)2.5-4(-4.5) \( \mu \text{m} \) long, basal excipular tissue of apothecia hemiamyloid (IKI reddish, KOH+IKI violaceous); asci IKI- (lit.: also J+), arising from croziers; ectal excipulum of ± gelatinized textura prismaticata-porrecta; hairs 50-130 \( \mu \text{m} \) long, with ± round to mostly irregularly elongate-crystalloid, partly detaching warts; paraphyses consistently narrow-sublanceolate .......................................................... 12

10. Spores min. *(4-)4.5-6 \( \mu \text{m} \) long, basal excipular tissue of apothecia inamyloid (rarely faintly hemiamyloid: L. laricis) .......................................................... 13

12. Spores (ovoid-)ellipsoid-fusoid. *(2.5-)3.4-7 x 1.6-2.4 (†2.5-4 x 1.5-2) \( \mu \text{m} \), with ± symmetrical guttulation: (0-)1-3 LBs in each end; asci *35-54 x 4.2-5.2 (†3.7-4.2) \( \mu \text{m} \), IKI-; pycnidia hemispherical to flat-convex, white to pale orange, 0.25-0.7 mm diam., conidia ± globose, *2.2-3(-3.5) x 2-2.8(-3.3) \( \mu \text{m} \), with 1-2 small excentric LBs ..........

.......................... L. resinaria (Cooke & Phill.) Rehm var. resinaria
12. Spores subglobose(-ellipsoid-ovoid), *(2.3-)2.5-3(-3.5) x 2-2.5(-2.8) (†1.9-2.5) µm, with ca. 1-4 small, nearly always ly asymmetrically arranged LBs; asci *39-50 x 4.6-5.5 (†4.2-5) µm, IKI-; conidia ellipsoid-ovoid, 3.5-4.8 x ?? µm .......................................................................................................................... L. resinaria var. calycina (Sacc.) Baral

On wood and bark of branches or stems of Pinus contorta, P. sylvestris, P. mugo, P. pinaster, P. radiata, P. strobus, rarely on Picea, Cupressus, 0-4 m above ground, sometimes associated with resin but mostly not so, never on cankers, planar-colline (XII-VI, apparently atlantic) or subalpine (VII-IX), rare in Europe (20-450 or 1725-2350 m), New Zealand (introduced). The isodiametrical cells treated by Raitviir as difference against L. resinaria are present in both varieties only at the apothecial base. The literature reports always globose spores and association with resin, only Kujala stresses the subglobose shape. In one collection a few asci with ellipsoid, partly biguttulate spores occurred among the subglobose-spored asci. Var. calycina differs from var. resinaria only in spore shape, and in the preference of more decayed, less resinous branches of Pinus without cankers. Ref.: Vuillemin (1888: LXX, "Trichoscypha calycina (Schum. pro parte ??)"; Saccardo (1889: 391), Kirschstein (1938: 398, resinaria), Ferdinandsen & Joergensen (1938: 191, rehmii), Kujala (1950: 28), Grelet (1951: 90), Gremmen (1960: 278), Raitv. (1980: 88), Spooner (1987: 430), Dennis (1961: 302), Stephan & Butin (1980), Baral & Matheis (2000), Kahr et al. (2009).

13. Spores long-filiform with tapered ends, †60-97 x 1.5-2.3 µm, ca. 7-septate; ascus apex conical, strongly hemiamyloid (RB), with croziers (with small perforation); hairs 100-300 x 3-5 µm, smooth, slightly tapering towards apex, with loose resinous granules and lumps; paraphyses sublanceolate ........ L. pseudofarinacea (P. & H. Crouan) Dennis


13. Spores globose, ellipsoid to fusoid, 4-35 µm long, max. 3-septate .......................................................................................................................... L. resinaria var. res.
14. Spores fusiform-naviculiform with distinctly attenuated, ± acute ends, 11.5-35 µm long, l/w-ratio min. 3.5-4; asci IKI- or blue (BB) .............................................................. 15
14. Spores ovoid, ellipsoid, oblong, with rounded ends (rarely one end acute), l/w-ratio max. 3.3, if fusoid: spores shorter ...................................................................................... 18

15. Spores †15-22(-28?) x 2-3 µm, with many small LBs (max. ±1 µm, LC 3), remaining asperate (?); asci †54-72 x 6.5-8.3 µm, IKI deep blue (BB), with croziers; hairs 50-150(-200) µm long, smooth (but sometimes granulate on flanks), towards apex not tapered and densely septate; paraphyses distinctly sublanceolate; anamorph yellowish-green, conidia 5-5.8 x 0.9-1.2 µm, fusoid ............................. L. ellisiana (Rehm) Baral comb. nov.

16. Spores * min. 3.4 µm wide, becoming septate when overmature, asci IKI- ........................................................................................................................................ 17
16. Spores * (12.5-)14-19(-21) x (3.4-)3.8-4.3(-4.8) µm, naviculiform, with 1-2 large (2-3.2 µm) and some small LBs in each half (living mature state), no glycogen; asci *(65-)72-95(-106) x 10.8-13(-14) µm, opening by an operculum, always with a basal, mostly septate downward protuberance, sometimes forming a crozier; hairs 100-300 µm long, apical part smooth, ± tapered, lower part slightly rough or nearly smooth, usually covered by ± low, easily detaching warts (0.1-0.3 µm) of irregular (crystalloid) shape, hairs often agglutinated to form distinct teeth; paraphyses * 2-3 µm wide, sublanceolate ................................................................................................. L. abietis (P. Karst.) Dennis.
On bark of living or dead, broken or hanging twigs and branches of Picea abies, sometimes close to or on blackened resin, 0-2.5 m above ground (especially trees felled by storms but also on standing living trees), often associated with Tryblidiopsis pinastri, colline to subalpine-subboreal, I-XII, quite frequent in Central Europe (385-1660 m), Scandinavia, NE of USA (Farr et al. 1989). Very constant species being confined to Picea. Dharne mentions also Abies alba as host (possibly by misinterpreting the name abietis). A very sparse unprepared collection on Abies-numerals from Germany, with two rather small LBs in the spores, might belong here. Ref. Dharne (1965: 139), Raitviiir (1970), Schmid-Heckel (1988: 24), Kujala (1950: 22), Baral & Matheis (2000), Kahr et al. (2009).

17. Spores * (21.5-)23-30(-35) x (5.5-)5.8-6.5(-7,5) µm, with many minute LBs (0.2-1 µm, living state!); with 1 large non-refractive body of glycogen in each half (redbrown in IKI); asci * 115-140 x 13.5-17 µm, often with an always non-septate basal protuberance (never croziers); hairs 50-150 µm long, not tapered towards apex, totally densely covered by globose warts (0.3-1 µm), not forming teeth; paraphyses apically min. * 3-5(-6.5) µm wide, cylindrical to slightly clavate .......................................................... L. splendidus (Schröter) Baral & Matheis

18. Spores min. * 4 µm wide (compare also underdetermined collections in lead 18, below of L. pseudotsugae) ................................................................. 28
18. Spores max. * 2-3(-3.5) µm wide (15-3 µm) ......................................................... 19
18. Spores intermediate: † 5(-6)-8(-9) x 2.6-4 µm, with several medium to small LBs in each half (LC (12-3)); asci †47-63 x 4-6 µm, apex subconical, strongly hemiamyloid, with croziers (or septate protuberances); paraphyses cylindrical to subpathulate or sublanceolate; apothecia 1.5-7 mm diam., stipes exceptionally long (1-2 mm); conidia † 1.5-4.5 x 0.5-3 µm, ellipsoid-ovate .............................................. L. agassizii (Berk. & Curt.) Dennis.
On bark of branches and trunks of Abies (mainly A. balsamea), Pinus (mainly P. strobus), Picea kitchinensis, Tsuga heterophylla, (also Larix), saprobe (to weak parasite), subboreal, VII-XI, frequent from NE-USA to E-Canada, also Midwest of USA (Rocky Mts.). Confused with collections with asci IKI-, without croziers (L. aff. pseudotsugae). Close to L. calyciformis differing by amyloid asci and croziers. Ref.: Bingham & Ehrlich (1943: 106); Seaver (1951: 247), Dharne (1965: 126, giving erroneous spore width of 3-4.5 µm), Raitviiir (1970: 69, erroneously stating Europe & Asia), Funk (1981: 85), Baral (in prep).

- Similar species with spores ellipsoid-fusoid, biguttulate, † 3.8-7.5 x 1.8-4 µm; asci † 47-60 x 3.5-5.5 µm, IKI?, croziers?; conidia † 2.5-4 x 1.8-3 µm; on cankers and bark of living branches & stems (parasitic) on Pseudotsuga taxifolia, Pacific coast (California to W-Canada): L. pseudotsugae (Hahn) Dennis (1962: 184). Close to L. calyciformis but with much wider conidia. Ref.: Bingham & Ehrlich (1943: 301), Hahn & Ayers (1940: 138), Dennis (1949: fig. 103b), Seaver (1951: 246), Funk (1981: 89).
- L. aff. pseudotsugae: Two collections from Canada (Brit. Columbia & Quebec), on indet. conifer/Abies balsamea, VII-IX, T.R.Lohmeyer/E. Smerlis ("agassizii"), have spores † 5-7.7 x (3.1-)3.3-4(-...
4.4) μm with some minute peripheral LBs (not biguttulate), ascii ≡50-65 x 5.3-7 μm, IKI-, without croziers, conidia ≡3.3-5.3 x 2-2.5 μm.

- A similar unpreserved collection [spores ≡6-9.2 x 3.5-5 μm, with numerous small LBs; ascii ≡88-100 x 8-9 μm, with septate protuberances or croziers, IKI-; hairs ≡8-250 x 2-3 μm; on bark of Pinus mugo, 6.VIII.1988, Liechtenstein (1975 m)] resembles L. gallica or L. kamtschatica in the multiguttulate spores, but differs from this in too narrow spores and rather narrow hairs.

19. Spores ≡4.5-7.5 x 1.5 μm, narrowly fusoid; ascii ≡10-40 μm long, J= "blue"; ectal excipulum of text. globulosa; hairs ≡95 x 4-6 μm, strongly tapering towards apex; apothecia very small ...

- A similar unpreserved collection [spores *6-9.2 x 3.5-5 μm, with numerous small LBs; ascii *88-100 x 8-9 μm, with septate protuberances or croziers, IKI-; hairs *8-250 x 2-3 μm; on bark of Pinus mugo, 6.VIII.1988, Liechtenstein (1975 m)] resembles L. gallica or L. kamtschatica in the multiguttulate spores, but differs from this in too narrow spores and rather narrow hairs.

19. Spores 5-10 μm long, min. 2 μm wide; ascii (†) min. 43-50 μm long ................................................................. L. minuta Dharne

On dead branches of Larix, montane, VI, Europe (Alps, known from 1 collection only). Similar to L. subtilissima, taxonomic value ambiguous. Ref.: Dharne (1965: 122).

20. Spores cylindric-fusoid, *(5-)6-10(-11) x 2-3.1 μm (-12 μm fide Dharne, -13 fide Kujala), eguttulate or with few minute LBs (LC 0-1(-2)), LBs polar or not; ascii IKI 2-3RR/Rb, usually most ascii with basal septate protuberance, some or many of these with true croziers, in some populations croziers and protuberances completely lacking; conidia *2.5-4 x 1.2-1.6 μm (Dharne: 3-4.5 x 1-1.3 μm), no or 1 minute (excentric?) LB ............................................................................................................................................................................................................ 21
21. Spores ellipsoid to ovoid, of ± consistent size and shape, *(4.8-)5-6.5(-7.7) x 2.3-3.3(-3.5) µm, †4-6.8(?-7.5) x (1.8-)2.2-3(?-3.5) µm; asci *54-72 x 5.4-7 µm, **no croziers, no basal protuberances**; hairs 90-190 µm; conidia †2-4 x 1-1.5 µm, ± ellipsoid ..........................................................................

L. subtilissima

L. calyciformis

L. mugonicola

.............................................................................................................................. .................................

L. calyciformis

(Fr.) Dharne (= L. minuscula Raitvi)

On bark of twigs to stems of mainly Abies spp., more rarely Picea, Larix, Pinus, Pseudotsuga, exceptionally close to resin, saprophyte (?rarely weak parasite), 0-2 m above ground, planar to montane(-subalpine), I-XII, common in Europe (Central E. 350-1500 m), Russia (European part, Ural, Caucasus, Kasachstan, Altai-region, East & Far East), Japan, rare in N-America, New Zealand. Rather constant species. The type of L. minuscula has spores †4.7-6.8 x 2.4-2.9 µm, i.e. distinctly wider than indicated by Raitviir. Ref.: Bingham & Ehrlich (1943: 98), Dennis (1949: fig. 103a, as Tax. sp. 2), Kujala (1950: 22), Grelet (1951: 87), Dharne (1965: 124), Raitviir (1980: 90, 1991: 316, 317), Oguchi (1981: 165), Baral (1984: 147), Breitenbach & Kränzlin (1981: pl. 230), Hanso (1978: 4), Funk (1981: 85), Kahr et al. (2009), Baral (in prep.).

21. Spores (ellipsoid-)fusoid, *(4.5-)5.5-7.5(-10) x (2.5-)2.7-3.2(-3.5) µm; asci *(50-)60-75(-79) x (5.3-)6-7(-7.5) µm, with croziers (at least with basal protuberances); hairs 70-210 µm ............................................................................................................

L. aff. calyciformis ("mugonicola" nom. prov.)

On undecayed bark of branch of Pinus mugo (also other Pinus species: P. strobus, P. ?uncinata), 0.3-1.8 m above ground, partly associated with Herpotrichia nigra, III, VII-IX, ?399 or 1000-1910 m (subalpine, rarely colline), Europe (Alps, Pyrenees, Sudeten). Apparently constant species very close to L. calyciformis. Possibly the same species but with "eguttulate" spores (4.5-8.5 x 2-3 µm), asci ?IKI-, conidia 1-4 x 1-2 µm, was reported on bark of living branches of Pinus mugo, weak parasite/saprobe following Cronartium ribicola cankers, common in NW of N-America (Bingham & Ehrlich). Here probably also belongs a collection by Huhtinen from Svalbard (= Spitsbergen) on indet. conifer, on account of the presence of crozier, inamyloid asci, and spore guttulation; the guttules exclude L. subtilissima although spore shape is not distinctly fusoid. Ref.: (Bingham & Ehrlich 1943: 295, Dasyscypha spec.), Huhtinen (1993: 194, L. calyciformis), Schmid-Heckel (1985: 61, 1988: 24 p.pt., judging from the substrate, L. calyciformis), Baral (in prep.).

28. Spores †10-16 x 3-4 (?-4.5), µm, ellipsoid-oblong, l/w-ratio 3.2-3.3; asci †90-120 x 6.5-7.7 µm, J-; hairs distinctly tuberculate (with large warts formed by protuberances of the wall), 6 µm wide near base, gradually tapering towards apex; apothecia 3-5 mm diam.; conidia 3-6.5 x 0.8-1 µm ................................................................. L. tuberculata Dharne

On Larix decidua, VI, subalpine, Europe (Alps, only known from 1 collection). The hair character should be restudied to clarify distinction from L. occidentalis. Ref.: Dharne (1965: 134).

28. Spores min. *4-5 µm wide, hairs normally warted ................................................................. 29

29. Spores oblong-ellipsoid-(clavate), min. *11-15 µm long, l/w-ratio ≈1.7-3, with many minute LBs enclosing large glycogen bodies (LC ≈1-3), asci with or without croziers .. ................................................................. 30

29. Spores globose, *4-7 µm long, or (ellipsoid)-ovoid, *6-15.7 µm long, l/w-ratio ≈1-1.5, multiguttulate (LC ≈3-4); asci with croziers ...................................................................................... 38
30. Spores *15-24 x (6.5-)7-8.5(-10.3) µm, ?exclusively on Larix ................................................................. 31
30. Spores *10-17.7 x (4-)5.5-7.5 µm .................................................................................................................. 34
31. Spores *14-)16-22(-24) x (6.2-)7-8.5(-9) µm, †(12-)15-19(-23) x 5-7(-8.4) µm, narrowly ellipsoid-clavate-oblong, ends mostly obtuse; asci *150-190 x 12-15 µm, †(83-)100-130(-166) x (7-)8-12(-13) µm, with or without large IKI deep RR apical ring (mature asci!): 30-100% of asci of an apothecium IKI-red, but sometimes all asci IKI- with apical wall nearly unthickened), without or often with aseptate (rarely septate) basal protuberances, no croziers; apices of some to many paraphyses slightly to very strongly moniliform, *4-5(-6) µm wide; conidia †2-5 x 1.2-1.8 µm; apothecia 0.5-4 mm diam., # saprophytic ............................................

L. occidentalis

(Hahn & Ayers) Dharne (= Dasyscypha calycina ss. Fuckel, = L. hahniana (Seaver) Dennis)


31. Spores *20-26.5 x 9-10.3 µm, †15.6-26(-28) x (6-)7-9(-9.4), one end often acute; asci †(126-)135-165(-173) x (9-)11-13(-14) µm, *always IKI- (?)*, frequently with septate protuberance (?and croziers); paraphyses filiform or only apically inflated; conidia †2-8 x 1-2 µm; apothecia 3-6 mm diam., parasitic ......................................................... L. willkommii

(Hartig) Dennis

On resinous cankers of branches or stems of Larix decidua, rarely L. dahurica, L. kurilensis, L. sibirica, L. sukaczewii, ?never on L. leptolepis, colline to subalpine-boreal, I-IX, frequent in Central Europe (Alps 500-1840 m) & Asia (European part, Central Siberia, Far East), Japan, introduced to S and SW of Scandinavia and to NE-NW-USA & W-Canada. The species was accepted e.g. by Dharne and Kujala, but the morphological differences to L. occidentalis are slight and still deserve clarification. Misidentifications are probably frequent: literature reports might often represent L. occidentalis (e.g. Breitenbach & Kränzlin, Raitviir, Schmid-Heckel). Dharne's clear distinction by the inamyloid asci of L. willkommii is relativised due to the variation in L. occidentalis. The main distinction is physiological. Ref.: Hahn & Ayers (1934), Seaver (1951: 243), Dharne (1965: 127), Kujala (1950: 31), Grelet (1951: 88, on Larix and Pinus sylvestris!), Müller (1977: 51), Raitviir (1980: 96, 1991: 321), Breitenbach & Kränzlin (1981: pl. 237, asci J+ reddish!), Butin (1983: 78-80), Baral (1984: 152 ff.), Manners (1953), Schmid-Heckel (1985: 61), Kahr et al. (2009). Oguchi's (1981: 166) treatise of "L. occidentalis" shows long and narrow conidia 5-8(-10) x 0.8-1.2 µm and non-moniliform paraphyses reminiscent of L. willkommii, but the spores are given smaller than in his "L. hahniana".
34. Excipular cortical cells short, rectangular, very thick-walled, with granular, pale to light yellow-ochraceous exudate around each cell (incl. base of flank hairs), giving the externally apothecia a light ochre colour, hairs 150-220 µm long, spores †12-16 x (4-)5-5.7 µm, with two large glycogen regions surrounded by many small LBs, asci †94-115 µm, ring IKI deep red (RR), with open croziers .......... **L. angustispora** Raitv. on thin corticated twigs of *Larix sibirica*, *L. daurica*, *Abies sibirica*, montane-boreal, VI-VIII, rare in Russia (from Ural to East & Far East). Apparently a good species. Ref.: Raitviir (1977: 3, 1980: 93, 1991: 319), Baral (in prep.).

34. Excipular cortical cells without granular exudate, hyaline, hairs 200-300(-400) µm long .......................................................................................... 35

35. Spores *(11-)12-15(-17.2) x (5-)5.5-6.7(-7.3) µm, with many small LBs in each half (LC 3-4), glycogen sparse; asci consistently IKI-, with basal septate protuberances or mostly with croziers, *93-148 x 12-14 µm, hair walls */†0.2-0.5(-0.8) µm thick, medulla without crystal druses, ectal excipulum inamyloid; conidia 6-10 x 0.8-1.2 µm .......................................................... **L. fuckelii** (Bres. ex Rehm) Dharne


35. Spores *(10-)12-16(-17.5) x (5.2-)5.5-7(-7.5) µm, with 2(-3) glycogen bodies surrounded by some minute LBs (LC 1-2), Dharne: †12-17.7 x 5.7-7.7 µm; asci IKI- or IKI deep red (RR), with croziers or basal protuberances, *105-132 x 10-11.6(-13.7) µm; hair walls *0.4-0.8 µm (KOH +1.2 µm), medulla with abundant crystal druses, ectal excipulum faintly hemiamyloid ........................................... **L. laricis** ( Cooke) Dharne

On bark of dead, dry twigs of *Larix dahurica*, *L. sibirica*, *L. decidua*, montane-subalpine, VI-IX, possibly quite frequent in Europe (Alps, 500-1750 m, asci IKI-, no crystals?), Russia (European part, Ural, East & Far East, Mongolia, e.g. 2100 m, asci IKI+), and N-America. Possibly frequently confused with *L. occidentalis* [ Cooke (1876) did not believe in different taxa]. Dharne reported the asci to be "J+ blue", but he included *D. oblongospora* Hahn & Ayers (1934) despite stating the asci as J-; however, the characters in the protologue of *D. oblongospora* would also suggest identity with *L. fuckelii*: spores 10-16 x 3.8-6 µm, cylindrical with obtuse ends; asci 68-115 x 7-9(-10) µm, IKI+; conidia 2.5-5 x 1-1.5 µm; apothecia 0.5-2 mm diam.; on dead branches of *Larix* spp., *Pinus* spp., *Picea*, *Pseudotsuga*, montane, NE-USA. Ref.: Seaver (1951: 247, *oblongospora*), Dharne (1965: 132), Müller (1977: 50), Raitviir (1980: 95, 1991: 320, 2008: 189), Zhuang (2002), Kahr et al. (2009), Baral (in prep.).

38. Asci IKI strongly red (RR), sometimes some asci IKI- ................................................................. 39

38. Asci constantly IKI- .......................................................................................................................... 40
39. Spores globose to subglobose (depending on collection), *4-7(-8) x 4-6 µm, LC 2-3: with one medium-sized or several small LBs; asci *70-94 x 6.5-9 µm, with zers or with seolate protuberances, ectal excipulum of gelatinized t. angelaris to prismatica-porrecta; apothecia 1-8 mm diam., disc deep yellow-orange; conidia 3-5 x 0.8-1.2 µm *L. suecica* (de Bary ex Fuckel)


39. Spores subglobose to broadly ovoid, †4-7 x 2.6-3.5 µm (x 4.5-5 µm from Dharne's drawing!); conida 3 x 1.5 µm *L. hyalina* Dharne

On dead branches of *Pinus mugo*, subalpine-alpine), V-VII & XI, not rare in Central Europe (Alps, 1250-1800 m). Differing from *L. suecica* fide Dharne in shape of ascospores and conidia, also in the culture medium remaining hyaline (but becoming yellow-orange in *L. suecica*). Possibly a synonym of *L. suecica* since the ascospore shape is partly variable within a collection. Ref.: Dharne (1965: 119), Kahr et al. (2009).

40. Spores *(10.4-)*11.5-14(-15.7) x 7.8-10(-11) µm, with numerous small and few larger LBs; asci *122-153 x 14.5-16.2 µm *L. robusta* Baral & Matheis (= *Perrotia robusta* Grelet ex Spooner)


40. Spores *≈4-7 x 4-5 µm .. see *L. suecica* .......................................................... 41

40. Spores *≈6-11.5 x 4.8-7 µm; asci *90-125 x 8-12.5 µm .......................................................... 41

40. Spores *≈4-7 x 4-5 µm .. see *L. suecica* .......................................................... 41

41. Spores †5.5-7.7(-8) x 4.3-5 µm, ectal excipulum of ± horizontal highly gelatinized texture of strongly elongated cells, hairs 100-140 µm long ....... *L. kamtschatica* Raitv.


41. Spores †6-10.5 x 4-6 µm, ectal excipulum of (irregularly) vertical, ± gelatinized texture of isodiametric to medium elongated cells, hairs 100-300 µm long ............... 42
42. Spores *(6.5-)8-10(-11.5) μm, ellipsoid-ovoid, rarely subglobose, LBs small (0.2-0.6(-0.8) μm, vital state!), forming **1-2 hollow spheres** enclosing large glycogen bodies; asci *90-125 x 9-11(-12.5) μm (†78-103 μm); hairs with obtuse, non-tapered ends ............................................................

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**L. gallica** (P. Karst. & Hariot) Dennis (= *Trichoscyphella carpatica* Srček, = *L. phyllocladi* (Dennis) Dennis)


- **L. ciliata** (Hahn) Dennis is a very similar species or even a synonym having scarcely longer spores †8-12.4 x 4-6.6 μm (with one confluent large LB, the LB-pattern of living spores is unknown) and slightly shorter asci (†63-93 μm), hairs with subacute ends (!), saprobe on thin branches of *Pinus pumila*, *Pseudotsuga*, Far East of Russia (Chukotka, Magadan and Sachalin areas), Northern Pacific coast (USA, Canada). Ref.: Seaver (1951: 247), Raitviir (1980: 93, 2008: 189), Hahn (1940: 141), Spooner (1987: 614).

42. Spores *7-9(-11) x 4.8-6.2 μm, LBs 0.6-1.3(-3) μm diam., not forming a hollow sphere* (living state!), glycogen absent or few; hairs with obtuse, non-tapered ends .............................................................

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**L. aff. gallica**

On bark of thin branches of *Pinus sylvestris*, *Abies alba*, montane, Europe (Black Forest). Doubtfully different from *L. gallica*. Fresh collections on substrates other than *Abies* should be examined for spore guttulation. Ref. Baral & Matheis (2000).

**Synoptic table to genus Lachnellula**
null
**L. arida-group** (hairs pigmented, asci inamyloid)
Lachnellula angustispora Raitv. 1978

Lachnellula arida (W. Phillips) Dennis 1962
  = Peziza arida W. Phillips, Grevillea 5:117 (1887)
  = Lachnella arida (W. Phillips) Seaver 1951
  = Trichoscyphella arida (W. Phillips) E. Müller & S. Ahmad 1962

Lachnellula flavovirens (Bres.) Dennis
  = Trichoscyphella flavovirens (Bres.) Mos.
  = Dasyscypha flavovirens Bres. 1887

Lachnellula fuscosanguinea (Rehm) Dennis 1962
  = Trichoscyphella fuscosanguinea (Rehm) Svrček, Ceská Mykol. 16: 104 (1962)
  = Dasyscypha fuscosanguinea Rehm 1872
  = Trichopeziza fuscosanguinea (Rehm) Lamb. 1887
  = Lachnellula fuscosanguinea (Rehm) P. Karst. 1888


Lachnellula microspora Ellis & Everh. (1893)

Lachnellula pini (Brunch.) Dennis 1962
  = Lachnella pini Brunch. 1911
  = Dasyscypha pini (Brunch. ) G.G. Hahn & Ayers, Mycologia 26: 487 (1934)

Doubtful taxon:
An apparently interesting species on *Abies sacchaliensis* with green pigment. Possibly a good *Lachnellula* (no description available)!

**L. resinaria-group** (spores 2-4.5 µm long, excipulum hemiamyloid, asci inamyloid)
Lachnellula resinaria (Cooke & Phill. in Cooke) Rehm 1896 var. resinaria
  = Trichoscyphella resinaria (Cooke & Phill.) Dennis 1949
  = Trichoscypha resinaria (Cooke & Phill. in Cooke) Boud. 1907
  = Peziza resinaria Cooke & Phill. in Cooke, Grevillea 3:185(1875)
  = Dasyscypha resinaria (Cooke & Phill. in Cooke) Rehm 1883
  = Lachnellula resinaria (Cooke & Phill. in Cooke) W. Phillips 1887

Lachnellula resinaria var. calycina (Sacc.) Baral in Baral & Matheis 2000
  = Lachnellula calycina Sacc. 1889
  = Lachnellula rehmii Ferd. & Joerg. 1938 (nomenclat synonym)
  = Lachnellula schumannii Rehm in Rabh. 1893 (nomenclat synonym)
= Trichoscypha vuillemini Boud. 1907 (nominal synonym)
= Pithya microspora Velen.

**L. subtilissima-group** (spores 4.5-11 x 1.5-3.5 µm)
Lachnellula agassizii (Berk. & M.A. Curtis) Dennis 1962
= Dasycypha agassizii (Berk. & M.A. Curtis) Sacc. 1889
= Peziza agassizii Berk. & M.A. Curtis 1872
= Lachnella agassizii (Berk. & M.A. Curtis) Seaver 1951

Lachnellula calyciformis (Wild. 1787 : Fr.) Dharne 1965
= Dasycyphus calyciformis (Wild.) Rehm 1896
= Peziza calyciformis Wild.
= Trichoscypha calyciformis (Wild.) Grelet 1951
= Trichoscyphella calyciformis (Wild.) Nannf.
= Lachnellula minuscula Raitv. 1978

Lachnellula minuta Dharne, Phytopath. Z. 53: 122 (1965)
Lachnellula pseudotsugae (G.G. Hahn 1940) Dennis 1962
= Dasycyphus pseudotsugae G.G. Hahn, Mycologia 32:138(1940)
Lachnellula subtilissima (Cooke) Dennis 1962
= Trichoscypha subtilissima (Cooke) Boud. 1907
= Peziza subtilissima Cooke 1871
= Lachnella subtilissima (Cooke) W. Phillips 1887
= Dasycypha subtilissima (Cooke) Sacc. 1889
= Trichoscyphella calycina (Schum.: Fr.) Nannf.

**L. gallica-group** (spores ± large, ends obtuse, l:w-ratio 1-1.5, asci inamyloid)
Lachnellula gallica (P. Karst. & Hariot) Dennis 1962
= Trichoscypha gallica (P. Karst. & Hariot) Boud. 1907
= Lachnellula gallica P. Karst. & Hariot 1890
= Dasycypha gallica (P. Karst. & Hariot) Sacc. 1892
= Trichoscyphella gallica (P. Karst. & Hariot) Berthet 1965
= Trichoscyphella carpatica Svrček 1962

?= Lachnellula phyllocladi (Dennis 1961) Dennis 1962
= Trichoscyphella phyllocladi Dennis 1961

?= Lachnellula ciliata (G.G. Hahn 1940) Dennis 1962
= Dasycypha ciliata G.G. Hahn, Mycologia 32:141 (1940)
Lachnellula hyalina Dharne, Phytopath. Z. 53:119(1965)

Lachnellula kamtschatica Raitv. 1970

Lachnellula robusta Baral & Matheis in Baral 1984
= Perrotia robusta Grelet ex Spooner 1987
  = Trichoscyphella gallica var. robusta (Grelet) Bertault & Malençon 1977
  = Trichoscypha gallica var. robusta Grelet 1951

Lachnellula suecica (de Bary ex Fckl.) Nannf.
  = Pithya suecica de Bary ex Fckl. 1876
  = Lachnellula chrysophthalma (Pers. ex Wallr.) P. Karst. 1885
  = Peziza chrysophthalma Pers.
  = Trichoscyphella chrysophthalma (Pers.) Nannf.
  = Pithya malochi Velen. (1934)

Doubtful taxon:
Lachnellula ikenoi Henn. 1902
The species grew on leaves of Juniperus chinensis in Japan and was described to have globose ascospores 8-10 µm diam., asci 100-120 x 10-12 µm (hairs not described). It was originally compared to Lachnellula chrysophthalma (= L. suecica), but appears to differ in larger asci and ascospores (iodine reaction not stated).

L. willkommii-group (spores large, ends obtuse, l:w-ratio 1.7-3)
Lachnellula fuckelii (Bres. in Rehm) Dharne 1965
  = Dasyscyphus willkommii var. fuckelii Bres. in Rehm 1896
  = Dasycypha calycina var. minor Rehm 1896

Lachnellula laricis (Cooke) Dharne 1965
  = Peziza laricis (Cooke) Rehm 1876
  = Peziza calycina * laricis Cooke 1871
?= Dasycyphus oblongospora G.G. Hahn & Ayers

Lachnellula occidentalis (G.G. Hahn & Ayers) Dharne 1965
  = Dasycypha occidentalis G.G. Hahn & Ayers, Mycologia 26: 90 (1934)
  = Lachnellula hahniana (Seaver) Dennis 1962
  = Dasycypha calycina Fuckel 1951
  = Trichoscyphella hahniana (Seaver) Manners 1953
  = Lachnella hahniana Seaver 1951

Lachnellula tuberculata Dharne, Phytopath. Z. 53:134(1965)

Lachnellula willkommii (R. Hartig) Dennis 1962
Trichoscyphella willkommii (R. Hartig) Nannf. 1932
= Dasyscyphus willkommii (R. Hartig) Rehm 1881
= Trichoscypha willkommii (R. Hartig) Boud. 1907
= Peziza willkommii R. Hartig 1874
= Helotium willkommii (R. Hartig) Wettst. 1881

Doubtful taxon:
Trichoscyphella tenuipilosa Cash in Cooke 1952
On dead twigs of Pinus ponderosa, USA. Reported as similar to L. pseudotsugae by Cash, but the diagnosis is insufficient, and the measurement of hair width ("1 µm") seems incredible.

L. pseudofarinacea-group (spores very long, filiform)
Lachnellula pseudofarinacea (P. Crouan & H. Crouan) Dennis 1962
= Trichoscyphella pseudofarinacea (P. Crouan & H. Crouan) Dennis 1960
= Peziza pseudofarinacea P. Crouan & H. Crouan 1867

L. splendens-group (spores large, fusiform)
Lachnellula abietis (P. Karst.) Dennis 1962
= Trichoscypha abietis (P. Karst.) Boud. 1907
= Helotium abietis P. Karst. 1867
= Lachnellula abietis P. Karst. 1867
= Trichoscyphella abietis (P. Karst.) Nannf. 1953
= Perrotia abietis (P. Karst.) Raitv. 1970
= Dasycypha abietis (P. Karst.) Sacc. 1889

Lachnellula ellisiana (Rehm) Baral in Baral & Matheis (2000)
= Dasycypha ellisiana (Rehm) Sacc. 1889
= Peziza ellisiana Rehm 1876

Lachnellula splendens (J. Schröt.) Baral & Matheis 2000
= Dasycypha splendens J. Schröt. 1908

Excluded species

Species belonging in Capitoticha and related genera
Lachnellula dabaensis Zhuang 1997

Lachnellula himalayensis Kar & Pal 1970
On unidentified stem. The filiform spores (60-89 x 1.6-3 µm) and the presence of crystals suggest that the species could belong in the group around Lachnum abnormis (?Capitotricha).

Lachnellula cervina (Ellis & Everh. 1897) Dennis 1963
Erinella cervina Ellis & Everh. 1897
Erinellina cervina (Ellis & Everh. 1897) Seaver 1951
Unclear species, on Betula, spores long-filiform

**Species belonging in Perrotia, Proliferodiscus, Hyphodiscus**


= Lachnella phragmiticola (Henn. & Plötn. 1899) Kirschst. 1936
= Lachnellula phragmiticola (Henn. & Plötn. 1899) Boud. 1907
= **Perrotia phragmiticola** (P. Henn. & Ploettn. in P.Henn. 1899) Dennis 1963

*Perrotia phragmiticola* (P. Henn. & Ploettn. in P.Henn. 1899) Dennis 1963

= Lachnellula phragmiticola (Henn. & Plötn. 1899) Boud. 1907
= Lachnella phragmiticola (Henn. & Plötn. 1899) Kirschst. 1936
= Lachnellula phragmiticola (Henn. & Plötn. 1899) Boud. 1907
= **Perrotia phragmiticola** (P. Henn. & Ploettn. in P.Henn. 1899) Dennis 1963

*Lachnellula pulveracea* (Alb. & Schwein. 1805) Dennis 1962

= Cenangium pulveraceum Alb. & Schwein. 1805
= Lachnellula pulveracea (Alb. & Schwein. 1805) Dennis 1962
= Dasyscyphus pulveraceus (Alb. & Schwein. 1805) Höhn. 1917
= Dermea pulveracea (Alb. & Schwein. 1805) Rehm 1912
= Farinodiscus pulveraceus (Alb. & Schwein. 1805) Srvcček 1987

*Lachnellula inspersa* (Ber. & M.A. Curtis 1868) Dennis 1962

= Peziza inspersa Berk. & M.A. Curtis 1868
= Dasyscyphus inspersus (Berk. & M.A. Curtis 1868) Sacc. 1889
= Atractobolus inspersus (Berk. & M.A. Curtis 1868) O. Kuntze 1898

*Lachnellula tricolor* (Sowerby: Fr. ) Dennis 1962 (1963)

= Lachnella tricolor (Sowerby) W. Phillips 1887
= Peziza tricolor Sowerby: Fr. (1822)
= Dasyscyphus tricolor (Sowerby: Fr.) Massé 1895
= Erinella tricolor (Sowerby: Fr.) Quél. 1886
= **Proliferodiscus tricolor** (Sowerby: Fr.) Baral 2009

A rarely collected species confined to xeric bark of thick branches and trunks of *Quercus* characterized by violet granules on hairs and excipulum giving a glaucous pigment to the apothecia. Asci euamyloid (rarely inamyloid), gelatinized excipulum hemiamyloid, ascospores guttulate, 9-17 x 2.6-3.7 µm.

*Lachnellula pittospori* L.M. Kohn 1981 var. pittospori

A synonym of **Proliferodiscus earoleucus** (Berk. & Broome 1875) J.H. Haines & Dumont 1983

*Lachnellula pittospori* var. azorica L.M. Kohn 1981

?A synonym of **Proliferodiscus earoleucus** (Berk. & Broome 1875) J.H. Haines & Dumont 1983

*Lachnellula viridiglauca* L.M. Kohn 1981

Probably a Proliferodiscus (or Hyphodiscus?)
Lachnellula theiodea (Cooke & Ellis 1878) Sacc. 1889
= Peziza theiodea Cooke & Ellis 1878
= Lachnella theiodea (Cooke & Ellis 1878) Sacc. in Seymour 1929
= Hyphodiscus theiodeus (Cooke & Ellis 1878) Zhuang, Mycotaxon 31: 414 (1988)

On wood of *Eucalyptus*. Generic position unclear (*?Hyphodiscus*).

*On Calamus spp. & Daemonorops margaritae* (monocotyledons). The hairs and also the medullary hyphae of this species are described as being covered by greenish-blue amorphous granules. This and the ectal excipulum of *t. obliterata* refer the species to the genus *Hyphodiscus* or *Proliferodiscus*.

Lachnellula rhopalostylides (Dennis) Korf 1977

Species probably belonging in other genera

Lachnellula calva Rick 1906
A synonym of *?Midotiopsis bambusicola* Henn. 1902

Lachnellula hysterigena (Berk. & Broome 1873) Sacc. 1889
= Peziza hysterigena Berk. & Broome 1873
= Lachnellula hysterigena (Berk. & Broome 1873) Sacc. 1889
= Unguiculariopsis hysterigena (Berk. & Broome 1873) Korf 1971
A synonym of *Unguiculariopsis ilicincola* (Berk. & Broome 1861) Rehm 1909

Trichoscypha distinguenda (P. Karst.) Boud. 1907
A synonym of *Dasyscyphella dryina* (P. Karst.) Raitv.

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BRESADOLA (1887) ...
BUTIN (1983) ...