

# A REVISION OF THE GENUS INOCYBE IN EUROPE

## I. SUBGENUS INOSPERMA AND THE SMOOTH-SPORED SPECIES OF SUBGENUS INOCYBE



Thomas W. Kuyper

HIAS

Herrn A. Hinkeliger mit freundlichen Grüßen

Thomas von Kroppe

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SMOOTH-SPORED SPECIES OF  
SUBGENUS INOCYBE

PROEFSCHRIFT

TER VERKRIJGING VAN DE GRAAD VAN DOCTOR  
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BUT WHY THY ODOR MATCHETH NOT THY SHOW  
THE SOIL IS THIS, THAT THOU DOST COMMON GROW

Shakespeare, Sonnet 69

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## CURRICULUM VITAE

Thomas Wilhelmus Kuyper werd op 29 april 1954 te Nijmegen geboren. Na het behalen van het diploma gymnasium-B aan het Canisius College te Nijmegen, begon hij in 1972 met de studie biologie aan de Katholieke Universiteit Nijmegen. Het candidaatsexamen B1w werd behaald op 6 januari 1976, het doctoraalexamen Biologie op 2 september 1980 (cum laude). gedurende zijn studie bewerkte hij de volgende onderwerpen:

- Systematiek en oecologie van *Clitocybe* subgenus *Pseudolyophyllum* in Nederland, onder Prof. Dr H.F. Linskens en Dr E.J.M. Arnolds.
- De vegetaties van vochtige hooilanden en kalkrijke blauwgraslanden in Burgenland en oostelijk Nederoostenrijk, samen met H.F.M. Leeuwenberg, onder Prof. Dr E. Hübl en Prof. Dr M.J.A. Werger.
- De geschiedenis van de diversiteit-stabiliteittheorie, onder Prof. Dr P. Smit.

Van 1 oktober 1980 tot 1 oktober 1984 was hij aangesteld als wetenschappelijk assistent aan de Rijksuniversiteit Leiden, gedurende welke periode hij op het Rijksherbarium dit proefschrift bewerkte. Sinds 15 oktober 1985 is hij als toegevoegd onderzoeker in dienst van de Landbouwniversiteit Wageningen, vakgroep Bosteelt en bosoeologie, werkzaam bij de Afdeling Bosoecologie te Wijster.

De volgende artikelen werden door hem gepubliceerd:

1978. (met H.F.M. Leeuwenberg & E. Hübl). Vegetationskundliche Studie an Feucht-, Moor- und Streuwiesen im Burgenland und östlichen Niederösterreich. Linzer biol. Beitr. 10: 231-321.
1981. Notes on *Clitocybe*-I. Persoonia 11: 385-386.
1984. Notulae ad Floram agaricinam neerlandicam VI-VII. *Rickenella* and *Omphalina*. Persoonia 12: 188.
- A new species of *Clitocybe*. Sydowia 36: 173-175.
- (met G. Gulden & C. Bas). Proposal to conserve *Hemimycena* Singer over *Helotium* Tode: Fries. Taxon 33: 331-333.
- (met W. Gams). Problems involved in the sanction of fungal names. Mycotaxon 20: 619-631.
1985. *Clitocybe metachroa* and the problem of the variable species. Agarica 6(12): 11-27.
- (met T. Stijve). Occurrence of psilocybin in various higher fungi from several European countries. Planta medica 1985: 385-387.
- Studies in *Inocybe*-I. Revision of the new taxa of *Inocybe* described by Velenovský. Persoonia 12: 375-400.
- (met M. van Vuure). Nomenclatural notes on *Russula*. Persoonia 12: 447-455.
- (met T. Stijve & J. Klán). Occurrence of psilocybin and baecocystin in the genus *Inocybe* (Fr.) Fr. Persoonia 12: 469-473.
- Studies in *Inocybe*-II. Persoonia 12: 479-482.
- (met J. Stangl). Neue und seltene Risspilz-Arten in der Bundesrepublik Deutschland. Z. Mykol. 51: 257-267.

1986. Zwei seltene Nabelinge in der Bundesrepublik Deutschland. Beitr. Kenntn. Pilze Mitteleuropa 2: 7-10.
- Proposal to conserve *Melanoleuca* Patouillard over *Psammospora* Fayod. Taxon 35: 377-378.
- (met G. Tjallingii-Beukers). Notes on *Pholiota*. Persoonia 13: 77-82.
- Generic delimitation in European omphalinoid Tricholomataceae. Proc. Int. Symp. Tricholomataceae, Borgo Taro 1984 (in druk).
- (met S.A. Redhead). Lichenized agarics: taxonomic and nomenclatural riddles. Proc. 2nd Symp. Arctic Alpine Mycology (in druk).

In de loop van 1987 zullen nog verschijnen:

- Generic concepts in agarics and boleti. Flora agaricina neerlandica 1.
- Specific and infraspecific delimitation. Flora agaricina neerlandica 1.
- Nomenclature. Flora agaricina neerlandica 1.
- (met C. Bas). Proposal to conserve *Phaeocollybia* R. Heim. Taxon 36.

## SAMENVATTING

In dit proefschrift worden de resultaten gepubliceerd van een systematische herziening van het paddestoelengeslacht *Inocybe* (vezelkop, behorende tot de groep van de plaatjeszwammen) voor Europa. Het onderzoek heeft zich beperkt tot het overgrote deel van de soorten met gladde sporen: soorten met hoekige en knobbelige sporen, en enkele soorten uit het (nieuw beschreven) ondergeslacht *Mallocybe* zijn niet bewerkt.

Het geslacht *Inocybe* is macroscopisch relatief gemakkelijk herkenbaar; ook microscopisch is het goed gekarakteriseerd. De herkenning van de afzonderlijke soorten is aanzienlijk moeilijker en grote verschillen tussen regionale bewerkingen kunnen worden geconstateerd.

Een compleet overzicht van alle bekende soorten van het geslacht werd gepubliceerd in 1904 door Masee. Dit werk is echter onvolledig en sterk verouderd aangezien er sedert die tijd nieuwe belangrijke kenmerken zijn ontdekt en vele nieuwe soorten zijn beschreven. De enige Nederlandse bewerking dateert van 1925 van de hand van Boedijn; ook dit werk is sterk verouderd en daardoor heden ten dage onbruikbaar.

Dit proefschrift is uit twee delen opgebouwd. In het algemene gedeelte bespreek ik de kenmerken en de variatie daarbinnen, de oecologie en geografische verspreiding, de verwantschap met andere geslachten en een indeling van het geslacht die de vermoedelijke evolutie ervan weerspiegelt. In het speciale gedeelte geef ik determinersleutels tot, en beschrijvingen en microscopische afbeeldingen van de in Europa voorkomende soorten en infraspecifieke eenheden.

De kenmerken van het geslacht *Inocybe* worden besproken in Hoofdstuk II. Vezelkoppen zijn reeds in het veld herkenbaar aan de zijdeachtige, vezelige tot schubbige hoed, vaak berijpte steel, bruine plaatjes, de bruine sporen en een doorgaans opvallende, onaangename geur die als 'spermatisch' wordt omschreven.

Microscopisch vallen de soorten van het geslacht op doordat het oppervlak van de sporen glad is, en niet wrattig zoals bij verwante geslachten. Ook de hoekige en knobbelige sporen blijken bij nauwkeurige studie een glad oppervlak te hebben.

Opvallend zijn verder steriele elementen (cystiden), die op de snede, en vaak ook op het vlak van de plaatjes voorkomen. In het laatste geval zijn ze dikwandig en dragen ze aan de top een kristalkop; vaak komen ze dan ook over een gedeelte van de steel voor. Wanneer alleen op de snede van de lamellen cystiden voorkomen zijn ze dunwandig en bezitten ze geen kristaltop. Dit type kan ook bij verwante geslachten worden waargenomen, maar het dikwandige type is bijna geheel tot *Inocybe* beperkt.

Vrijwel alle soorten *Inocybe* bevatten muscarine en zijn dus giftig. Enkele soorten zijn hallucinogeen, en van slechts één Europese soort wordt opgegeven dat ze eetbaar zou zijn.

Om tot een evenwichtig oordeel te komen over de waarde van de kenmerken die gebruikt zijn om soorten af te grenzen, is het zeer wenselijk om zelf vers materiaal uit verschillende delen van het areaal te verzamelen. Door het drogen van de paddestoelen voor het herbarium verdwijnt immers een aantal kenmerken. Derhalve is in de periode 1980-1984 een aantal verzamelreizen in West en Centraal Europa ondernomen. Dankzij de aanwezigheid van een goede basiscollectie op het Rijks-

herbarium en met behulp van vele mycologen in binnen- en buitenland, kon ik zodoende een goed beeld van de kenmerken van *Inocybe* verkrijgen.

Op grond van deze studie kon ik concluderen dat de macroscopische kenmerken veel variabele waren dan door de meeste mycologen werd verondersteld. Deze afwijkende conclusie kan verklaard worden uit het feit dat veel mycologen in een geografisch te beperkt gebied hebben gewerkt. De microscopische kenmerken, waaraan vaak minder waarde was geschonken, bleken daarentegen in een aantal gevallen relatief constant.

De kenmerkenstudie had tot gevolg dat de afgrenzing van soorten in een groot aantal gevallen herzien diende te worden en een ruimer soort concept dan voorheen diende te worden gehanteerd.

De oecologie en geografische verspreiding van de vezelkoppen worden besproken in hoofdstuk III. Vrijwel alle soorten vormen zgn. ectomycorrhiza, dat wil zeggen dat de ondergrondse schimmeldraden (het mycelium) een zeer nauwe associatie aangaan met wortels van verschillende boomsoorten. Deze associatie is zowel voor de boom als voor de paddestoel van voordeel. Over het algemeen zijn vezelkoppen weinig kieskeurig waar het de keuze van de boomsoort betreft. De meeste soorten hebben een voorkeur voor kalk- en voedselrijke plaatsen. Slechts enkele soorten worden aangetroffen op zure, voedselarme bodem. Vezelkoppen komen over de hele wereld voor, zowel in de tropen als in de gematigde streken van het Noordelijk en Zuidelijk Halfrond. Het zwaartepunt van de tegenwoordige verbreiding ligt in Noord-Amerika en in mindere mate Europa. Uit het huidige zwaartepunt van de verbreiding mag overigens niet de conclusie getrokken worden dat het geslacht ook daar ontstaan is.

Het doel van een systematische bewerking is zowel fundamenteel alsook praktisch van aard. De praktische betekenis van een bewerking ligt in het verschaffen van de middelen ter identificatie van een organisme. Daartoe dienen de determinatiesleutels en beschrijvingen die in het speciale gedeelte worden gegeven. De fundamentele betekenis ligt in het verschaffen van een hiërarchisch indelingssysteem dat natuurlijke verwantschappen, of met andere woorden de loop van de evolutie, weerspiegelt. In hoofdstuk IV is een poging gedaan de evolutiegeschiedenis van de vezelkoppen te reconstrueren.

Met behulp van geselecteerde kenmerken zijn voor een aantal soorten afstamingschema's (cladogrammen) geconstrueerd (Fig. 1 en 2). Deze schema's geven aan in welke volgorde de soorten uit hun voorouders ontstaan gedacht kunnen worden. Aangezien deze reconstructie slechts betrekking heeft op een deel van de soorten uit slechts een gedeelte van het verspreidingsgebied moeten de resultaten met enige voorzichtigheid geïnterpreteerd worden. Uit de cladogrammen trek ik de volgende conclusies:

Soorten met hoekige en knobbelige soorten zijn in de loop der evolutie meer dan eens ontstaan. Deze conclusie wijkt af van hetgeen tot nu toe door de meeste mycologen verondersteld werd. Alle soorten met dikwandige cystiden behoren tot één natuurlijke groep. Deze groep kan worden onderverdeeld in twee, eveneens natuurlijke groepen, die verschillen in de wijze van vruchtlichaamontwikkeling. Bij de eerste groep wordt in beginsel eerst de steel aangelegd en daarna pas de hoed, terwijl bij de tweede groep eerst de hoed wordt aangelegd en de steel zich eerst in een laat stadium ontwikkelt. Het is aan te nemen dat de tweede groep uit de eerste groep afgeleid kan worden. De soorten met alleen dunwandige cystiden op

de lamellensnede blijken geen natuurlijke groep te vormen. Wel kunnen twee subgroepen worden onderscheiden die verschillen in de wijze waarop de cystiden zich ontwikkelen; deze beide subgroepen vormen wel natuurlijke eenheden.

Deze evolutionaire reconstructie vormt de grondslag voor een nieuw voorgestelde, meer natuurlijke indeling van het geslacht *Inocybe*. Uitgaande van de gedachte dat het geslacht *Inocybe* monophyletisch is, m.a.w. dat alle *Inocybes* één gemeenschappelijke, unieke voorouderssoort bezitten, kan het geslacht in drie ondergeslachten worden verdeeld.

Het ondergeslacht *Malloocybe* werd nieuw beschreven, maar is hier verder niet bewerkt. Het ondergeslacht *Inosperma* werd op zijn beurt weer in twee secties verder verdeeld. Een verdere verdeling van het ondergeslacht *Inocybe* kan nog niet voorgesteld worden zolang een systematische bewerking van de soorten met hoekige en knobbelige sporen ontbreekt. Wel worden binnen dit ondergeslacht twee hoofdgroepen onderscheiden, gebaseerd op de wijze van vruchtlichaamontwikkeling. Dit onderscheid geldt zowel voor gladsporige als knobbelsporige soorten (zie boven).

Van het ondergeslacht *Inosperma* en de gladsporige soorten van het ondergeslacht *Inocybe* worden in het speciale gedeelte de in Europa voorkomende soorten beschreven. Tevens worden de sporen en de cystiden afgebeeld. Ten behoeve van de identificatie worden twee determinatiesleutels gegeven, een analytische sleutel tot alle soorten en een synoptische sleutel tot soorten met opvallende kenmerken.

In totaal worden 93 soorten onderscheiden. In een aantal gevallen bleek het noodzakelijk om binnen de soort nog infraspecifieke eenheden (variateiten en vormen) te onderscheiden. Het totale aantal taxa in dit proefschrift bedraagt 112. Tien soorten en zes varieteiten werden nieuw beschreven. Een aantal soorten werd van de soortrang teruggebracht tot die van varieteit of vorm. Vaak ook werden de soortsgrenzen herzien en soorten samengevoegd.

Van alle soorten wordt de correcte wetenschappelijke naam gegeven volgens de thans geldende regels voor paddestoelennamen. Deze regels bepalen dat, behoudens enkele nauwkeurig omschreven uitzonderingsgevallen, de oudst beschikbare geldige en wettige naam ook de correcte naam is. Het is derhalve nodig om een zo compleet mogelijk overzicht te krijgen van alle namen van vezelkoppen en na te gaan of er ook bij die naam behorend oorspronkelijk materiaal in herbaria bewaard is gebleven. In totaal zijn 273 namen bestudeerd aan de hand van de literatuur en zijn 206 zogenaamde type-collecties bekeken. In een aantal gevallen bleek het onontkoombaar tot naamsverandering over te gaan op grond van thans geldende nomenclatuurregels.

De verhouding tussen het aantal beschikbare namen (479) en het aantal in dit proefschrift erkende taxa (112) is zeer hoog. Hieruit kan geconcludeerd worden dat vele soorten meer dan eens beschreven zijn, vaak omdat onvoldoende rekening gehouden is met de variatie die inherent is aan organismen zoals paddestoelen.

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## INTRODUCTION

Fries (1821: 11) established *Agaricus* series *Derminus* tribus *Inocybe*, which was later elevated by him to generic rank (Fries, 1863: 346). Originally Fries based his circumscription of *Inocybe* solely on macroscopical characters; when it was raised to generic status Fries added that the spores of all *Inocybe* species were seemingly rough ('sporae scabrae videntur omnibus *Inocybis* communes'). Almost certainly this was not based on original observation, as Fries considered the use of the microscope unnecessary, but the result of an uncritical appraisal of observations by Berkeley (1860). The relevance of Fries's statement regarding the typification of *Inocybe* is discussed on p. 29.

Although the genus *Inocybe* is easily recognisable by macroscopical characters, judging from the fact that the generic concept has scarcely changed to the present day, the delimitation of species is considerably more difficult. The number of species increased continually from 1821 onwards. Masee (1904) published a world monograph of the genus but his work unfortunately lacks precision and it is moreover outdated. Important regional work on the genus has been carried out by Heim (1931) and Kühner (in Kühner & Romagnesi, 1953) in France; Alessio (1980) in Italy; Enderle & Stangl (1981) and Stangl & Enderle (1983) in Germany; Kauffman (1924), Stuntz (1947, 1954), and Grund & Stuntz (1968, 1970, 1975, 1977, 1980, 1981, 1983, 1984) in North America; and Horak (1978, 1979, 1980, 1981) in Australia and Asia.

A treatment of the *Inocybe* species occurring in the Netherlands has been given by Boedijn (1925), but this work has now become obsolete. Important contributions to the knowledge of the Netherlands's species have been made by Huijsman but the results of his studies have for the greater part not been published.

Compilatory keys to all European species of *Inocybe* have been provided by Bataille (1910), Alessio (1980), Enderle & Stangl (1981), Stangl & Enderle (1983), and Moser (1983). A real disadvantage of compilatory keys, however, is that they result in a rather large overestimation of the actual number of species. It was therefore felt that a critical revision of the European species was desirable. However, due to the large number of species and the limited amount of time available for this study, I had to confine myself to a study of the smooth-spored species occurring in north-wester Europe. At a later stage subgenus *Mallochybe* (see p. 22) was also excluded from this study. On the other hand I tried to include a revision of all *Inocybe*-types described from Europe, and I also studied several types from North America, as the *Inocybe* flora of both continents appeared to be more alike than had hitherto been suspected (cf. Lange, 1934).

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## A. GENERAL PART

## CHAPTER I

## MATERIAL AND METHODS

Most of the species dealt with herein have been studied by me in fresh as well as in dried condition. Macroscopical characters are therefore for the most part based on personal observations, supplemented by descriptions provided by other mycologists. It has been explicitly indicated when descriptions have been taken from the literature.

The colours of fresh specimens are compared with Munsell Soil Colour Charts, Baltimore, or with Kornerup & Wanscher, Methuen Handbook of Colour.

Microscopical examinations have always been made in a 10%  $\text{NH}_4\text{OH}$ -solution. Only with very old specimens a pretreatment in a 5%  $\text{KOH}$ -solution was sometimes necessary. Although both solutions yield a comparable colour of the cystidial wall in thick-walled cystidia (see p. 10), the use of the latter solution is to be discouraged as the spores tend to swell strongly, thereby leading to unrepresentative values. Microscopical characters have been measured under an oil immersion objective. Values of spores have been rounded to the nearest 0.5  $\mu\text{m}$ , those of cystidia and basidia to the nearest 1  $\mu\text{m}$ .

The drawings have been made with the aid of a camera lucida. The magnifications of the figures are: spores x 1500, cystidia x 1000. The calcium oxalate-crystals at the cystidial apex have been drawn, but their frequency and dimensions are influenced by the age and mode of preservation of the material. Drawings of these could therefore well be atypical and lead to false conclusions.

The abbreviations of the herbaria follow Holmgren & al. (1981). Unless otherwise indicated, collections mentioned are deposited at L.

## CHAPTER II

## NOTES ON CHARACTERS

1. *Habit*

The habit of the basidiocarps is in most species tricholomatoid or collybioid, exceptionally mycenoid. Differences in habit are, however, rather difficult to express and not sharply distinct and therefore of only limited value for specific discrimination. In some cases an Index of Slenderness may be useful, defined as

$$IS = \frac{l^2}{d \cdot D}$$

(Heinemann, 1981), in which *l* is length of stipe, *d* is diameter of stipe and *D* is diameter of pileus. This index is often useful for separating the two varieties of *I. phaecomis* and of *I. splendens*. Only mature specimens should be used in calculating this index.

2. *Pileus*

Size and shape of the pileus are rather variable too and can therefore only rarely be used as a taxonomic character. Shape is for a large part age-dependent, young specimens generally being more or less conical or campanulate, and mature specimens being convex, plano-convex to applanate. An umbo is usually present, but is often lacking when the velipellis is well-developed (see p. 15). This character must therefore be used with great caution. The colour is usually some shade of yellow, brown or red-brown, other tinges being diagnostically more important. The pileus of only three species, viz. *I. impexa*, *I. hygrophana*, and *I. ionochlora*, is reported to be hygrophaneous.

The surface of the pileus is far more variable than the generic name (*Inocybe* means 'fibrillose pileus') implies and is taxonomically rather important, although only at specific level. Surface texture ranges from smooth to radially fibrillose, squamulose or squarrose. However, a correct assessment of the surface texture is often hindered by the velipellis which can result in an unusual development of the underlying pileipellis.

Old specimens may also show an aberrant pileus surface due to disruption on ageing, causing a secondarily squamulose to squarrose aspect. Microscopical examination of the pellis, however, will usually reveal its true nature.

3. *Lamellae*

The lamellae are broadly to narrowly adnate, sometimes even (almost) free. This character is hardly applicable as an infrageneric character, although species considered as relatively primitive usually possess broadly adnate lamellae. Young lamellae are often white, but yellow, grey or violaceous tinges are sometimes present. Lamellae soon turn brown as the spores mature, but sometimes this process is rather slow.

Much value has been attached to the presence of olivaceous tinges in the lamellae, but in my opinion incorrectly so. The colour of the lamellae in mature specimens is determined by five different factors, viz. (i) presence of intracellular pigment in the lamellae, (ii) colour of ripe spores, (iii) presence of necropigmented basidia (in subg. *Mallocybe*), (iv) colour of the cystidial wall, and (v) presence of refractive hyphae in the hymenophoral trama. Olivaceous tinges, being a mixture of greyish, yellowish, and brownish tinges, can originate in different ways and it is therefore not surprising that this character is met with in a rather large number of unrelated species, especially in those that possess refractive hyphae.

The edge is (almost) always white because of the presence of cystidia and ranges from coarsely flocculose to minutely fimbriate. Some species possess cystidia with coloured contents, and the edge is then accordingly coloured. The pattern of the cystidia at the lamella edge is further discussed on p. 11.

4. *Stipe*

The stipe is always central, more or less cylindrical and sometimes twisted. It is equal over the whole length to distinctly broadened below; not uncommonly it possesses a bulb that can be either marginate or not. However, the presence of a marginate bulb is taxonomically of less relevance than has commonly been assumed, since it is probably partly phenotypically variable. Several species possess a marginate bulb in their primordial stage, but it disappears on subsequent development (Reijnders, 1963). On the other hand, the marginate bulb is a constant and easily recognisable character in some smooth-spored species, e.g. *I. amblyspora*.

Much attention has been given to the colour of the stipe, especially in the apical part, mainly as a result of the observations by Kühner (in Kühner & Romagnesi, 1953). He even separated different groups with pink and with yellow tinges; subsequent analysis, however, has cast much doubt as to whether these groups are natural. The use of this character itself is beset with many difficulties and much subjectivity is involved in trying to determine whether or not faint reddish tinges are present. For that reason I have tried to omit this character from the determination keys. Green (or blue-green) tinges and a conspicuous darkening of the stipe are characteristic for a few species.

The surface of the stipe consists (partly) of a pruinose covering (caulocystidia) and underneath a zone of loosely appressed longitudinally arranged whitish fibrils. Observation of the pruinosity of the stipe may in some cases be difficult, even with the help of a good hand-lens, and a microscopic study of the distribution of the caulocystidia and caulocystidioid hairs should always be executed. This character is of paramount importance in defining natural groups (see p. 22). This pruina easily disappears on damaging the stipe, and care should be taken when collecting specimens of *Inocybe*. Careful collecting is also necessary for an assessment of the presence of a marginate bulb. A squamulose to subsquarrose covering in the lower half of the stipe is encountered in several species. A true ring has so far only been found in *I. terrigena*; *I. agardhii* sometimes forms an arachnoid ring-like zone on the upper part of the stipe.

5. *Context*

The colour of the context of most species is whitish, pale buff, yellowish, pale

brownish, or pale reddish. In many species, the context of the base of the stipe is pure white, rather strongly contrasting with the context of the remainder of the stipe, and this indicates the different origin of the base of the stipe and the rest of the stipe (see Reijnders, 1974). Violaceous tinges can be observed in the stipe context of several species, but these tinges, caused by intracellular pigment, easily disappear on age. The context of several unrelated species can show strong reddening.

#### 6. Smell

The genus *Inocybe* is well-known for its peculiar smell, nowadays mostly described as 'spermatic'; this smell is exactly like that of piperidine (Heim, 1931). It is most conspicuous when the specimens are bruised or cut. Some species have a spermatic smell when bruised, but the intact basidiocarps (especially the hymenium) exhibit a different smell. The hymenium of *I. hirtella* possesses a distinctive smell reminiscent of bitter almonds, and *I. obscuroidia* develops a *Pelargonium*-like smell on drying. Smell should therefore be assessed in both intact as well as in bruised basidiocarps. Several other species exhibit a distinctive sweet smell like that of Peruvian balsam, and on chemical analysis the odoriferous substance was found to be methyl-cinnamate (Schmitt, 1978).

Although the smell is often useful in species recognition, its importance should not be overrated for the following reasons: (i) smell perception by individual mycologists often shows considerable variability, (ii) the smell itself may change within one species, e.g. *I. calamistrata*. As different smells may be caused by substances that are chemically much alike, their use on higher taxonomic levels seems hardly possible.

The taste of most species is hardly diagnostic, being indistinct or more or less similar to the smell. In some species a faint bitterish aftertaste may be noticed.

#### 7. Velum

It seems likely that all species of *Inocybe* are monovelangiocarpous (Reijnders, 1963). Kühner (1956) described a new species under the name *I. gymnocarpa* and noted that he had not seen a cortina in young specimens but he did not want to imply that that species is actually gymnocarpous (Kühner, pers. comm.).

Douglas (1920) was the first to point out that already in young primordia the hyphae of the velum universale and those of the pileipellis proper begin to grow intricately through one another; for that reason it is often very difficult to determine in older stages which hyphae originate from the pileipellis proper and which from the universal veil (called here the velipellis). Hyphae of the velipellis are mostly colourless and do not possess any incrustations in their wall and this might form a criterion for distinction. In other cases, however, intermingling hardly takes place and the velipellis is then well-recognisable macroscopically. In these cases the hyphae of the velipellis often tend to form thickened walls, but without any incrustations.

Douglas's observations on velar development provide a balanced assessment of the velar characters and indicate that far too much weight has been given to it (cf. Reumaux, 1983). Her observations can explain why there is often so much variation in colour in species as *I. fuscidula* and *I. splendens* (see p. 156 and 215).

It is therefore inevitable that in several cases taxa with and without a well-developed velipellis have to be merged, although in some cases these taxa have been maintained in the rank of variety.

The velipellis can sometimes be viscid, resulting in the adherence of particles of earth and causing then a very distinct aspect of the pileus as in some variants of *I. splendens* and *I. serotina*. Conditions of drought can sometimes make the velipellis rather rigid and in these cases the velipellis exerts a significant influence on pileus shape, usually preventing the formation of a central umbo, whereas the pileus margin is also more distinctly inflexed. Such character differences are of course devoid of any taxonomic significance.

#### 8. Ontogeny

The relevance of ontogeny of the basidiocarps within the genus *Inocybe* as a taxonomic criterion was first mentioned by Boursier & Kühner (1928). In their study of the nodulose-spored species they recognised two main groups, viz. *Cortinatae* and *Marginatae*, differing in basidiocarp ontogeny. The authors also contended that both groups were natural. Unfortunately they did not provide any explanation with regard to this character, but they noted that both types could be recognised macroscopically, viz. by presence or absence of a cortina (in this case being part of the velum universale, arising as a velum marginale, and therefore not homologous with the velum parziale that forms the greater part of the cortina in the genus *Cortinarius*) and by the structure of the stipe covering.

The application of an ontogenetic criterion to the taxonomy of *Inocybe* was more explicitly discussed by Heim (1931), who, however, denied its systematic relevance, and Huijsman (1953) who found it applicable to the smooth-spored species of subgenus *Inocybe* too. It seems unlikely, however, that this criterion can also be applied to the taxonomy of subgenus *Mallochybe* and *Inosperma*.

According to Reijnders (1963) all species of *Inocybe* are probably pileo-stipitocarpous, but within this broad category a large variation can be observed. Some species, e.g. *I. dulcamara*, are almost stipitocarpous, whereas other species, e.g. *I. asterospora*, are almost isocarpous with a rather precocious development of the pileus margin, as usual in pileocarpous development.

In the first-mentioned developmental mode stipe development is prior to pileus development; during development of the pileus the velum universale is especially abundant in the marginal region because of reinforcement by velar hyphae emanating from the stipe. In the more pileocarpous mode of development the margin of the pileus is continuous with the plectenchyma of the primordial bulb, and there is no contact between stipe and pileus margin. As the velum universale is formed by the outer layer of the primordial bulb, these species may also be called bulbangiocarpous (Reijnders, 1974). It should be remarked explicitly that the primordial bulb does **not** form part of the stipe, but that the stipe develops secondarily within this bulb.

The presence of a velum marginale, reinforced by hyphae emanating from the stipe and resulting in a cortina in young specimens, which covers the stipitopellis proper, exerts a barring influence on the development of caulocystidia.

According to Reijnders (1963) the caulocystidia arise under the influence of factors that are responsible for the formation of the hymenium. In some cases formation

of the hymenium occurs concurrently with the formation of the caulocystidia (as in *I. asterospora*), whereas in other cases the caulocystidia are already developing before the hymenium is formed (as in *I. petiginosa*). An explanation for this difference is not yet available but it might be a corollary of isocarpous versus pileostipitocarpous development.

The above description indicates that species belonging to the group of *Cortinatae* possess only caulocystidia above the insertion point of the cortina (and as this insertion point may be at the extreme stipe apex, caulocystidia can be completely absent), whereas species belonging to the group of *Marginatae* possess caulocystidia throughout. It has already been noted on p. 3 that some species possess a marginate bulb in the primordial stage, but that this bulb disappears on further development (*I. petiginosa*). The considerations above also make clear that presence or absence of a cortina on the one hand, and the nature of stipe covering on the other are probably not two different independent characters, but both morphological expressions of an underlying difference in ontogeny (but see p. 19). Reijnders (1974) regards the type with a marginate bulb, without a cortina and with caulocystidia throughout as derived. It is noteworthy that this character transformation from more stipitocarpous towards more pileocarpous development is also encountered in other genera of brown-spored Agaricales (e.g. *Conocybe*, *Cortinarius*).

As the formation of caulocystidia is presumably controlled by the same morphogenetic stimuli that cause the development of the hymenium (and hence the hymenial cystidia), it is not surprising to find that the pattern of cystidia and paracystidia among the lamella edge is paralleled by the pattern of caulocystidia. For that reason it seems logical and practical to call the part of the stipe with caulocystidia a caulohymenium.

As noted above, the level of insertion of the cortina in *Inocybe* can show some variability and for that reason the caulohymenium can be completely absent or descend to about 1/3rd from the stipe apex. Lower insertion of the cortina has thus far not been found. Although the length of the caulohymenium in some species is remarkably constant, it is far more variable in other species. It is therefore not always possible to delimit species with caulocystidia in the upper 1/3rd part from those totally lacking caulocystidia. For that reason these species have been keyed out more than once in the key on p. 69.

Alessio's contention that the main division within the smooth-spored species of subgenus *Inocybe* is to be found between species without and with caulocystidia, can be easily demonstrated to be incorrect on account of the data presented here.

It might seem at first sight that occurrence of the caulohymenial zone could easily be studied with the help of a good hand-lens, but it is always necessary to complement such a superficial examination with a more profound microscopical investigation.

Although species belonging to the group of *Marginatae* should at least in principle possess caulocystidia throughout, these caulocystidia are often scarce or even completely absent just above the base. This can be explained by assuming that the initially present primordial bulb disappears on subsequent development and the basal part of the stipe becomes more or less equal. The part of the stipe that originally belongs to the primordial bulb does not of course possess a caulohymenium. However, even in these cases the caulocystidia always descend to at least 3/4th of the stipe (unless the stipe has been damaged).

Observation of the presence of a cortina in young specimens is often a difficult

undertaking, as sufficiently young basidiocarps are frequently absent in a gathering. Microscopical examination of the covering of the stipe is therefore essential.

Although the picture as sketched above seems fairly simple and clear-cut, and therefore easily applicable as a taxonomic criterion, its practical use is complicated in the smooth-spored species. Because of some exceptions Kühner (1955) asserted that this criterion must not be overestimated and that groups so defined might not always be natural.

The most important exceptional species is *I. sindonia*. Young specimens of this species possess a very distinct cortina, but old specimens possess caulocystidia descending to over 3/4th, thereby seemingly invalidating the above theory of ontogenetic development. A closer inspection of stipe covering will, however, provide an explanation of this seeming contradiction. The caulocystidia in the lower part of the stipe are not exactly similar to the cheilocystidia, but are often somewhat more cylindrical and more irregular, and, even more importantly so, there are no cauloparacystidia to be found in the lower half, although they abound in the upper 1/3rd. Apparently the 'caulocystidia' of the lower half have a different origin from those of the apical part, and are consequently not homologous. This becomes even more evident when we notice that young specimens hardly possess any caulocystidium-like elements at the lower half, indicating that these elements appear only very slowly and belatedly.

It has been noted above (see p. 6) that morphogenetic stimuli on the stipitopellis are responsible for the formation of the caulocystidia and that the hyphae of the velum marginale, covering the stipe in the lower part, repress these stimuli. However, expression and repression of these stimuli seem to form some sort of dynamic equilibrium, either spatially or temporally. Repression of morphogenetic stimuli in *I. sindonia* is apparently relaxed in time, and a secondary caulohymenium seems to develop. This secondary caulohymenial zone is somewhat different from the true caulohymenium, and in this work the secondarily differentiated elements are called caulocystidioid hairs and not caulocystidia to indicate that they are of a different origin.

The dynamic equilibrium between the caulohymenial upper zone and the velar lower zone can often be observed upon closer microscopical examination of the stipe, where an intermediate zone of more or less differentiated caulocystidioid hairs but without any cauloparacystidia (cf. p. 11) can be noticed. The spatial extension of this intermediate zone is often rather narrow, and will hardly be conspicuous upon cursory examination, but it is more prominent in *I. geophylla*, where a true caulohymenial zone is often absent.

The secondary caulohymenial zone of *I. sindonia* is identical to this intermediate zone. This intermediate zone can also be observed in other species where occasional to rather frequent caulocystidioid hairs are encountered in the lower half, e.g. in *I. nitidiuscula*, *I. sambucina*, and *I. pruinosa*.

Although species with and without a marginate bulb occur in sect. *Rimosae* (subgenus *Inosperma*), they do not differ in the extension of the caulohymenial zone. Up to now nothing is known about the development of the basidiocarps, but it seems unlikely that it is similar to that of subgenus *Inocybe*. However, differences in stipe covering in sect. *Rimosae* are not completely without taxonomic importance.

## 9. Spores

It is well known that within the genus *Inocybe* both species with smooth and species with nodulose or angular spores occur. The spores of the latter group have sometimes been described as 'rough'. But this is clearly an incorrect term, as the spore outline is essentially even. However, Pegler & Young (1972) reported small rugulosity under the electron microscope in both smooth-spored and nodulose-spored species of *Inocybe*. According to Kühner (1980) these rugulosity are of episporial origin and the perispore is always completely smooth, in marked contrast with species of *Cortinarius* and *Hebeloma* where spore ornamentation is of perispore origin.

Although the angular- and nodulose-spored species are excluded from this revision, it is fairly certain, as Heim (1931) already remarked, that there is no clear demarcation line between the smooth-spored species on the one hand and the nodulose-spored species on the other. Classification of the species of subgenus *Inocybe* in groups of purely smooth-spored and purely nodulose-spored species is artificial (see also p. 21). Classification of some particular species as smooth- or angular-spored is sometimes even arbitrary.

The spores of *I. lacera* are probably better regarded as minimally angular, as in several collections more pronouncedly angular spores are encountered. The same probably applies to the spores of *I. vulpinella*, where the somewhat applanate apex seems to indicate an affinity with species such as *I. decipiens* and *I. dunensis*. Both *I. lacera* and *I. vulpinella* have generally been regarded as smooth-spored species, and their placement within the smooth-spored group is accepted here.

*Inocybe ambigua* also forms an intermediate case, but as its remaining characters clearly point towards a relationship with sect. *Petiginosae*, it is excluded from this revision (cf. Romagnesi, 1979; Stangl & Kuyper, 1985). The question of a multiple origin of angular-nodulose spores and the possibility of character reversal are more fully explored on p. 19.

Also within the smooth-spored species variation in spore form is encountered. Roughly speaking two main types can be recognised, and the groups delimited with the help of this character also differ in cystidial characters.

Species of subg. *Inosperma* on the one hand possess (sub)phaseoliform (rarely regular) spores with an obtuse apex and are always devoid of thick-walled pleurocystidia.

Species of subg. *Inocybe* on the other hand possess (sub)amygdaliform spores, almost always with a (sub)conical apex. Only in *I. geophylla* and *I. whitei* the apex of the spore is obtuse, and an almost obtuse apex can occasionally be encountered in other species as well. All species of subg. *Inocybe* possess thick-walled pleurocystidia (except *I. leptocystis* with thin-walled pleurocystidia).

A germ-pore is only found in *I. subporospora* and *I. luteipes*, but several species in subg. *Inocybe* sometimes show a thinning of the spore-wall near the apex, without, however, forming a true germ-pore. Several species have spores with an apical papilla, and these spores are therefore said to be limoniform, but this character seems to have originated more than once.

Spore size is somewhat more variable than indicated in most publications and species discrimination by this character is quite often impossible.

Measurements as given by Heim (1931) are unrepresentative, as he seems to have included all extreme (and even abnormal) spores in his measurements. It is therefore

difficult to give a balanced view on the phenomenon called 'calibration' of spores by Heim (1931), implying that the spore length is extremely variable, whereas the width is constant. I have never seen instances of calibrated spores, and regard this phenomenon therefore as artificial. Abnormal spores might easily arise under conditions of stress (especially drought). These abnormal spores are far more frequently met in fragments of lamellae than in spore prints, and it seems reasonable to suppose that many of these abnormal spores have not been discharged. There is no reason to accord any taxonomic status to these heterosporic variants.

The occurrence of albinistic spores, often linked with a (semi-)albinistic basidiocarp, is far more interesting. I have recorded such albinistic variants of the following species: *I. geophylla*, *I. lacera*, *I. flocculosa*, *I. pelargonium*, *I. sindonia*, *I. lanuginosa*, *I. paludinella*, and *I. asterospora*. These spores are thin-walled and inamyloid, and it seems reasonable to suppose that by some mutation development of the thick-walled perispore (or coriotunica) is barred. Apparently this mutation arises not infrequently, but nothing is known about the survival value of these colourless thin-walled spores. In my opinion no useful purpose is served by recognising these variants as autonomous taxa, as it will only lead to a multiplication of taxa without any increase in taxonomic understanding. Singer (1962) felt that *I. cystidioides* (A.H. Smith) Sing. must be recognised as an autonomous species as it has constantly pigmentless spores, a definite geographic area, and other distinctive characters. As I was unable to find any other character difference with *I. geophylla*, and regard the geographic criterion irrelevant, I have reduced this species to a variant under *I. geophylla* (p. 86).

*Inocybe rufolutea* has also albinistic spores but a coloured basidiocarp. I have been unable to determine the species to which it should be attached (see p. 233).

## 10. Basidia

Most *Inocybe* species possess clavate basidia, but in some species the basidia are conspicuously swollen towards the apex. The relevance of this character needs some further study, but it might help in circumscribing natural taxa. Such basidia are mostly found in species with a stipe that is pruinose throughout.

Most taxa possess exclusively or almost exclusively 4-spored basidia; basidia with fewer sterigmata often produce somewhat irregular and deformed spores. Exclusively 2-spored basidia are found in varieties of *I. fuscidula* and *I. hirtella*. Horak (1960) reported another *Inocybe* with 2-spored basidia, but this species, which is also characterised by the lack of cystidia and clamp-connections, almost certainly must be excluded from *Inocybe* as circumscribed here.

The basidia of species in subg. *Mallochybe* are filled with a brown necropigment and this character seems unique to this subgenus.

Basidia with thickened walls (crassobasidia) occur occasionally but inconstantly in several species; in such cases the sterigmata possess thickened walls too. Spores originating from such basidia are often deformed.

## 11. Clamp-connections

So far all *Inocybe* species are reported to have clamp-connections at all septa. Only Horak (1960) reported an *Inocybe* without clamp-connections. However, his description suggests that this species must be excluded from *Inocybe*, as it lacks cheilocystidia, and 2-spored basidia are also aberrant.

### 12. *Cystidia*

Cystidia are encountered in all species of *Inocybe*, but these sterile elements can be of different origin and/or of different structure. I do not distinguish between true cystidia and marginal hairs as was proposed by Romagnesi (1944), as the distinction between both types is not always possible. Cystidia can be present as cheilocystidia, pleurocystidia, caulocystidia and pileocystidia.

The occurrence of pileocystidia in velangiocarous Agaricales seems somewhat surprising at first sight. It seems reasonable to assume that morphogenetic stimuli, which may be mechanical in nature, incite the hyphae of the pileipellis and/or velipellis to secondary differentiation as pileocystidia or pileocystidioid hairs. This process seems analogous to the formation of a secondary caulohymenium (see p. 7). The occurrence of pileocystidia is irregular and inconstant and apparently without any systematic value. The occurrence of caulocystidia has been discussed under the heading of ontogeny on p. 5.

Hymenial cystidia can be encountered at the sides and/or at the edge of the lamellae. They might be of different origin, as the cheilocystidia in subg. *Mallochybe* arise as terminal elements of the hyphae of the hymenophoral trama, whereas the cheilocystidia in subg. *Inosperma* and the cystidia in subg. *Inocybe* (both cheilo- and pleurocystidia) are of (sub)hymenial origin, seeming to have the nature of modified basidia.

Pleurocystidia are only encountered in subg. *Inocybe*; they are always, except in *I. leptocystis*, thick-walled, possessing a double wall and apically incrustated with crystals of calcium oxalate. Such cystidia have generally been called metuloids, but this term is not used here.

The thickness of the cystidial wall ranges from less than 0.5  $\mu\text{m}$  to more than 5.0  $\mu\text{m}$ . Wall thickness generally increases with age.

The function of these cystidia remains unknown, although it is generally accepted that they serve an excretory function. There is a rather good correlation between lime-content of the soil and the thickness of the cystidial wall and frequency of apical crystals.

The presence of calcium is easily demonstrated in these crystals (Stalpers, pers. comm.), but the demonstration of oxalate proves to be a difficult undertaking. Calcium oxalate is generally held to be insoluble, but these crystals are somewhat soluble under weak alkaline conditions. According to Franceschi & Horner (1980) calcium oxalate occurs in two principal forms, viz. monohydrate and dihydrate, known as whewellite and weddellite respectively. According to Frey-Wyssling (1981) the precipitation of the crystals of oxalate is a mixture of crystals of the two hydrates. It seems likely that both types are formed simultaneously (cf. Holdenrieder, 1982) and that the physical and chemical parameters (temperature, pH, ion concentration) affect their proportion. When both crystals are together in a watery solution the weddellite is metastable and the whewellite is stable; the former disappears by dissolution and additional whewellite appears. It seems likely that the crystals of the cystidia consist mainly of weddellite and that the crystals of the monohydrate are much smaller than those of the dihydrate.

Within rather broad limits wall thickness is species specific, but, as noted above, both age of the material and ecological conditions exert their influence too. When observed in a solution of 10%  $\text{NH}_4\text{OH}$  the wall can be colourless to bright yellow (or even greenish yellow). Although thickness of the wall is generally correlated

with its colour, there are some notable differences. The wall of *I. obscurobadia* is usually less than 1.0  $\mu\text{m}$  thick, but is rather bright yellow, whereas the wall of *I. impexa* can be to 4.0  $\mu\text{m}$  thick, but remains colourless.

The dimensions of the pleurocystidia are usually too variable to be of much use in species delimitation, as they show a rather large overlap between related species, but their form is a rather constant feature. Thusfar this character has been somewhat neglected.

The lamella edge consists of true cheilocystidia and thin-walled, clavate to pyriform elements; these latter elements are called here paracystidia. Kits van Waveren (1985) on the other hand uses the terms pleurocystidioid cheilocystidia and clavate cells respectively. Numerous transitions between both types of elements can be observed, although the proportion of both types is rather constant and has some value for infrageneric taxonomy. Species generally considered to be primitive possess predominantly paracystidia, whereas in more advanced species true cheilocystidia are in the majority.

Fully developed cheilocystidia are similar to the pleurocystidia. As their delimitation from paracystidia is somewhat arbitrary, no separate measurements of their dimensions are given.

Paracystidia are almost always thin-walled and colourless, although in a few species (e.g. *I. phaeocomis*, *I. muricellata*, *I. vulpinella*) somewhat thickened and brown incrustated walls can be encountered. It is probably coincidental that these three species have pleurocystidia with yellow walls.

Only cheilocystidia are to be found in subg. *Inosperma*, and these are of subhymenial origin. They are always thin-walled. Their form ranges from slenderly cylindrical to broadly clavate or pyriform, and is rather species specific. They are usually colourless, but they may become filled with brown or red-brown pigment. This latter character is, however, without taxonomic importance.

### 13. *Pileipellis*

The pileipellis is in most cases a rather undifferentiated cutis; some scattered bundles of ascending hyphae can be noticed, but a true trichodermous development is rare, although it can be encountered in *I. squarrosa*. However, the pellis can become rather rigid in some species and it may consequently break up on age, forming recurved squamules or even small scales. Microscopical examination will then reveal that the pellis itself is not or hardly differentiated. The increasing rigidity of the pileipellis may be caused by thickening of the hyphal walls, as in *I. squamata*.

Unfortunately, almost nothing is known about the ontogeny of the pileipellis in *Inocybe*, especially the more complex one, and evaluation of this character is therefore difficult. The rather simple structure of the pileipellis is in marked contrast with that in species of the genera *Phaeomarasmium* and *Flammulaster* that in other respects show resemblance to *Inocybe* (see p. 16).

### 14. *Chemistry*

Most species of *Inocybe* are said to contain muscarine, and several investigations have been carried out to determine their quantities and possible taxonomic significance (Malone & al., 1962; Stijve, 1982). Bioassays with the help of rats and chromatography sometimes yielded strikingly different results and these differences

are probably best explained by the occurrence of stereo-isomers of muscarine with a very slight biological activity (Catalfomo & Eugster, 1970). It was generally felt that there was no meaningful correlation between taxonomic position and distribution of muscarine and its isomers within the genus *Inocybe*. Recent investigations by Stijve & al. (1985) indicated, however, that the distribution of muscarine is not completely erratic, and that some sections are characterised by the complete lack of muscarine (e.g. sect. *Cervicolores*, sect. *Corydalinae*). Probably all species of sect. *Rimosae* contain muscarin, except *I. adaequata*, generally considered to be the sole edible species of the genus in Europe. The contradiction with earlier investigations can probably be best explained by errors of determination and/or an artificial infrageneric taxonomy. However, even these recent investigations suggest a multiple origin and/or a multiple loss of muscarine. Continued research in this field seems desirable.

Robbers & al. (1964) undertook an interesting evaluation of various primary metabolites such as amino acids and secondary metabolites as muscarine, ergothioneine, tryptamine and 5-hydroxytryptophan as chemotaxonomical characters in *Inocybe*. Their results indicated that primary metabolites possess scarcely any chemotaxonomic significance, but compounds such as muscarine and ergothioneine were potentially useful chemotaxonomic indicators. The authors even provided a chemotaxonomic key to 30 taxa of *Inocybe* species.

Following a report by Drewitz (1983) on a case of poisoning by *I. aeruginascens* that was probably caused by psilocybin, Stijve & al. (1985) undertook a systematic search for the occurrence of psilocybin and related compounds in *Inocybe*. Although psilocybin was detected in several species, there was no reason to assume that this character was of potential chemotaxonomical value. They noted nevertheless that all hallucinogenic *Inocybe*-species were devoid of muscarin.

The usefulness of macrochemical reactions in species delimitation of *Inocybe* is rather low. Heim (1931) applied Guaiac and noted a blue discoloration in several species. My results were more ambiguous when I repeated these tests. It should also be noted that this positive reaction is rather unspecific, being a reaction on phenoloxidases of which there are at least two different types, viz. tyrosinases (endo-enzymes) and laccases (exo-enzymes). From a theoretical point of view, this reaction is therefore rather uninformative. Several species, e.g. *I. appendiculata* and *I. bresadolae* show a reddening context when treated with  $\text{NH}_3$ . However, these species are easily recognisable otherwise, and the use of a chemical test is therefore hardly necessary.

## CHAPTER III

### ECOLOGY AND DISTRIBUTION

#### 1. Ecology

The genus *Inocybe* is generally regarded as forming ectotrophic mycorrhiza, because they are (almost) always found associated with trees and shrub. Actual formation of mycorrhiza has only very rarely been demonstrated (Limonard, pers. comm.). It is therefore difficult to assess whether this mycorrhizal association is obligatory or facultative, the species (temporarily) living saprophytically. There are a few reports of *Inocybes* growing in pure dune-sand without any trees or shrub nearby (Courteuisse, 1985) and this could either be explained by assuming a saprophytic way of life or by assuming mycorrhiza formation with *Ammophila arenaria*.

The association of *Inocybe*-species with particular genera or families is highly aspecific, much more so than in other genera of mycorrhizal Agaricales. Association with the following families of vascular plants has been reported for the Northern Hemisphere: Pinaceae, Cupressaceae, Salicaceae, Betulaceae, Corylaceae, Fagaceae, Rosaceae (*Dryas octopetala*), Tiliaceae, and Cistaceae. In the Southern Hemisphere Dipterocarpaceae, Myrtaceae, and several other families are also reported as mycorrhizal hosts. The individual species are generally euryoecious. *Inocybe geophylla* for instance is reported as associated with 8 and *I. rimosae* even with 14 different genera of trees. In this latter case some ecological specialisation combined with weak morphological differentiation seems to take place, but these ecotypic variants do not seem to deserve autonomous taxonomic status (see p. 67).

No satisfactory explanation has thus far been put forward for the rather catholic association between species of *Inocybe* and their associated mycorrhizal trees. It seems reasonable to suppose that the association per se is rather loose, and it could be a consequence of the ecological requirements of the *Inocybes* and their associated trees. Most species of *Inocybe* prefer calcareous, and somewhat nutrient-rich soils, and it is well known that mycorrhizal association is less obligate under such ecological conditions in comparison with conditions of relative nutrient-deficiency (Harley & Smith, 1983). There are, however, a few species which are (exclusively) found on acid, nutrient-poor soil, such as *I. sambucina* and *I. lacera*.

Several species of *Inocybe* are rather xerophytic, being even found under (extreme) xeric conditions. Their subterranean development and well-developed velipellis are clearly adaptive under such conditions.

The majority of the species seem to prefer somewhat disturbed vegetations, and they are often found in forest clearings, along paths, in young plantations or in parks. Such disturbances may lead to relaxed competition with other mycorrhiza-forming fungi. Regular disturbance could also explain the rather loose association between *Inocybes* and their trees.

#### 2. Distribution

Although the genus *Inocybe* is distributed world-wide, the majority of the species



occur in the temperate zone, mainly in the Northern Hemisphere. The tropics are much poorer in species of *Inocybe*, and the species found there generally possess rather advanced characters. It therefore seems reasonable to assume that the genus originated under temperate conditions, but no rational choice can be made between a centre of origin in the Northern Hemisphere or in the Southern Hemisphere (e.g. New Zealand) where several other genera of the brown-spored agarics seem to have originated (Horak, 1982; Høiland, 1984).

Most of the species occurring in Europe show a wide distribution, and a substantial part of these are also found in North America (Lange, 1934). Endemism seems (very) rare among the temperate species of *Inocybe*.

### 3. Phenology

By far the greatest number of *Inocybes* are found during summer and autumn, and most collections in north-western Europe are made between July and October. Only a few species, e.g. *I. erubescens* and *I. queletii*, are vernal and/or early aestival, being mainly found in May and June. *Inocybe sindonia* on the other hand fruits rather late in autumn, generally not before the second half of September. In the Mediterranean Region there is a shift in fruiting time, and many collections are made there during winter and spring (January to April). The phenological indications following the descriptions in this work generally refer to fruiting in north-western Europe.

## CHAPTER IV

### EVOLUTION OF INOCYBE

#### 1. Affinities of *Inocybe* with other genera

The relationships of the genus *Inocybe* with other genera of Basidiomycetes has been variously conceived. The oldest and still generally accepted view is that *Inocybe* belongs to the order Agaricales (sensu Singer, non Kühner), family Cortinariaceae. Within this family *Inocybe* is either classified as a monogeneric tribus *Inocybeae* (Kühner, 1980) or together with *Hebeloma*, *Hebelomina*, and *Alnicola* in tribus *Inocybeae* (Singer, 1975). This latter viewpoint can in fact be traced back to Fries (1821, 1838) who noted the macromorphological similarity (and hence assumed relationship) between *Hebeloma* and *Inocybe*. Despite a number of similarities between both genera (partly shared by other genera of the Cortinariaceae too), a close relationship, however, seems unlikely. *Hebeloma*, and more generally speaking, the other genera of the Cortinariaceae are characterised by the possession of ornamented basidiospores, and this ornamentation originates in the epitunica (Cléménçon, 1977). The genus *Inocybe* on the other hand possesses essentially smooth spores, although minute irregularities on the surface of the spores were noted by Pegler & Young (1972). These irregularities are, however, of a different origin, viz. from the coriotunica. Although there are *Galerina* species with smooth spores (cf. Pegler & Young, 1971; Cléménçon, 1977), these spores have a well-developed epitunica, and this layer is completely absent in *Inocybe*.

Cléménçon (1977) interpreted the spore-wall of *Inocybe* species, consisting of a coriotunica and directly covered by the sporothecium without any myxosporium layer (tunica and epitunica), as a reduction series from the more complex spores as present in *Cortinarius*.

Basic to Cléménçon's interpretation is an assumed process of exogenisation, leading from an endospore via a false exospore to a true exospore. False exospores are endospores in their morphology, building a spore-wall of their own, but the wall of the basidia also contributes to their formation, forming the sporothecium, and partly contributing to the myxosporium. A true exospore does not build a spore-wall of its own, and it consists of merely the more or less transformed basidial wall. A corollary of this supposed evolutionary process of exogenisation is that thin-walled, colourless spores without a wall of their own, as present in the Tricholomataceae, must be considered as highly derived, whereas morphologically more complex spores with a wall of mixed composition are more primitive in a phylogenetic sense. The direction of this transformation series implies that the Tricholomataceae must be derived from the Cortinariaceae (cf. Høiland, 1984) and that several supposedly primitive characters (e.g. uninucleate spores) must be explained (away) by neoteny.

However, hardly any arguments are given for this direction of the transformation series, and an inversion of this transformation series seems at least equally likely. The process must then be assumed to be towards endogenisation and this could

be a consequence of a developmental pattern that is concentrated instead of diffuse (cf. Reijnders, 1963), and therefore more internal.

The different make-up of the spore-wall in *Inocybe* has led to some doubt with regard to its close relationship with the remaining Cortinariaceae, and Jülich (1982) proposed the new family Inocybaceae to accommodate *Inocybe*. It is difficult, however, to see the merit of this proposal, because the circumscription of the Cortinariaceae has been emended by Jülich to include several genera with smooth spores (*Phaeomarasmius*, *Tubaria*) and no discriminating characters between Inocybaceae and Cortinariaceae have been given. The erection of the Inocybaceae led to a taxonomic inflation without any increased insight into natural relationship, and it would seem that Jülich has confused homogeneity and naturalness of a taxon (cf. Steenis, 1978). For the time being I regard the recognition of the Inocybaceae as at least premature.

In order to execute a cladistic analysis of the genus *Inocybe* it is necessary to find an outgroup, as character states can only be polarised with the help of such an outgroup. As it would seem that the use of *Hebeloma* (or any other cortinariaceous genus with ornamented spores) as an outgroup is rather debatable, I also considered the possibility, earlier put forward by Kühner & Romagnesi (1953) and Horak (pers. comm.), that *Phaeomarasmius* (inclusive of *Flammulaster*) could be an outgroup of *Inocybe*. There are several species of *Inocybe* in New Zealand and New Guinea that show strong resemblance to species of *Phaeomarasmius*, e.g. *I. strobilomyces* (Horak, 1978).

*Phaeomarasmius* has generally been considered a member of the Strophariaceae on account of investigations by Singer & Machol (1972). However, the interpretation of their results may be questioned as the comparison was made between *Phaeomarasmius* on the one hand and *Inocybe*, *Alnicola*, *Hebeloma*, and *Hebelomina* on the other. It would be useful to reanalyse their data and using the sole genus *Inocybe* for comparison.

There are several differences between *Inocybe* and *Phaeomarasmius*, however. Both genera differ strikingly in their nutrition, *Inocybe* forming ectotrophic mycorrhiza and *Phaeomarasmius* being saprophytic. The importance of this difference should probably not be overrated as there are several *Inocybes* that probably can also occur saprotrophically on dead wood (cf. Horak, 1978) and ectomycorrhiza has arisen repeatedly during the evolution of the Agaricales. The structure of the pileipellis is far more complex in *Phaeomarasmius*, generally being a trichoderm, although occasionally a simple cutis can be observed, whereas in *Inocybe* the pellis is usually a rather simple cutis. The majority of the *Inocybe* species possess rather specialised thick-walled pleurocystidia, but it is remarkable that in subg. *Mallochybe*, which is macroscopically not unlike some *Phaeomarasmius* species, only very simple cheilocystidia are observed. Unfortunately, not much is known about the make up of the spore-wall in *Phaeomarasmius*, although the illustrations in Pegler & Young (1971) show a remarkable resemblance with those of *Inocybe*.

In summary I would conclude that our present knowledge does not allow a reasonable classification of the Cortinariaceae and related taxa. For the cladistic analysis it seems reasonable, however, to accept the genus *Phaeomarasmius* as the most likely candidate for the functional outgroup (cf. Watrous & Wheeler, 1981). The monophyly of *Phaeomarasmius* has not been established, however.

## 2. Cladistic analysis of *Inocybe*

In order to arrive at a more rational infrageneric classification I have used several techniques for phylogenetic reconstruction, viz. parsimony analysis (Jensen, 1981) and compatibility analysis (Meacham, 1981).

I had to assume that the genus *Inocybe* itself is holophyletic (monophyletic in the strict sense). However, this monophyly of *Inocybe* is not based on the possession of truly autapomorphic characters; truly unique characters have not been found. There is a polythetic set of several relatively outstanding characters, but not all members of *Inocybe* possess that particular combination of character states. Considering that *Inocybe* has been considered as a natural grouping by all mycologists, the assumption that *Inocybe* is monophyletic must provisionally be accepted as long as no cladistic analysis on a higher level (analysis of the Cortinariaceae) has been executed. Thus far a hypothesis that *Inocybe* is polyphyletic has not been proposed.

It is not possible to execute a cladistic analysis on the level of the individual species, as this revision only treats species of a restricted area (and even in Europe the number of species is far too large), and the number of characters in which both a plesiomorphous (primitive) and apomorphic (derived) condition could be unambiguously recognised was very limited.

The validity of this cladistic reconstruction rests therefore on the assumption that the European species are representative enough to allow extrapolation of the results on a world-wide basis. It should be admitted, however, that this assumption is not completely met, because several species with outstanding characters occur in Asia and New Guinea (cf. Horak, 1978).

I restricted myself to a selection of species that seems representative for the genus in Europe. This selection reflects more or less homogeneous groups that have been recognised in earlier infrageneric classifications. The monophyly of these groups has not been assessed, however. In all 13 species were analysed and 14 characters used. The complete data-matrix is presented in Table I.

In order to make my assumptions as explicit as possible, I have discussed below the characters employed and commented on the character state that I consider to be primitive. The primitive state is coded 0, the derived state is coded 1 in Table I.

1. Presence of necropigmented basidia. This character seems unique in one small group, represented here by *I. terrigena*. The presence of such basidia is regarded here as a derived character state.

2. Hymenial cystidia might be of different origin, arising either as terminal elements of the hyphae of the hymenophoral trama, or arising from modified basidia. The latter character state is regarded as derived, because the cheilocystidia in *Phaeomarasmius limulatus* also originate as terminal elements of the hyphae of the hymenophoral trama. The homology of both character states might be questioned, however.

3. Presence of thick-walled, crystalliferous pleurocystidia (metuloids). This character state is regarded derived; it is not, however, unique for the genus *Inocybe*, as the same cystidial type can be encountered in *Hohenbuehelia*, *Galerina*, *Psathyrella*, and *Crepidotus*.

Table I. Data matrix

	Characters													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TERRIGENA	1	0	0	0	0	0	0	0	0	0	0	0	0	0
BONGARDII	0	1	0	0	0	0	1	0	1	0	0	0	0	0
RIMOSA	0	1	0	0	0	0	0	1	0	0	0	0	0	0
COOKEI	0	1	0	0	0	0	1	1	0	1	0	0	0	0
GEOPHYLLA	0	1	1	0	0	0	0	1	0	0	1	0	0	0
CORYDALINA	0	1	1	0	0	0	0	1	0	0	1	0	1	0
SINDONIA	0	1	1	0	1	0	0	1	0	0	1	0	1	0
HIRTELLA	0	1	1	0	1	0	0	1	0	0	1	1	1	0
GODEYI	0	1	1	0	1	0	0	1	0	1	1	1	1	0
CURVIPES	0	1	1	1	0	0	0	1	0	0	1	0	1	0
ASTEROSPORA	0	1	1	1	1	0	0	1	0	1	1	1	1	0
CALOSPORA	0	1	1	1	1	0	0	1	0	0	1	1	1	1
PETIGINOSA	0	1	1	1	1	1	0	1	0	0	1	1	1	0

4. Spore form. The presence of angular or nodulose spores is considered here an apomorphy, and this apomorphy seems unique for a part of the genus *Inocybe*. The spores of *Horakia flavofusca* are said to somewhat resemble those of *Inocybe*, but my observations indicate that this resemblance is very superficial.

5. Stipe-covering. The presence of caulocystidia on the whole stipe is considered a derived character state as was explained on p. 6.

6. Hyphae of the pileipellis inflated. During the later stages of pileus development in *I. petiginosa* the hyphae tend to enlarge, forming chains of short and broad elements. Their presence is typical for *I. petiginosa* and related species, and can also be observed in *I. furfurea*. This character state is regarded as derived.

7. Asymmetry of spores. Several species have somewhat curved, phaseoliform spores, and this character state is regarded as derived.

8. Basidial form. Slender basidia with a length/width ratio of more than 4.0 are considered primitive. This character state is also encountered in *P. limulatus*.

9. The contents of the cheilocystidia of *I. bongardii* are strongly cyanophilous, and this character has not been observed in other species of *Inocybe*. It is unlikely that this apomorphic character state is homologous with the chrysocystidia that can be found in the Strophariaceae.

10. Presence of a marginate bulb. This character state is considered derived. Several species possess a marginate bulb in their primordial stage, but the bulb disappears on subsequent development, e.g. *I. petiginosa*. In that case the character has been assigned the primitive character state.

11. Hilar appendix. Several species possess a (very) small hilar appendix that might easily be overlooked, whereas other species possess a much larger one. I regard the small hilar appendix as the primitive character state, as it is also found in *P. limulatus*.

12. Cortina. The presence of a cortina is to be regarded as the plesiomorphic state. Type of stipe-covering and the presence of a cortina are generally correlated (see p. 16), but *I. sindonia* is exceptional in being cortinate and possessing caulocystidia throughout (although in a somewhat modified form). For that reason the character of the cortina has been considered apart.

13. Spore apex. The apex of the spore is generally obtuse in species without pleurocystidia, and conical in species with metuloids (except in *I. geophylla*). For that reason obtuse spores are considered to represent the primitive state. It is necessary to assign a state of this character to the angular-spored species too, and these species are considered to have spores with a (sub)conical apex.

14. Projections of spore solid. In *I. calospora* the projections of the spore wall, which form the spines, are solid, whereas this is not the case in other goniosporous species, the nodulae being hollow. According to Kühner (1980) this is an important character, and the solid spines are considered to be derived from hollow projections.

The results of the parsimony analysis are presented in Fig. 1. This type of analysis is founded on the idea that the estimate concerning evolutionary history that assumes the shortest pathway is better than any other estimate that requires more changes of character states. The adoption of this criterion does not of course mean that nature herself is always parsimonious; it is rather a methodological device to reduce the number of ad-hoc explanations for the observed pattern of synapomorphies.

The parsimony method as used here gives equal weight to all characters, permits reversal of characters, and counts parallelisms and reversals equally. It must be admitted, however, that these assumptions are not completely realistic from a biological point of view.

The analysis yielded several equally parsimonious cladograms, which after optimisation contained 19 steps. As these cladograms did not differ much in their gross structure, only one of these is drawn. There is not much evidence of homoplasy, indicating that most characters evolved only once in the selected species. It is immediately clear, however, that the angular and nodulose spores have arisen at least twice.

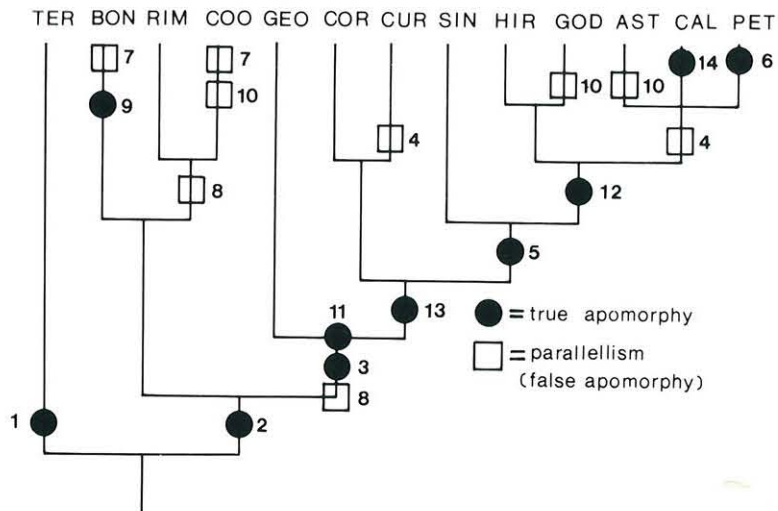


Fig. 1. One of the most parsimonious cladograms. Species names are abbreviated.

Compatibility analysis tries to find the network and subsequently the cladogram that is supported by the largest group of characters (a clique) without inferring parallelisms and/or reversals of character states. Such an analysis is founded upon the assumption that characters whose states are uniquely derived are 'better' (from a taxonomic viewpoint) than characters whose states evolved more than once. The network can be converted into a cladogram, but in this case the cladogram could not be completely resolved locally. This has subsequently been done in a second step.

It should be noted that the cladogram, which is supported by the largest number of compatible characters, is not always most parsimonious. Especially when the largest clique is comparatively small, is there a great chance that much homoplasy is needed to explain the incompatible characters.

Two largest cliques were obtained, each containing 11 (out of 14) characters. However, character state 4 (smooth versus nodulose spores) never formed part of these largest cliques, indicating again that this character has evolved more than once. The presence of a marginate bulb is also incompatible with the largest clique.

Both cliques differ in one character, because character 7 (phaseoliform spores) and character 8 (slender basidia) are incompatible. I have drawn in Fig. 2 one of the cladograms based on the assumption that character 8 evolved once. The alternative cladogram seems almost equally probable, however.

Comparison of both Fig. 1 and 2 indicates that both cladograms are fairly congruent and show the same gross structure. This is hardly surprising as there is not much

evidence of homoplasy in the characters used. Both cladograms indicate that the nodulose spores are of polyphyletic origin, and that a more natural classification of the group with pleurocystidia (metuloids) must be based on ontogenetic characters (viz. character 5 and 12).

### 3. Infrageneric taxonomy of *Inocybe*

These results of the cladistic analyses can be used to arrive at a more natural infrageneric classification of *Inocybe*. There has been much dispute concerning a direct translation of a cladogram into a classification, but all systematists agree that the classification must be consistent with the cladogram (Mayr, 1974). This means that polyphyletic groups are not permissible, and that the recognition of the species with angular-nodulose spores as a separate genus or subgenus, as was done by Horak (1978) and Jülich (1982) must be rejected.

The dispute centers therefore around the acceptability of paraphyletic groups. Many cladists defend the position that natural groups can only be recognised by

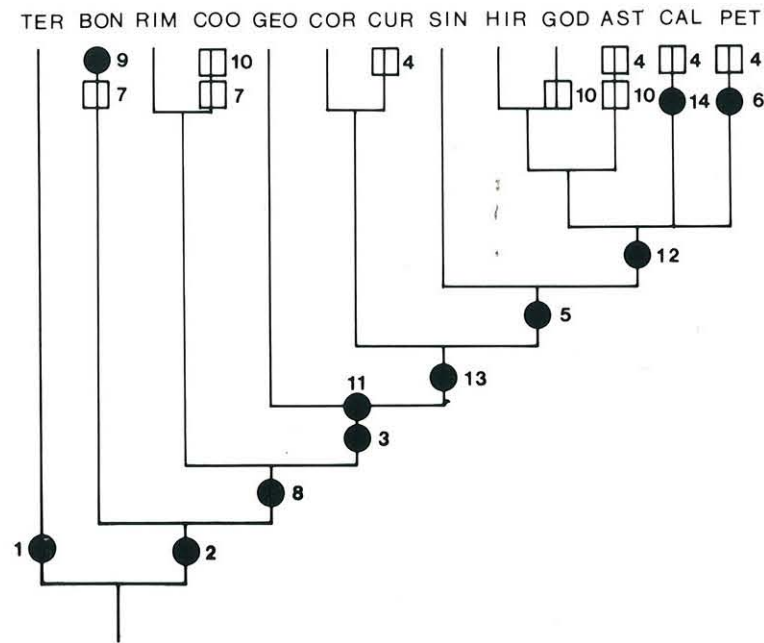


Fig. 2. Cladogram based on one of the largest cliques, secondarily resolved.

the possession of synapomorphies and hence must be holophyletic. Consequently paraphyletic groups are denied real existence. However, as a consequence of certain speciation models (cf. Eldredge & Cracraft, 1980) the existence of paraphyletic taxa cannot be excluded a priori. But this conclusion should not lead to an indiscriminate admission of paraphyletic groups into a classification, as most of these groups are indeed not natural. The smooth-spored *Inocybes* represent such a paraphyletic group that has to be subdivided in order to arrive at natural taxa.

Within the genus *Inocybe* three different subgenera are recognised, viz. *Mallocybe* Kuyp.<sup>1</sup>, *Inosperma* Kühner, and *Inocybe*.

Subgenus *Mallocybe* has one apomorphy, viz. the presence of necropigmented basidia, and for that reason this subgenus can be regarded as holophyletic. The broadly adnate or even subdecurrent lamellae, the comparatively short stipe, and the mode of development of the cheilocystidia are also outstanding characters.

The holophyly of subgenus *Inosperma* is rather doubtful, but the presence of phaseoliform spores (with a character reversal or neotenous retention of the regular spores in *I. rimosa*) could be a synapomorphy. For the time being I accept it as a natural taxon, especially as this group seems rather homogeneous. Within subgenus *Inosperma* two sections are recognised, viz. *Cervicolores* Sing. and *Rimosae* (Fr.) Sacc. Both sections are probably holophyletic.

The presence of thick-walled pleurocystidia (metuloids) and the rather long hilar appendix also establish subgenus *Inocybe* as holophyletic. Two main groups can be recognised within this subgenus, and both groups are temporarily given the (informal) rank of supersection. For the time being those groups are called *Cortinatae* and *Marginatae* respectively. However, a formal subdivision of subgenus *Inocybe* could only partially be executed, because this revision deals only with the smooth-spored species (a paraphyletic group). It is to be expected that a refined subdivision of subgenus *Inocybe* is necessary as soon as the species with angular and nodulose spores have been revised. I consider it therefore prudent to refrain from a further elaboration of the taxonomy of subgenus *Inocybe* for the time being, because a premature classification would almost certainly promote taxonomic and nomenclatural instability.

#### 4. Species concept and speciation in *Inocybe*

It is necessary for any cladistic analysis on specific level to start with well-delimited species, because an incorrect specific delimitation will certainly lead to an incorrect analysis and, hence, incorrect classification. It is therefore useful to reflect on the nature of the species and the criteria for its recognition. As I have dealt with my ideas on this subject more extensively elsewhere (Kuyper, 1987), I will present here only a concise summary of my views.

Species are the basal units in the natural hierarchy and they are generally held to exist in nature as a reality, independent of man's ability to perceive them. Species

are therefore not just mental concepts that can be defined; particular species cannot be defined because species are individuals (in the philosophical sense) and not classes.

From a practical point of view, however, the problem for a taxonomist does not reside in the reality of the species (however important that may be), but in the difficulties of their recognition. Two different concepts have been used for species recognition, viz. a concept based on morphological criteria and a concept based on genetical criteria. These concepts are generally known as morphological and genetical species concept respectively.

A definition of the genetical species concept pertaining to fungi has been given by Esser & Hoffmann (1977): 'Populations belong to different species when the failure to interbreed and to produce viable offspring in nature is not caused by genetic parameters operating in the completion of the sexual cycle.' The genetical species concept has been applied in several genera of the Agaricales, and it has usually led to a rather narrow species concept in comparison with a morphological concept.

It has generally been felt that the genetical species concept is superior to a morphological concept from a theoretical point of view, because the genetic cohesion, which species have because of their common evolutionary history, is a central part of the definition. The concept also allows for experimental falsification and therefore attains a higher degree of objectivity.

The initial optimism with respect to the usefulness of the genetical species concept for determining species status has been tempered during the last decades as its application has appeared to be beset with many difficulties. In the first place the organisms must be amenable to experiments, i.e. they must be grown in culture. Thus far it has been (almost) impossible to culture species of *Inocybe* effectively, and for that reason alone a genetical species concept could not be applied. We must therefore resort to morphological criteria and search for morphological discontinuities for species delimitation.

Species distinction based on a single character usually leads to artificial divisions and delimitation. Only a combination of (independent) characters ensures a natural division of species (Steenis, 1957). This can be generalised in the statement that good species must differ from each other in at least two independent morphological characters. Taxa differing in one character only are therefore accorded infraspecific rank (see below).

It should be clear, however, that morphological characters solely do not provide absolute certainty for discovering natural taxa because of inherent limitations to descriptive taxonomy. It is therefore quite feasible that not all morphologically delimited species are natural species, but that some are only artificial species (cf. Kemp, 1985).

Generally speaking, matters are not so bad, fortunately! The results of an experimental genetical taxonomy often show a good correlation with the results of a descriptive morphological taxonomy. The unraveling of the *Armillaria mellea*-complex by means of genetics and morphology yielded strikingly similar results (Korhonen, 1978; Romagnesi & Marxmüller, 1983).

Many species show a pattern of infraspecific variation that can also be recognised and classified. Although this variability might be biologically trivial, it sometimes seems useful to designate it formally because it might go unnoticed otherwise. The aim of giving an adequate and formal representation of the population structure

<sup>1</sup> *Inocybe* subgen. *Mallocybe* Kuyp., subgen. nov. — Cheilocystidia enascentia ex hyphis tramae hymenophoralis; basidia plena necropigmenti; lamellae late adnatae vel subdecurrentes; pileus saepe lanato-squamulosus, cum NH<sub>4</sub>OH conspicue fuscans. — Holotypus: *Inocybe terrigena* (Fr.) Kuyp.

ETYMOLOGY: μαλλοκυβη, woolly pileus, referring to the aspect of the pileus.

DISTRIBUTION: About 10 species in the Northern Hemisphere.

of a species is of course unattainable. For that reason we are forced to sail between the Scylla of typology and the Charybdis of relinquishing the classification of any infraspecific variation. Infraspecific taxa might well be of polyphyletic origin, contrary to species, and for that reason are less real than species. These infraspecific taxa are often based solely on one character difference.

The category of subspecies has hardly been used in systematic mycology and, when used, two different and scarcely comparable criteria were applied, viz. (i) morphological discontinuities and (ii) geographical and/or ecological differentiation. The latter criterion relies rather heavily on assumptions concerning the speciation process, but almost nothing is known about speciation in agarics (see below). For that reason I decided to discard the subspecific rank for *Inocybe* completely, and to restrict myself to the use of varieties and forms.

Varieties are constant variants within a species (mostly differing in one character only) of which the aberrant character is not connected by a series of intermediates with the corresponding character in the typical variant. Forms on the other hand are constant variants within a species differing in a character that shows some (limited) intergradation with the character in the typical form. The amount of intergradation should of course be rather limited, as delimitation of an (almost) continuous series of variants is arbitrary and has, therefore, no predictive value.

Although the distinction between varieties and forms might in exceptional cases be somewhat arbitrary, it is often a convenient tool to handle infraspecific variability. Within *I. geophylla* two constant character variants can be recognised, differing only in the presence or absence of violaceous intracellular pigment. These variants are therefore given the rank of variety. Variation in *I. whitei* on the other hand is not completely discontinuous, as some exceptional intermediates can be encountered. For that reason the variant with a large obtuse pileus, and the variant with a small pileus with prominent papilla are given the rank of forma. Both forms seem to occupy an almost mutually exclusive area and intergradation of characters occurs in the contact zone, both in Europe and in North America.

It might be evident that it does not serve any useful purpose if we strive to name every slightly aberrant variant of which the character difference is assumed to be genetically based. More advantage can be taken of an informal category for such character variants, and the term variant is used here. As this rank has no official status under the rules of nomenclature, it can be rather loosely and informally applied. Such a category can be useful for very variable species such as *I. rimosa*, where the erection of formal taxa would lead to an unmanageable number of (very) local forms and varieties which can scarcely be recognised on a more regional scale.

Not much is known about the mechanisms of reproductive isolation (a prerequisite for speciation) in the Agaricales. The few data published thus far on speciation in the Agaricales seem to confirm Kemp's (1977) assertion that instantaneous sympatric speciation is the dominant mode of the formation of new species. This process usually begins at the cellular level by means of incompatibility reactions. Morphological differentiation between these incompatible races develops gradually as a result of the autonomous evolution of both populations.

This generalisation, however, is mainly based on data from saprophytic (and predominantly dung-inhabiting) fungi. It might well be that speciation in mycorrhizal fungi progresses differently, but in the absence of experimental data all theories are highly speculative. Høiland (1984) suggested sympatric speciation via ecological

differentiation in several species pairs of *Cortinarius* subgenus *Dermocybe*. Some data on *Inocybe* would support such a theory. Species pairs, which have probably arisen by mycorrhizal specialisation, are *I. rimosa* — *I. arenicola*, *I. rimosa* — *I. squamata*, and *I. lacera* — *I. impexa*. However, considering the fact that the mycorrhizal association of *Inocybe* is rather unspecialised, such a mode of speciation might be of minor importance.

No data with regard to hybridisation in *Inocybe* have been published. It is unlikely that hybrids could easily be detected with morphological criteria alone in the absence of any experiments, and hypotheses regarding hybridisation must remain completely speculative.

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## B. S P E C I A L P A R T

## I N O C Y B E (Fr.) Fr.

- Agaricus* tribus *Inocybe* Fr., *Syst. mycol.* 1: 11, 254. 1821. — *Inocybe* (Fr.) Fr., *Monogr. Hymenomyc. Sueciae* 2: 346. 1863. — Lectotype: *Agaricus relicinus* Fr.: Fr.
- Astrosporina* J. Schroet. in Cohn, *Krypt.-Fl. Schlesien* 3 (1): 576. 1889. — Lectotype: *Inocybe praetervisa* Quéf.
- Agaricus* subgenus *Clypeus* Britz. in *Ber. naturw. Ver. Augsburg* 26: 137. 1881. — *Clypeus* (Britz.) Fay. in *Ann. Sci. nat. Bot., sér. VII*, 9: 362. 1889 (June). — *Clypeus* (Britz.) P. Karst. in *Bidr. Känned. Finl. Natur Folk* 48: 212. 1889 (Jan.-Sept.). — Lectotype: *Agaricus trechisporus* Berk.
- Inocybium* Earle in *Bull. N. Y. bot. Gdn* 5: 439. 1909. — Holotype: *Inocybe lacera* (Fr.: Fr.) Kumm.
- Agmocybe* Earle in *Bull. N. Y. bot. Gdn* 5: 439. 1909 (illeg., Art. 63.1.). — Holotype (Art. 7.11.): *Inocybe rimosa* (Bull.: Fr.) Kumm.
- Inocybella* Zerov in Zerov & Peresipkin, *Viznachnik Gribiv Ukraïni* 5, *Basidiomycetes* (2): 347. 1979 (inval., Art. 36.1.). — Holotype: *Inocybe calospora* Quéf.

Notes: 1. All lectotypifications are according to Earle (in *Bull. N. Y. bot. Gdn* 5: 440. 1909).

2. The typification of the genus *Inocybe* has been somewhat controversial. When Fries (*Monogr. Hymenomyc. Sueciae* 2: 346. 1863) recorded *Agaricus trechisporus* for the first time for Sweden, he noted that the species was said to have uneven ('rough') spores, and suggested that the genus *Inocybe* was characterised by the same type of spores. Fries's contention led Singer & Smith (in *Mycologia* 40: 628. 1948) to the (incorrect) conclusion that *Inocybe* must be typified with *A. trechisporus*. However, as that species was not an original species, under the basionym *Agaricus* tribus *Inocybe*, it cannot serve as a type. Singer (*Agaricales mod. Taxon.*, 3rd Ed.: 569. 1975) still kept to his idea that *Inocybe* must be typified with an angular or nodulose-spored species, and, while rejecting his former lectotypification, suggested *Agaricus lanuginosus* Bull.: Fr. as type.

However, there is no obligation to typify *Inocybe* with such a species. Fries's remark is only a generalisation of observations by Berkeley that several *Inocybes* have uneven spores. Fries himself had a definite dislike for the use of the microscope and he said only that the spores seem ('videntur') to be uneven.

The first typification of *Inocybe* was by Earle (in *Bull. N. Y. bot. Gdn* 5: 440. 1909) who selected *Agaricus relicinus* Fr.: Fr. Donk (in *Beih. Nova Hedwigia* 5: 147. 1962) agreed with this choice, and added that the main advantage of this is choice was that *Inocybe* is then typified with a smooth-spored species, leaving the names *Astrosporina* (priorable) and *Clypeus* for the species with angular and nodulose spores. This taxonomic remark turned out to be incorrect, however, as *I. relicina* sensu Heim (*Genre Inocybe*: 153. 1931) is a misapplication, the true *I. relicina* having angular-nodulose spores.

Although it is possible to conserve *Inocybe* with a smooth-spored species as the type (Art. 10.3.), I consider such a conservation as undesirable.

It should be noted that the use of the names *Inocybe* and *Astrosporina* for the artificial groups with smooth and uneven spores is nomenclaturally incorrect.



However, considering the unnaturalness of both taxa (see p. 121), dwelling on these nomenclatural consequences seems irrelevant and counterproductive.

Habit tricholomatoid or collybioid, rarely mycenoid. Pileus smooth, fibrillose, squamulose or squarrose, when fibrillose then often with diverging fibrillae and often radially rim(ul)ose in outer half; velipellis present or absent; lamellae broadly adnate to almost free; stipe equal to bulbous, with a marginate bulb or not, fibrillose or pruinose, in some species squamulose to squarrose in lower half; cortina present or absent; spore print brown, exceptionally white in albinistic specimens.

Spores brown, but colourless in albinistic specimens, slightly to conspicuously thick-walled, smooth, without any ornamentation, but often angular or nodulose, cyanophilous, not amyloid, very rarely dextrinoid, very rarely with germ-pore; basidia usually 4-spored, in some collections 2-spored. Cheilocystidia always present, either originating from the hymenophoral trama or from the subhymenium, thin-walled to thick-walled; pleurocystidia absent or present, in the latter case almost always thick-walled, with double wall, and crystalliferous apex; caulocystidia absent or present; clamp-connexions always present; hymenophoral trama regular.

Usually forming ectomycorrhiza, but a few species growing (saprophytically) on wood.

#### KEY TO THE SUBGENERA OF INOCYBE

1. Pleurocystidia present, almost always thick-walled and with crystalliferous apex; spores smooth or angular-nodulose. . . . . Subgen. *Inocybe* (partly treated), p. 69
1. Pleurocystidia absent; cheilocystidia thin-walled, without crystalliferous apex; spores always smooth.
  2. Cheilocystidia originating from the hymenophoral trama; with necropigment; stipe usually shorter than diameter of pileus. . . . . Subgen. *Mallocybe* (not treated)
  2. Cheilocystidia originating as modified (sub)hymenial elements; basidia without necropigment; stipe usually longer than diameter of pileus. . . . . Subgen. *Inosperma*, p. 34.

#### SYNOPSIS OF THE TAXA OF INOCYBE TREATED IN THIS WORK

##### Subgenus *Inosperma*

##### Section *Cervicolores*

1. *I. calamistrata*
2. *I. geraniodora*
3. *I. cervicolor*
- 4.1. *I. bongardii* var. *bongardii*
- 4.2. *I. bongardii* var. *pisciodora*

##### Section *Rimosae*

5. *I. erubescens*
6. *I. adaequata*
7. *I. reissneri*

8. *I. quietiodor*
- 9.1. *I. cookei* var. *cookei*
- 9.2. *I. cookei* var. *kuthanii*
10. *I. maculata*
- 11.1. *I. flavella* var. *flavella*
- 11.2. *I. flavella* var. *roseipes*
- 12.1. *I. arenicola* var. *arenicola*
- 12.2. *I. arenicola* var. *mediterranea*
13. *I. mimica*
14. *I. squamata*
15. *I. vinosistipitata*
16. *I. rimosae*

##### Subgenus *Inocybe*

##### Supersection *Cortinatae*

17. *I. appendiculata*
18. *I. haemacta*
19. *I. fraudans*
20. *I. tricolor*
21. *I. coelestium*
- 22.1. *I. corydalina* var. *corydalina*
- 22.2. *I. corydalina* var. *erinaceomorpha*
- 23.1. *I. geophylla* var. *geophylla*
- 23.2. *I. geophylla* var. *lilacina*
- 24.1. *I. whitei* f. *whitei*
- 24.2. *I. whitei* f. *armeniaca*
25. *I. subporospora*
26. *I. luteipes*
- 27.1. *I. lacera* var. *lacera*
- 27.2. *I. lacera* var. *rhacodes*
- 27.3. *I. lacera* var. *helobia*
- 27.4. *I. lacera* var. *regularis*
28. *I. impexa*
29. *I. similis*
- 30.1. *I. rufuloides* var. *rufuloides*
- 30.2. *I. rufuloides* var. *exilis*
31. *I. leptocystis*
32. *I. obscurobadia*
33. *I. maculipes*
34. *I. melanopus*
35. *I. olivaceobrunnea*
36. *I. albovelutipes*
37. *I. monochroa*
38. *I. abjecta*
- 39.1. *I. phaeodisca* var. *phaeodisca*
- 39.2. *I. phaeodisca* var. *geophylloides*
40. *I. glabripes*
41. *I. griseovelata*
42. *I. brunneotomentosa*
43. *I. rupestris*
44. *I. aeruginascens*
45. *I. hystrix*
46. *I. squarrosa*
47. *I. griseoilacina*
48. *I. brevicystis*
49. *I. amethystina*
- 50.1. *I. phaeocomis* var. *phaeocomis*
- 50.2. *I. phaeocomis* var. *major*
51. *I. hygrophana*
52. *I. ionochlora*
53. *I. cryptocystis*

54. *I. auricoma*
55. *I. posterula*
56. *I. pusio*
57. *I. nitidiuscula*
58. *I. pseudodistricta*
- 59.1. *I. fuscidula* var. *fuscidula*
- 59.2. *I. fuscidula* var. *bisporigera*
60. *I. xantholeuca*
61. *I. queletii*
- 62.1. *I. flocculosa* var. *flocculosa*
- 62.2. *I. flocculosa* var. *crocifolia*
- 62.3. *I. flocculosa* var. *ferruginea*
63. *I. frigidula*
64. *I. serotina*
65. *I. pruinosa*
66. *I. inodora*
67. *I. grammopodia*
68. *I. sambucina*
69. *I. sindonia*

##### Supersection *Marginatae*

70. *I. vulpinella*
71. *I. godeyi*
- 72.1. *I. furfurea* var. *furfurea*
- 72.2. *I. furfurea* var. *rufotacta*
73. *I. albomarginata*
74. *I. amblyspora*
75. *I. pseudoreducta*
76. *I. leiōcephala*
77. *I. tjallingiorum*
78. *I. saponacea*
- 79.1. *I. hirtella* var. *hirtella*
- 79.2. *I. hirtella* var. *bispora*
80. *I. muricellata*
81. *I. squamosa*
82. *I. hirtelloides*
83. *I. langei*
84. *I. pelargonium*
85. *I. ochroalba*
86. *I. tenebrosa*
87. *I. mycenoides*
88. *I. brevicystis*
89. *I. stangliana*
90. *I. roseipes*
- 91.1. *I. splendens* var. *splendens*
- 91.2. *I. splendens* var. *phaeoleuca*
92. *I. vaccina*
93. *I. glabrescens*

SYNOPTICAL KEY TO THE SMOOTH-SPORED SPECIES OF INOCYBE IN THIS REVISION  
WITH STRIKING CHARACTERS

(The numbers refer to those in the synopsis; numbers in brackets mean: character sometimes present).

- Pileus* larger than 70 mm: 6, 10, 16, 19, 22.1, 91.1  
whitish, rufescent: (4.2), 5, 19, 24, 71  
with green tinges: 18, 21, 22.1, (22.2), 44  
vinaceous or purplish: 6, 20, 49  
with appendiculate-dentate margin: 17, 19, (62.1), 69  
with appressed scales: 13, 14, 19, 22.2, 29  
with recurvate scales when young: 1, 2, 3, (4.1), 28, (35), 38, 45, 46, 50, 80
- Lamellae* becoming reddish on damage: 4.1, (5), (24), 71, 72.2  
reddish when young: (12.1), 62.3  
greyish when young: (12.1), 16, 83  
yellow when young: (26), (27.1), 58, 60, 62.2, 87, 89  
violaceous when young: 7, 15, 23.2, 47, (48), 49, 50, 51, 52, 56
- Stipe* more than 10 mm thick: 5, 6, 12.1, 16, (17), 19, 22.1, (55), 61, 64, 66, (74), 91.1  
with (sub)marginate bulb: (7), (8), 9, 10, (16), 53, (61), 64, 70, 71, 73, 74, 75, (76), (82), (83), 84, 91.1  
squamulose to squarrose in lower half: 1, 2, 45, 50  
distinctly darkening downwards: (17), 27, 29, 33, 34, 42, (43), 70, 77, 86, (91)  
with green tinges near base: 1, 18, 21, 22.1, 44  
bright yellow: 26, 62.2, (89)  
with violaceous tinges: 7, (8), 15, 23.2, (46), 47, 48, 49, 50, 51, 52, 56  
red tomentum at base: 87
- Context* reddening: 1, 3, 4, 6, 11.2, (13), 18, 19, 20, 22, 24, 71
- Smell* sweet, fruit-like: 1, 4.1, (4.2), (7), (18), 19, 20, 21, 22, (67)  
*Pelargonium*-like: 1, 2, 4.2, 32, (33), 47, (48), (49), (62.1), 84, (91.1)  
fish-like: 1, 4.2  
bitter almonds: 79, (80)  
as *Tricholoma saponaceum*: (15), 78  
as *Lactarius quietus*: (7), 8  
as *Amanita phalloides*: 5, (6), 9.1, 10, 16, 44, 64, 91.1  
honey-like: 9.1, (83)
- Spores* on average less than 8.0  $\mu\text{m}$  long: 9, (21), (22), (32), 40, (59), 69, 73, 83, 84, 89  
on average more than 12.5  $\mu\text{m}$  long: 2, 3, 4, (5), 12, 13, 16, 27, 28, 29, 30, 59.2, 64, 65, (66), (79.2)  
on average less than 4.5  $\mu\text{m}$  wide: (9.1), 27.1, (44), 68, 73, 83, (84)  
on average more than 7.0  $\mu\text{m}$  wide: 3, 4, 5, 12, 16, 19, 28, 29, 30, 64, 70  
 $\bar{Q}$  less than 1.5: 14, (16), 19, 20, 21, 22, 26, (73), 81, 89  
 $\bar{Q}$  more than 2.0: 1, 2, (3), (11), 12.1, 13, (16), 27.1, 27.2, 27.3, 28, 64, 65, (66), 67, 68  
with indistinct germ-pore: 25, 26
- Cheilocystidia* (only for species of subg. *Inosperma*)  
more than 70  $\mu\text{m}$  long: 4.2, 12.1  
more than 20  $\mu\text{m}$  wide: 10, (12.2), 15, 16  
cylindrical: 1, 2, (3), 4, 5, 6, 11, 12.1, 13, 14, 16

*Pleurocystidia*

- less than 50  $\mu\text{m}$  long: 17, 20, 21, 22, 42, 53, 54, 77, 82, 83, 84, 85, 86, 87, 88, 89  
more than 80  $\mu\text{m}$  long: 32, 35, 37, 45, 50, (57), 69, 80  
less than 15  $\mu\text{m}$  wide: 20, 21, 22, 26, 32, 33, 36, 37, 40, 50, 53, 60, 67, 69, 79, 87, 88  
more than 25  $\mu\text{m}$  wide: 63, 64, 65, 66, (91.1)  
completely thin-walled: 31, (46)  
with bright yellow wall in  $\text{NH}_4\text{OH}$ : 24.1, (26), 27.2, 27.3, 30, 32, (33), 49, 50, (52), 54, 62, (69), (70), (79), 80, (81)

*Paracystidia*

- brown incrusted: 27.2, 28, (49), 50, (70), (80)

*Basidia* exclusively 2-spored: 59.2, 79.2

### INOCYBE subgenus INOSPERMA Kühner

*Inocybe* subgenus *Inosperma* Kühner in Bull. mens. Soc. linn. Lyon 49 (no.spéc.): 898. 1980. — Holotype: *Inocybe calamistrata* (Fr.: Fr.) Gillet.

Pileurocystidia absent; cheilocystidia present, continuous along edge of lamellae, originating as modified (sub)hymenial elements; spores with (very) small hilar appendix and obtuse apex; necrobasidia absent.

#### KEY TO THE SECTIONS OF SUBGENUS INOSPERMA

1. Pileus squamulose to squarrose; context usually reddening; basidia slender,  $Q > 4.0$ .  
Sect. *Cervicolores*, p. 34
1. Pileus radially rim(ul)ose; context usually not reddening; basidia not so slender,  $Q < 3.5$ .  
Sect. *Rimosae*, p. 43

### *Inocybe* sectio *Cervicolores* Sing.

*Inocybe* sectio *Cervicolores* Kühn. & Romagn. in Bull. trimest. Soc. mycol. Fr. 71: 200 ('1955'). 1956. (inval., Art. 36.1).

*Inocybe* sectio *Cervicolores* Sing. in Sydowia 15: 70 ('1961') 1962. — Holotype: *Inocybe cervicolor* (Pers.) Quéf.

Pileus squamulose to squarrose, never radially rimose; context often reddening; smell often conspicuous; metuloid cystidia absent, cheilocystidia with cyanophilic contents; basidia slender,  $Q > 4.0$ .

DISTRIBUTION — About 5 species in the Northern Hemisphere, also occurring in New Zealand.

#### KEY TO THE SPECIES OF SECTIO CERVICOLORES

1. Spores on average less than  $6.0 \mu\text{m}$  broad; stipe in lower half with blue-green tinges.  
*I. calamistrata*, p. 35
1. Spores on average more than  $6.5 \mu\text{m}$  broad; stipe never with blue-green tinges.
  2. Context not reddish or reddening; pileus dark brown to chocolate-brown, unicolorous; stipe in lower part distinctly squamulose. . . . . *I. geraniodora*, p. 36
  2. Context reddish or reddening; pileus from almost white to brown, but never very dark; stipe in lower part not or only indistinctly squamulose.
    3. Pileus with dark brown squamules or recurvate scales at centre, contrasting with ochraceous brownish background; smell strong, disagreeable, musty. . . . . *I. cervicolor*, p. 38
    3. Pileus tomentose to coarsely fibrillose or subsquamulose, sometimes with appressed scales in centre, but scales brownish buff; smell sweet, as leaves of *Pelargonium* or somewhat fishy.  
*I. bongardii*, p. 39

Notes: 1. Chemical variants that are characterised by the absence of smell occur in all species of this section, but are not given independent taxonomic status.

2. Muscarine is probably lacking in all species (cf. Stijve & al. in Persoonia 12: 472. 1985).

### 1. *Inocybe calamistrata* (Fr.: Fr.) Gillet — Figs. 3–4

*Agaricus calamistratus* Fr.: Fr., Syst. mycol. 1: 256. 1821. — *Inocybe calamistrata* (Fr.: Fr.) Gillet, Hyménomycètes: 513. 1876.

*Agaricus hirsutus* Lasch in Linnæa 4: 546. 1829. — *Agaricus hirsutus* Lasch: Fr., Syst. mycol. 3(Index): 23. 1832. — *Inocybe hirsuta* (Lasch: Fr.) Quéf. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 178. 1872.

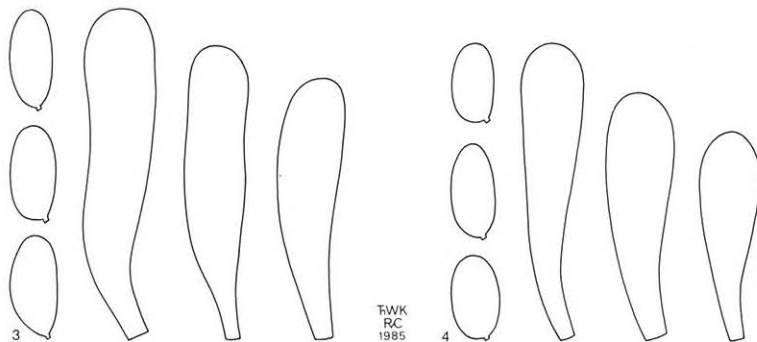
*Inocybe praetermissa* P. Karst. in Meddn Soc. Fauna Flora fenn. 11: 3. 1885.

*Inocybe calamistrata* f. *gracilis* J. Lange, Fl. agar. dan. 3: 80. 1938 (inval., Art. 36.1).

EXCLUDED. — *Inocybe hirsuta* sensu J. Lange, Fl. agar. dan. 3: 80. 1938 (= *I. cervicolor*).

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 89, 90. 1929. — Bres., Iconogr. mycol. 15: pl. 720, f. 1., pl. 721, f. 2. 1930. — R. Heim, Genre *Inocybe*: pl. 3, f. 2. 1931. — J. Lange, Fl. agar. dan. 3: pl. 114D. 1938 (as *I. calamistrata* f. *gracilis*). — Alessio, Iconogr. mycol. 29: pl. 8. 1980. — R. Phillips, Paddest. Schimm.: 148. 1981. — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 9, f. 1. 1985.

Pileus 10–38 mm, campanulato-convex to convex, not or only indistinctly umbonate, margin inflexed when young, brown to isabella-brown, but somewhat darker around centre, recurvately scaly around centre, outwards more subsquarrose to even coarsely squamulose; velipellis not observed. Lamellae,  $L = 30\text{--}45$ ,  $l = 1\text{--}3$ , to 6 mm broad, not or hardly ventricose, rather broadly adnate, cinnamon-brown to brown, finally even with an olivaceous tinge; edge fimbriate to flocculose, white. Stipe 25–92 x 2–6 mm, equal or attenuated near base, solid, then becoming somewhat fistulose, pale brown at apex, brown half-way, discolouring in lower half to greenish blue or dark greyish green, sometimes even olivaceous black at base, coarsely squamulose to indistinctly squarrose in lower half, at apex minutely pruinose-subflocculose. Context whitish in pileus and apex of stipe, on exposure soon discolouring to pinkish or pale vinaceous, bluish green in lower part of stipe. Smell faint, acidulous



Figs. 3–4. *Inocybe calamistrata*. — Spores, cheilocystidia (3. from holotype of *I. praetermissa*; 4. from neotype of *I. calamistrata*).

with a sweetish component, *Pelargonium*-like or reminding of *I. bongardii* var. *bongardii*, sometimes disagreeable, somewhat fishy. Taste indistinct.

Spores (9.5–)10.0–13.5(–14.0) x 5.0–6.0(–6.5)  $\mu$ m, on average 10.5–12.3 x 5.3–5.9  $\mu$ m, Q = (1.7–)1.8–2.6,  $\bar{Q}$  = 1.8–2.3, smooth, subphaseoliform. Pleurocystidia absent. Cheilocystidia 30–54(–55) x (7–)8–11(–13)  $\mu$ m, (broadly) cylindrical, thin-walled, sometimes with brown contents. Basidia 30–41 x 8–10  $\mu$ m, 4-spored. Caulocystidia only present at (extreme) apex of stipe, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — In moist forests on rather nutrient-poor soil; associated with *Salix*, *Alnus*, *Pinus*, and *Picea*. Widespread in Europe, also occurring in North America, India and Japan. Uncommon in the Netherlands. June–Sept.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Overijssel, Denekamp, 19.VIII.1941, *Huijsman*; prov. Gelderland: Vorden, 5.VII.1958 & 5.VI.1960, *Kits van Waveren*; Staverden, 14.VIII.1971, *Bas 5601* & *de Kleuver 71011*; prov. Noord-Brabant: Breda, 26.VII.1967, *Jansen*; Nuenen, 15.IX.1979, *Noordeloos 1023* & *Kuyper 1293*. — BELGIUM: Ardennes, Champlon, without date, *Huijsman*. — ENGLAND: Forres, 17.IX.1957 (K). — FINLAND: Tavastia australis, Tammela, Mustiala, 30.VIII.1867, *Karsten* (holotype of *I. praetermissa*, H). — INDIA: Uttar Pradesh, Mussooree, Oak-villa, 16.VIII.1964, *Bas 4393*. — JAPAN: Honshu, Yarenashi Pref., Mt. Fuji, Yoshoba-gu-chi, 6.IX.1983, *Pegler 3519* (K). — PORTUGAL: Serra do Marao, Amarante-Vila Real, 18.X.1955, *Dennis* (K). — SCOTLAND: co. Invernesshire, Fort William, Nevis Forest, 18.IX.1983, *Kuyper 2399*; co. Perthshire, Rannoch, Black Wood of Rannoch, 24.IX.1983, *Kuyper 2425*. — SWEDEN: Småland, Femsjö, 1.IX.1979, *Moser 79.433* (neotype of *I. calamistrata*, design. mihi, IB); Småland, Femsjö, Slättagårdet, 15.IX.1981, *Moser 81.399* (IB). — UNITED STATES: Michigan, Ogenaw Co., Ogenaw Wildlife Sanctuary, 11.VII.1963, *Bas 3275*.

Notes: 1. A comparison between the protologues of *Agaricus calamistratus* Fr.: Fr. and *A. hirsutus* Lasch: Fr. suggests that both names refer to the same taxon; representative material from various parts of Europe did not give any reason to assume the existence of two different species or infraspecific taxa.

2. Considering the variability in the smell of various collections of *I. calamistrata*, it seems likely that var. *mucidiolens* Grund & Stuntz in *Mycologia* 62: 929 (1970) is only a minor variant without autonomous status. I did not study the type, however.

## 2. *Inocybe geraniadora* J. Favre — Figs. 5–6

*Inocybe geraniadora* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 200. 1955.

*Inocybe geraniadora* var. *gracilentata* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 84. 1955 (inval., Art. 34.1, 36.1).

SELECTED ICONES. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: pl. 6, f. 3, 5. 1955.

Pileus 7–12 mm, conical to convex, not umbonate, dark sepia-brown to dark chocolate-brown, recurvately squarrose around disc, coarsely appressedly fibrillose towards margin; velipellis not observed. Lamellae, L = 18–21, l = 1(–3), ventricose, rather broadly adnate, ochraceous brown to rusty brown; edge subflocculose, whitish. Stipe 18–40 x 2–2.5 mm, equal, solid, very dark brown, concolorous with pileus or even somewhat darker, white-flocculose at apex, downwards appressedly to recurvately squamulose. Context in stipe dark brown, not reddening on exposure. Smell strong, reminding of *Pelargonium*, but sometimes absent.

Spores 12.0–14.0(–15.0) x 6.0–7.0  $\mu$ m, average 13.0 x 6.5  $\mu$ m, Q = 1.9–2.1,  $\bar{Q}$  = 2.0, smooth,

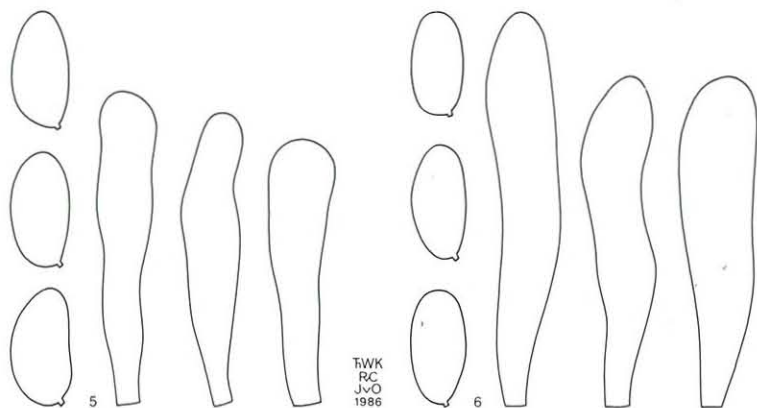


Fig. 5. *Inocybe geraniadora*. — Spores, cheilocystidia (from lectotype of *I. geraniadora*).

Fig. 6. *Inocybe mutata*. — Spores, cheilocystidia (from *Bas 3186*).

regular to slightly phaseoliform. Pleurocystidia absent. Cheilocystidia (37)–39–49(–51) x 9–14  $\mu$ m, cylindrical, sometimes cylindricoclavate, thin-walled. Basidia 40–52 x 9–11  $\mu$ m, 4-spored. Caulocystidia only present at apex of stipe, similar to cheilocystidia or somewhat less slender.

HABITAT & DISTRIBUTION. — In alpine vegetation; associated with dwarfish *Salix*. Known from Switzerland. Aug.–Sept.

COLLECTIONS EXAMINED. — SWITZERLAND: Kt. Graubünden, Ofenpass, God il Fuorn, 4.IX.1942 Favre (lectotype of *I. geraniadora*, design. Monthoux & Kuyper, G); Val Minger, between Sur il Foss and Alp Minger, alt. 2250 m, 19.VIII.1951, Favre (authentic material of *I. geraniadora* var. *gracilentata*, G); Kt. Bern, Oberaar, Gletschervorfeld, 4.VIII.1981, *Irllet 81.147* (BERN).

Notes: 1. *Inocybe geraniadora* var. *depauperata* J. Favre (in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 587. 1960 (inval., Art. 37.1.)) differs in being larger and paler, absence of smell and reddening context. It could be an odourless form of either *I. cervicolor* (Pers.) Quél. or *I. geraniadora* J. Favre.

2. *Inocybe geraniadora* seems to come close to *I. mutata* (Peck) Mass. in *Ann. Bot.* 18: 496 (1904), based on *Agaricus mutatus* Peck in *Ann. Rep. N. Y. State Mus.* 24: 69 (1872). According to the description this latter species is more robust and lacks a distinctive smell. I did not examine the type, but studied another collection from the United States (Michigan, Cheboygan County, Rucis Bog between Burt Lake and Douglas Lake, 30.VI.1963, *Bas 3186*). Further investigations might show these taxa to be conspecific.

3. *Inocybe cervicolor* (Pers.) Quél. — Figs. 7–8

*Agaricus cervicolor* Pers., Syn. meth. Fung.: 325. 1801. — *Inocybe cervicolor* (Pers.) Quél., Enchir. Fung.: 95. 1886.

*Inocybe corrubescens* Sing. in Beih. bot. Zbl. 48: 537. 1931.

MISAPPLIED NAMES. — *Agaricus bongardii* sensu Fr., Ic. sel. Hymenomyc. 2: pl. 107, f. 1. 1877.

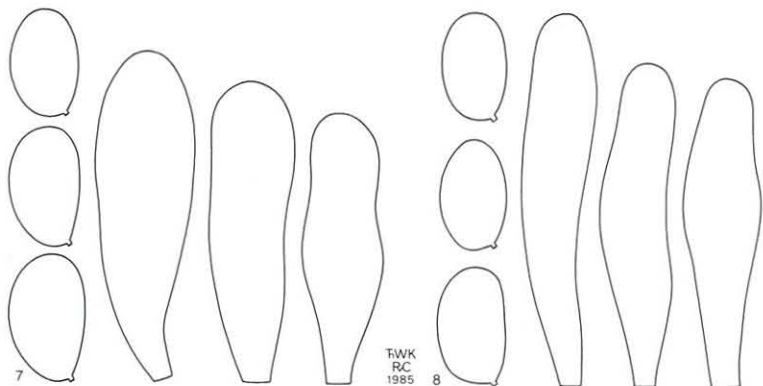
*Inocybe relicina* sensu Rick., Blätterpilze: 112. 1911.

*Inocybe hirsuta* sensu J. Lange, Fl. agar. dan. 3: 80. 1938.

SELECTED ICONES. — Pers., Ic. pict. rar. Fung.: pl. 8, f. 4. 1804. — Fr., Ic. sel. Hymenomyc. 2: pl. 107, f. 1. 1877 (as *A. bongardii*). — Rick., Blätterpilze: pl. 31, f. 2. 1911 (as *I. relicina*). — Konr. & M., Ic. sel. Fung. 1: pl. 88. 1928. — J. Lange, Fl. agar. dan. 3: pl. 114F. 1938 (as *I. hirsuta*). — Alessio, Iconogr. mycol. 29: pl. 7. 1980 — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 9, f. 2. 1985.

Pileus 6–40 mm, conical, conico-convex, convex or plano-convex, not or only indistinctly umbonate, with involute margin when young, with dark brown [7.5 YR 4/3, 3/3] squamules or small recurvate scales around centre, outwards with rather coarse squamules on contrasting ochraceous brownish or brownish buff [2.5 Y 6/4–6/6] background. Lamellae, L = 25–60, l = 1–3, slightly thickish, 2–5 mm broad, often subventricose, rather broadly to rather narrowly adnate, yellowish brown to sordid brown, finally with a faint olivaceous tinge, often with reddish tinges; edge flocculose, white, but becoming red-brown on damage. Stipe 23–106 x 2–5 mm, equal to slightly swollen at base, but sometimes attenuate at base, pale brown to brown [7.5 YR 6/6, 5/6, 4/6], on age mixed with reddish tinges because of underlying context, most conspicuously so in lower half, at apex (sub)flocculose, downwards fibrillose, rather coarsely so in lower half. Cortina present in youngest specimens, very fugacious. Context soon pale reddish brown to vinaceous, especially in stipe. Smell strong, disagreeable, musty, reminding of old wine-casks. Taste as smell, often also bitterish.

Spores (10.0–)10.5–14.5(–15.0) x (6.0–)6.5–8.0(–8.5)  $\mu$ m, on average 10.9–13.8 x 6.7–7.8  $\mu$ m, Q = 1.5–2.2,  $\bar{Q}$  = 1.6–2.0, smooth, regular, not phaseoliform. Pleurocystidia absent. Cheilocystidia (33–)35–60(–62) x 9–15(–16)  $\mu$ m, cylindrical to slenderly clavate, thin-walled,



Figs. 7–8. *Inocybe cervicolor*. — Spores, cheilocystidia (7. from authentic material of *I. corrubescens*; 8. from *Kuyper 2152*).

often with reddish-brownish contents. Basidia 41–49 x 10–12  $\mu$ m, 4-spored, sometimes with brownish contents. Caulocystidia only present near apex, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil, also in alpine vegetation. Associated with *Fagus*, *Picea*, and *Pinus mugo*. Hitherto not with certainty known from the Netherlands, widespread in Central Europe, once reported from North America. June–Sept.

COLLECTIONS EXAMINED. — A U S T R I A: Niederösterreich, Mariazell, 22.VI.1981, *Schreurs 568*; Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2152 & 2156*; Rosskogel, 7.IX.1982, *Kuyper 2169*. — B E L G I U M: prov. Namur, Ave et Auffe, Le Roptai, 21.VIII.1980, *Kuyper 1409*. — F R A N C E: dpt. Doubs, Lougres, 9.IX.1956, *Huijsman 4471*, 16.IX.1956, *Bas 1089 & 26.IX.1956*, *Huijsman*; Belfort, Vallée de Rosémont, 24.IX.1946, *Huijsman 83*; Puy de Dôme, Martignat, 28.VI.1957, *Huijsman*. — G E R M A N Y: Eifel, Gerolstein, Papenkäule, 23.IX.1980, *Kuyper 1475*; Müllenborn near Gerolstein, 21.IX.1980, *Kuyper 1480*; Hundsbach near Gerolstein, 26.IX.1980, *Kuyper 1491*. — I T A L Y: prov. Alto Adige, Trento, Parco Gocciadoro, 26.IX.1981, *Kuyper 1851*. — S O V I E T U N I O N: Caucasus, 1937, *Vasilieva* (authentic material of *I. corrubescens*, LE). — S W I T Z E R L A N D: Kt. Fribourg, Bulle, 21.VIII.1976, *Bas 7001*; Jura, Rochefort, Ducommun, 13.VI.1957 & 2.IX.1965, *Huijsman*; Kt. Luzern, Willisau, 17.IX.1984, *Kuyper 2547*.

Note: *I. cervicolor* (Pers.) Quél. comes very close to *I. bongardii* (Weinm.) Quél. and can only be separated on macroscopical and olfactory characters. Both species are completely identical in microscopical respects. Odourless forms of *I. cervicolor* can be recognised by its relatively slender habit, and ochraceous brownish pileus with contrasting, (very) dark squamules. Hitherto no intermediate specimens have been encountered.

4. *Inocybe bongardii* (Weinm.) Quél.

*Agaricus bongardii* Weinm., Hymenomyc. Gasteromyc. Imp. ross. obs.: 190. 1836. — *Inocybe bongardii* (Weinm.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 319. 1872.

*Agaricus absistens* Britz., Dermis Südbayern: 4. 1882. — *Inocybe absistens* (Britz.) Sacc., Syll. Fung. 5: 770. 1887.

*Agaricus fallaciosus* Britz. in Ber. naturw. Ver. Augsburg 27: 155. 1883. — *Inocybe fallaciosa* (Britz.) Sacc., Syll. Fung. 5: 775. 1887.

*Inocybe connexifolia* Gillet in Rev. mycol. 5: 30. 1883.

*Agaricus gratus* Weinm., Hymenomyc. Gasteromyc. Imp. ross. obs.: 185. 1836, non *A. gratus* Schum. 1803. — *Inocybe grata* (Weinm.) Sacc., Syll. Fung. 5: 777. 1887.

*Inocybe pisciodora* Donadini & Rioussat in Docs mycol. 5(20): 5. 1975.

EXCLUDED: *Inocybe bongardii* sensu Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 319. 1872 (= *I. erubescens*).

*Agaricus bongardii* sensu Fr., Ic. sel. Hymenomyc. 2: pl. 107, f. 1. 1877 (= *I. cervicolor*).

KEY TO THE VARIETIES OF *I. BONGARDII*

1. Smell sweet, reminding of flowers of *Impatiens glandulifera* or overripe pears. . . . var. *bongardii*, p. 40
1. Smell initially as leaves of *Pelargonium*, later more or less fishy. . . . . var. *pisciodora*, p. 41

Notes: 1. The synonymy of *A. bongardii* and *A. gratus* is based on a comparison of the original protologues, as type-material does not seem to exist.

Contrary to the assertions of Stangl & Bresinsky (in *Z. Mykol.* 47: 237, 238, 1981) I consider both *A. absistens* and *A. fallaciosus* as synonyms of *I. bongardii*, not of *I. cervicolor*. The rather smooth pileal surface excludes this latter species.

2. The two varieties also differ in a few other characters such as robustness and pileal covering. However, these characters show too much intergradation to be reliable for identification. Odourless variants, which are known in both varieties, can for that reason not always be determined unequivocally.

#### 4.1. *I. bongardii* var. *bongardii* — Fig. 10

*Agaricus bongardii* Weinm. — *Inocybe connexifolia* Gillet

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 87, 1928. — Bres., Iconogr. mycol. 15: pl. 723, 1930. — J. Lange, Fl. agar. dan. 3: pl. 114E, 1938. — Alessio, Iconogr. mycol. 29: pl. 6, 1980. — R. Phillips, Paddest. Schimm.: 149, 1981. — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 10, f. 1, 1985.

Pileus 11–45 mm, campanulate, convex to plano-convex, not or only indistinctly umbonate, with margin involute when young, ochraceous brownish or brownish buff often mixed with pinkish tinges, in centre with almost concolorous to somewhat darker brown appressed scales, outwards more squamulose to tomentose, or minutely squamulose all over; velipellis not observed. Lamellae, L = 30–45, l = 1–3, moderately crowded, 2–7 mm broad, ventricose or not, rather broadly to narrowly adnate, brownish buff or cinnamon-brown, often with a greyish tinge, on age slightly olivaceous-tinged brown; edge flocculose, white, turning red to red-brown on damage. Stipe 23–100 x 3–9 mm, equal, clavate to subbulbous, orange brownish or pinkish buff, more red-brown in lower half, especially near base, flocculose at apex, downwards irregularly fibrillose. Cortina present in young specimens, fugacious. Context discolouring to pinkish red or pale vinaceous, exceptionally only (very) faintly so. Smell strong, sweet, reminding of flowers of *Impatiens glandulifera*, ethyl cinnamate, or overripe pears, but sometimes absent. Taste not distinct.

Spores (11.0–)11.5–16.5(–17.0) x (6.0–)6.5–9.0 μm, on average 12.3–14.0 x 6.7–8.6 μm, Q = 1.4–2.1(–2.2),  $\bar{Q}$  = 1.5–1.9, smooth, regular to subphaseoliform. Pleurocystidia absent. Cheilocystidia (42–)43–62(–70) x 10–18 μm, cylindrical to slenderly clavate, thin-walled, with colourless or red-brown contents. Hymenophoral trama mostly with abundant refractive hyphae, sometimes very scarce. Basidia 39–51 x 10–13 μm, 4-spored. Caulocystidia only present at apex, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Under frondose, exceptionally also under coniferous trees, on calcareous soil. Associated with *Fagus*, *Quercus*, *Carpinus*, *Corylus*, and *Picea*. Wide-spread in Europe, not uncommon in the Netherlands in alluvial forests on clay. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Doetinchem, X.1936, *Schweers*; prov. Utrecht: Breukelen, 9.X.1955, *Maas Geesteranus 10764* & 1.IX.1956, *Daams*; Bunnik, 10.VIII.1973, *Arnolds 782*; Maarssen, 3.IX.1961, *Schütz*; Zeist, 6.IX.1953, *Reijnders* & 19.IX.1968, *Arnolds 320*; prov. Zuid-Holland: Voorschoten, 25.VIII.1974, *Bas 6351*, 3.IX.1974, *Jansen & Noordeloos*; Oostvoorne, 29.IX.1970, *Bas 5427*; prov. Zeeland, Walcheren, IX.1937, *Huijsman 1404*. — AUSTRIA: Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2155*. — BELGIUM: prov. Luxembourg, Resteigne, Bois de Resteigne, 3.IX.1981, *Schreurs 615* & *Vellinga 391*; prov. Namur, Rochefort, Bois de Famennes, 26.IX.1974, *van der Laan*; Dourbes, Tiène-au-Pauquis, 1.X.1984, *Kuyper 2607*. — BULGARIA: Montes Stara Planina, inter pagos Banja et Obsor, haud procul Rt Emone, 3.VI.1979, *Kuthan*. — CZECHOSLOVAKIA: Bohemia, Karlštejn, 3.IX.1960, *Bas 2070*. — FRANCE: Loudrefing, Forêt de Fénétrange, Moselle, 20.VIII.1955, *Bas 834*; dpt. Doubs, Lougres,

12.VIII.1956, *Huijsman 4339* & 19.IX.1956, *Bas 1108*; Vaucluse, Murs, 27.X.1974, *Bas 6498*. — GERMANY: Eifel, Gerolstein, Papenkäule, 23.IX.1980, *Kuyper 1467*; Eifel, near Kyllburg, 26.IX.1980, *Kuyper 1494*. — SWITZERLAND: Lammsberg near Schüpheim, 13.VIII.1955, *Huijsman*; Vanel, 31.V.1965, *Huijsman*; Fenin, 3.X.1968, *Huijsman 68.231*; Planeyse, 17.VIII.1965, *Huijsman*; Villaret, 11.VIII.1961, *Huijsman*.

Note: Odourless variants are at the same time characterised by the (almost) lack of refractive hyphae in the hymenophoral trama and the not or only slightly reddening context.

#### 4.2. *I. bongardii* var. *pisciodora* (Donadini & Riousset) Kuyper, *comb. & stat. nov.* Fig. 9

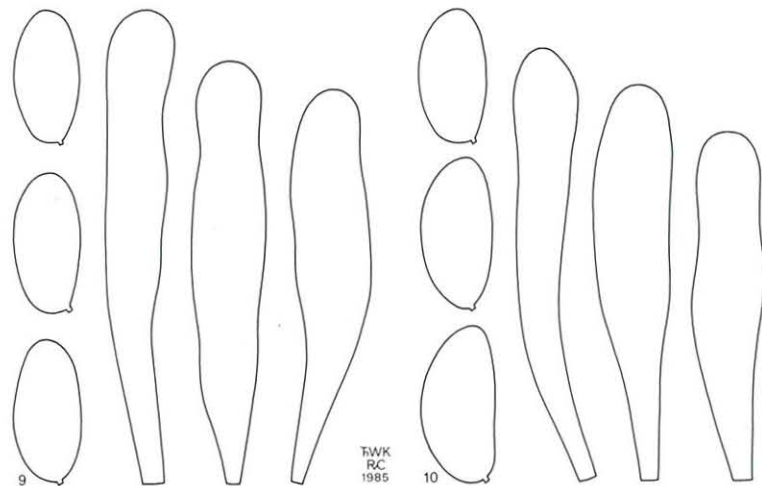
*Inocybe pisciodora* Donadini & Riousset in *Docs mycol.* 5(20): 5, 1975 (basionym).

*Agaricus absistens* Britz.? — *Agaricus fallaciosus* Britz.? — *Inocybe grata* (Weinm.) → Sacc.?

MISAPPLIED NAME. — *Inocybe subrubescens* sensu R. Heim, *Genre Inocybe*: 293, 1931.

SELECTED ICONES. — Bres., *Iconogr. mycol.* 15: pl. 732, f. 1, 1930 (as *I. grata*). — R. Heim, *Genre Inocybe*: pl. 35, f. 1, 1931 (as *I. subrubescens*). — Alessio, *Iconogr. mycol.* 29: pl. 9, 1980 (as *I. grata*). — Mos. & Jülich, *Farbatl. Basidiomyc.*: pl. 10, f. 2, 1985.

Pileus 15–42 mm, campanulate, convex or plano-convex, not or only indistinctly umbonate, with margin involute when young, at first almost whitish to pale creamy buff, on age



Figs. 9–10. *Inocybe bongardii*. — Spores, cheilocystidia (9. from isotype of *I. pisciodora*; 10. from *Kuyper 2155*).

discolouring to ochraceous, brown or brownish orange, almost smooth to appressedly fibrillose when young, later more woolly-squamulose, but never appressedly scaly; velipellis present in young specimens, sometimes rather persisting. Lamellae,  $L = 30-80$ ,  $l = 1-3$ , moderately crowded, 3–5 mm broad, not to slightly ventricose, narrowly adnate to almost free, pale brownish to greyish brown, finally with faint olivaceous tinges; edge flocculose, white, discolouring brown to red-brown on damage. Stipe 27–65 x 3–9 mm, equal, slightly clavate or slightly attenuate at base, whitish when young, discolouring to reddish brown from base upwards, flocculose at apex, downwards irregularly fibrillose. Cortina present in young specimens, rather fugacious. Context white, then discolouring to reddish-brownish or pale vinaceous. Smell when fresh as leaves of *Pelargonium*, later more fishy, often mixed with a faint, sweet component as in var. *bongardii*, sometimes absent. Taste indistinct to somewhat fishy, or slightly bitterish.

Spores (12.0–)12.5–16.5(–17.0) x 6.5–8.5(–9.0)  $\mu\text{m}$ , on average 13.0–15.2 x 7.1–7.8  $\mu\text{m}$ ,  $Q = 1.7-2.1(-2.2)$ ,  $\bar{Q} = 1.8-2.0$ , smooth, regular, exceptionally subphaseoliform. Pleurocystidia absent. Cheilocystidia (33–)39–76(–77) x (8–)9–18(–22)  $\mu\text{m}$ , cylindrical, cylindrico-clavate to slenderly utriform, thin-walled, with colourless or reddish-brownish contents. Hymenophoral trama with refractive hyphae. Basidia 37–57(–60) x 10–14  $\mu\text{m}$ , 4-spored. Caulocystidia only at apex, similar to cheilocystidia.

HABITAT & DISTRIBUTION: Under frondose and coniferous trees. Associated with *Quercus*, *Castanea*, *Ahns*, *Picea*, and *Pinus*. Widespread in Europe, only known from two localities in the Netherlands. Febr.–April (in the Mediterranean Region), and July–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Buren, 17.VII.1981, *Kuyper 1624* & 11.IX.1982, *Rubers 8911*; prov. Zuid-Holland, Wassenaar, 1.IX.1943, *Huijsman 420*. — CZECHOSLOVAKIA: Bohemia, near Karlštejn, Srbsko, 7.IX.1981, *Kuyper 1722*. — FRANCE: Fontainebleau, X.1937, *Huijsman*; Porquerolles, 20.II.1974 (isotype of *I. pisciodora*, PC); ibidem, 3.III.1980, *Donadini* (MARS); dpt. Bas-de-Rhône, near Maillane, 1.IV.1972, *Riousset* (herb. Romagnes). — GERMANY: Bavaria, Augsburg, Haunstetter Wald, 3.VIII.1982, *Kuyper 2087*. — ITALY: S. Antonia, V.1900, *Bresadola* (authentic material of *I. grata* sensu Bres., S); prov. Alto Adige, Trento, Parco Gocciadoro, 26.IX.1981, *Kuyper 1853*; prov. Pisa, S. Rossore, 6.IV.1984, *Kuyper 2503*; prov. Livorno, Marina di Bibbona, 7.IV.1984, *Kuyper 2506*. — SWITZERLAND: Schüpheim, Goberwald, 26.IX.1953, *Huijsman*; Kt. Luzern, Menzberg, 20.IX.1984, *Enderle*; Kt. Ticino, Serpiano, 26.IX.1984, *Kuyper 2586*.

Notes: 1. Vernal variants from the Mediterranean Region are generally more robust than summer and autumnal variants from West and Central Europe. No taxonomic value can be given to this difference, however.

2. Mr J.C. Donadini affirmed in a letter that *I. pisciodora* cannot be considered an autonomous species, but is only an infraspecific taxon of *I. bongardii*.

3. Although nothing is known about the composition of the olfactory substances of var. *bongardii* and var. *pisciodora*, I consider it very likely that they are chemically much related. Young specimens of var. *pisciodora* often possess a mixture of a *Pelargonium*-smell and a smell of overripe pears. Both smells can also be observed in *I. calamistrata* (Fr.: Fr.) Gillet.

### *Inocybe* sectio *Rimosae* (Fr.) Sacc.

*Agaricus* III. *Rimosae* Fr., Epicrisis: 174. 1838 (illegitimate, Art. 35.2). — *Inocybe* 3. *Rimosae* (Fr.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 180. 1872 (illegitimate, Art. 35.2). — *Inocybe* sect. *Rimosae* (Fr.) Sacc., Fl. ital. crypt. I, 15: 728. 1916. — Holotype: *Agaricus rimosus* Bull.: Fr.

Pileus radially rimose or rimulose, not squamulose or squarroluse; metuloid cystidia absent; cheilocystidia without cyanophilic contents; basidia not slender,  $Q < 3.5$ .

DISTRIBUTION. — About 20 species distributed world-wide.

#### KEY TO THE SPECIES OF SECTIO RIMOSAE

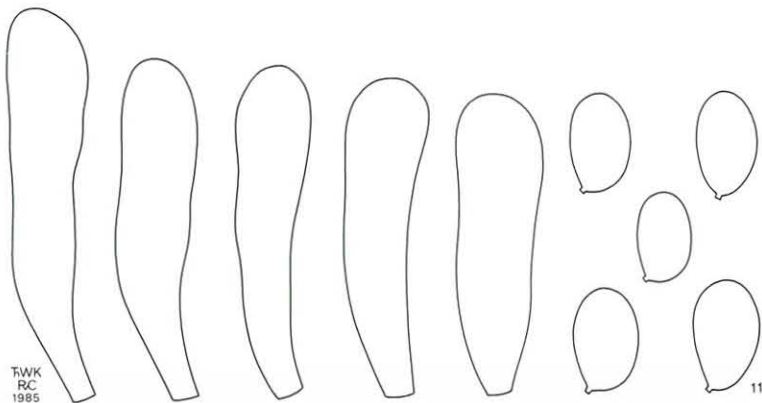
1. Context in lower half of stipe discolouring to pinkish red, vinaceous or purplish (muscarin absent)..... *I. adaequata*, p. 45
1. Context not or hardly discolouring on exposure (muscarin probably present in all species).
  2. Basidiocarps white to pale ochraceous, becoming orange to brick-red with age and/or from damage..... *I. erubescens*, p. 44
  2. Basidiocarps not turning orange to brick-red.
    3. Spores on average more than 6.0  $\mu\text{m}$  broad.
      4. Pileus scaly around centre.
        5. Spores (8.5–)9.0–11.0 x 5.5–7.0(–7.5)  $\mu\text{m}$ ,  $Q = (1.3-)-1.4-1.7$ ; pileus smaller than 50 mm..... *I. squamata*, p. 59
        5. Spores 12.0–18.0(–18.5) x 6.0–8.0(–9.0)  $\mu\text{m}$ ,  $Q = (1.8-)-1.9-2.3(-2.5)$ ; pileus more than 50 mm..... *I. mimica*, p. 58
      4. Pileus not scaly around centre.
        6. Stipe at apex with violaceous tinges..... *I. vinosistipitata*, p. 60
        6. Stipe at apex without violaceous tinges.
          7. Pileus with conspicuous velipellis when young, often persisting around centre.
            8. Pileus towards margin only indistinctly rimulose or not rimulose at all, straw-yellow to brownish ochraceous; in coastal dunes..... *I. arenicola*, p. 55
            8. Pileus towards margin distinctly rimose, with brownish tinges under velipellis; in other habitats..... *I. rimosae*, p. 61
          7. Pileus without or only with an indistinct velipellis, soon disappearing and not persisting.
            9. Pileus without umbo, radially rimulose, ochraceous yellow; smell often sourish..... *I. squamata*, p. 59
            9. Pileus conspicuously umbonate, radially rimose, yellow to dark brown; smell spermatoid or reminiscent of acorns..... *I. rimosae*, p. 61
      3. Spores on average less than 6.0  $\mu\text{m}$  broad.
        10. Cheilocystidia slenderly cylindrical, less than 15  $\mu\text{m}$  broad..... *I. flavella*, p. 53
        10. Cheilocystidia clavate to pyriform.
          11. Spores regular, not or hardly phaseoliform.
            12. Stipe violaceous..... *I. reiseri*, p. 47
            12. Stipe whitish to pale yellowish..... *I. quietiodor*, p. 48
          11. Spores distinctly phaseoliform, a minority regular.
            13. Pileus straw-yellow to orange-brown; smell honey-like; spores on average less than 5.0  $\mu\text{m}$  broad..... *I. cookei*, p. 49
            13. Pileus ochraceous brown to dark reddish brown; smell of *Tuber*; spores on average more than 5.0  $\mu\text{m}$  broad..... *I. maculata*, p. 52

5. *Inocybe erubescens* Blytt

Fig. 11

*Inocybe erubescens* Blytt in Blytt & Rostrup in Vid. Selsk. Skr. math.-nat. 1904(6): 54. 1905.*Inocybe patouillardii* Bres. in Anns mycol. 3: 161. 1905.*Inocybe lateraria* Rick., Vademecum Pilzfr.: 75. 1920.MISAPPLIED NAMES. — *Inocybe bongardii* sensu Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 319. 1872.*Agaricus trinii* var. *rubescens* sensu Pat., Tab. anal. Fung. 1: 156. 1885.SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 86. 1925. — Bres., Iconogr. mycol. 15: pl. 749. 1930. — R. Heim, Genre Inocybe: pl. 27, f. 1, 2, pl. 28. 1931. — J. Lange, Fl. agar. dan. 3: pl. 115E. 1938. — Alessio, Iconogr. mycol. 29: pl. 19. 1980. — R. Phillips, Paddest. Schimm.: 149. 1981. — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 5 f. 1. 1985 (all as *I. patouillardii*).

Pileus 17–70 mm, conico-campanulate or conical with inflexed margin when young, then plano-convex with straight margin, umbonate, at first white to very pale ochraceous, turning flesh-colour, orange to brick-red with age or from damage, smooth and sometimes even slightly greasy at disc, outwards radially rimose; velipellis absent or indistinct. Lamellae, L = 60–80, l = 1–3, moderately crowded, 3–5 mm broad, not or hardly ventricose, sinuate, narrowly adnate to almost free, at first pale buff or pale pinkish buff, finally greyish brown to olivaceous buff, often with flesh-coloured spots; edge flocculose, white, becoming orange-red to red-brown on damage. Stipe 25–110 x 6–13 mm, clavate to bulbous (at base 11–19 mm), but without marginate bulb, white to very pale ochraceous, becoming flesh-colour, orange to brick-red, more or less as pileus, at apex hairy-pruinose to minutely flocculose, downwards longitudinally fibrillose. Cortina present in young specimens, fugacious. Context whitish to slightly pinkish-tinged, hardly discolouring on exposure. Smell disagreeably sweetish, reminding of perfumed soap, or more as *Amanita phalloides*. Taste somewhat similar to smell.

Fig. 11. *Inocybe erubescens*. — Spores, cheilocystidia (from holotype of *I. patouillardii*).

Spores (9.5–)10.0–14.5(–15.0) x (5.5–)6.0–7.5(–8.0)  $\mu\text{m}$ , on average 10.6–13.4 x 6.1–7.2  $\mu\text{m}$ , Q = 1.5–2.0(–2.2),  $\bar{Q}$  = 1.7–1.9, smooth, regular to subphasoliform. Pleurocystidia absent. Cheilocystidia (37–)40–62(–70) x 8–14(–16)  $\mu\text{m}$ , cylindrical to slenderly clavate, often somewhat flexuose, thin-walled, with colourless or red-brown contents. Hymenophoral trama with refractive hyphae. Basidia 31–46 x 11–14  $\mu\text{m}$ , in majority 4-spored, but a few 2-spored. Caulocystidia only at apex, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil. Associated with *Fagus*, *Quercus*, *Tilia*, and *Pinus*. Widespread in Europe, also occurring in North America, rather uncommon in the Netherlands. June–July, once found in Sept.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland: Doetinchem, 19.VI.1949, *Huijsman*; Beek-Bergh, VI.1952, *Huijsman*; Neerijnen, I.VI.1981, *Rubers 7956*; prov. Noord-Holland: Bloemendaal, 4.VII.1958, *Bas 1480*; Heemstede, 7.VII.1951, *van der Laan*; 's-Graveland, 7.VII.1958, *Daams*; Naarden, 25.VI.1972, *van Winden 62*; Vogelenzang, 30.VI.1974, *Bas 6309*; prov. Zuid-Holland: Warmond, 14.VII.1960, *Bas 1937*; Voorschoten, 3.VII.1977, *Noordeloos 357*; Wassenaar, 4.VI.1981, *Kuyper 1575*, 24.VI.1956, *Maas Geesteranus 11573* & 29.VI.1956, *Donk*; Rotterdam, 2.VI.1967, *Balke*; Oostvoorne, 28.VI.1972, *Bas 5847*; prov. Limburg, Linne, 15.IX.1956, *Verschuren*. — FRANCE: dpt. Doubs, Lougres, 14.VI.1956, *Huijsman 4124*. — ENGLAND: Herfordshire, Langley Bury, 22.VI.1953, *Reid*. — HUNGARY: Com. Pest, Gyömrő, 7.VI.1959, *Konecni*. — ITALY: prov. Alto Adige, Trento, Margone, VI.1903, *Bresadola* (holotype of *I. patouillardii*, S). — SWITZERLAND: Planeyse, 21.VI.1965 & 11.VI.1967, *Huijsman*; St.-Aubin, 9.VI.1967, *Huijsman*.

Notes: 1. The name *Inocybe erubescens*, which was published on 3 May 1905, has priority over the name *I. patouillardii* which was published on 10 May of the same year.

2. This species contains great quantities of muscarin, and is therefore very toxic.

3. Distribution maps of *I. erubescens* have been published by Krieglsteiner (in *Z. Mykol.* 45: 95. 1979, for the Federal Republic of Germany), Kreisel & al. (in *Hercynia* 17: 243. 1980, for the German Democratic Republic), and Heinemann & Thoen (*Distr. Fung. Belg. Lux.* 1: 60. 1981, for Belgium and Luxemburg).

6. *Inocybe adaequata* (Britz.) Sacc. — Figs. 12–13

*Agaricus adaequatus* Britz., *Dermini Südbayern*: 4. 1882. — *Inocybe adaequata* (Britz.) Sacc., *Syll. Fung.* 5: 767. 1887.

*Agaricus deductus* Britz., *Dermini Südbayern*: 5. 1882. — *Inocybe deducta* (Britz.) Sacc., *Syll. Fung.* 5: 779. 1887.

*Agaricus juranus* Pat., *Tab. anal. Fung.* 6: 23. 1886. — *Inocybe jurana* (Pat.) Sacc., *Syll. Fung.* 5: 778. 1887.

*Inocybe rhodiola* Bres., *Fungi trident.* 1: 80. 1887. — *Inocybe jurana* var. *rhodiola* (Bres.) *Quadraccia* in *Does mycol.* 14(56): 32. ('1984') 1985.

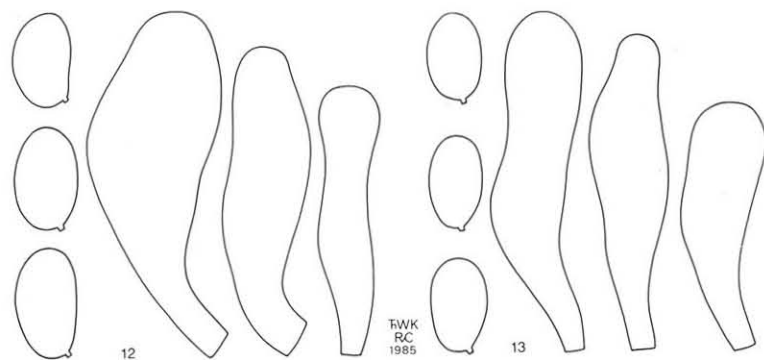
*Agaricus sanguilentus* Britz. in *Bot. Zbl.* 68: 111. 1896. — *Inocybe sanguilenta* (Britz.) Sacc. & Syd. in *Sacc., Syll. Fung.* 14: 133. 1899.

MISAPPLIED NAMES. — *Inocybe stricta* sensu Boud., *Ic. mycol.* 1: pl. 121. 1906.

*Inocybe frumentacea* sensu Bres., *Fungi trident.* 2: 87. 1900; *Iconogr. mycol.* 15: pl. 725. 1930.

SELECTED ICONES. — Boud., *Ic. mycol.* 1: pl. 121. 1906 (as *I. stricta*). — Konr. & M., *Ic. sel. Fung.* 1: pl. 85. 1927 (as *I. jurana*). — Bres., *Iconogr. mycol.* 15: pl. 724, 725. 1930 (as *I. rhodiola* and *I. frumentacea*). — J. Lange, *Fl. agar. dan.* 3: pl. 117E, 117F. 1938. — Alessio, *Iconogr. mycol.* 29: pl. 20, 21. 1980. — Mos. & Jülich, *Farbatl. Basidiomyc.*: pl. 5 f. 2. 1985 (as *I. jurana*).





Figs. 12–13. *Inocybe adaequata*. — Spores, cheilocystidia (12. from authentic material of *I. rhodiola*; 13. from isonotype of *I. adaequata*).

Pileus 23–80 mm, at first convex, spreading, finally plano-convex to applanate with a distinct to indistinct umbo, when young with inflexed margin, later with straight margin, dark red-brown, sometimes with purplish tinge, vinaceous, pinkish red, orange-brown, brownish ochraceous to dark ochraceous [5 YR 2/4, 3/4, 7.5 YR 4/4, 4/6, 5/6, 10 YR 5/6, 6/6], at margin slightly paler, smooth around centre, outwards radially fibrillose-rimose or rimulose, later pileipellis somewhat breaking up and then squamulose to appressedly scaly, especially in central part; velipellis not observed. Lamellae, L = 50–95, l = 1–3, crowded, 3–10 mm broad, not ventricose to (sub)ventricose, narrowly adnate to almost free, (pale) yellow-brown, sometimes with a greyish or olivaceous tinge; edge fimbriate to subfloculose, white, discolouring red-brown on age or damage. Stipe 30–100 x 4–12 mm, equal to slightly swollen below, but never with true bulb, sometimes somewhat swollen near apex, solid, at first white, discolouring to pinkish red, vinaceous or dark red-brown from base upwards [5 YR 3/4, 4/4, 4/6, 7.5 YR 5/4, 5/6], but remaining whitish in apical part, irregularly fibrillose, at apex almost smooth, minutely hairy to subfloculose. Context white, discolouring in lower half of stipe to pinkish red, vinaceous or even purplish red, in pileus pale vinaceous. Smell strong, somewhat disagreeable, differently described as spermatic, as rotting acorns, as green corn or sickly-sweetish. Taste reminding of smell.

Spores 9.0–12.5(–14.0) x 5.5–7.0(–7.5)  $\mu\text{m}$ , on average 9.3–11.5 x 5.9–6.7  $\mu\text{m}$ , Q = 1.5–2.0(–2.1),  $\bar{Q}$  = 1.5–1.8, smooth, regular to phaseoliform. Pleurocystidia absent. Cheilocystidia (26–)31–69(–70) x (8–)9–17(–20)  $\mu\text{m}$ , cylindrical, exceptionally tending to subtrifurcate, thin-walled, with colourless or reddish brown contents, sometimes 1–2-septate. Hymenophoral trama with refractive hyphae. Basidia (29–)30–42(–44) x 9–11(–12)  $\mu\text{m}$ , 4-spored, a few 2-spored. Caulocystidia only in apical part, scattered to clustered, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Under frondose trees on calcareous soils, preferably in parks. Associated with *Quercus*, *Castanea*, *Fagus*, and *Corylus*. Widespread in West and Central Europe, also occurring in North America, not uncommon in the Netherlands in alluvial forests on clay and humus-rich sand. July–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Neerijnen, 3.IX.1972, de Kleuver 72.100 & 13.VIII.1977, van der Laan; prov. Utrecht: Breukelen, 10.IX.1967, de Vries & 16.IX.1982, Kuyper 2217; Utrecht, 4.IX.1945, Huijsman & 3.VII.1960, Bas 1988; Vleuten, 13.VIII.1981, Kuyper 1676, 1677 & 1679; prov. Noord-Holland: Overveen, 2.IX.1967, Langezaal; prov. Zuid-Holland: Leiden, 1943, Maas Geesteranus 265 & 4.X.1944, Maas Geesteranus 3105; Oegstgeest, 30.VIII.1955, Bas 804 & 19.VIII.1958, Bas 1517; Ridderkerk, 27.VIII.1977, Noordebos 414; prov. Zeeland, Terneuzen, 14.VIII.1982, de Meijer 577; prov. Limburg: Linne, 6.X.1962, Bas 2833; Gronsveld, 13.VIII.1983, Schreurs 781. — GERMANY: Niedersachsen, Dissen, 25.VIII.1977, Huijsman; Bavaria, Augsburg, Wittelsbacher Park, 1.VIII.1982, Kuyper 2072 & 5.VIII.1982, Kuyper 2113; Augsburg, Siebentisch Wald, 2.VIII.1982, Kuyper 2079; Augsburg, Siebentisch Park, 27.VII.1979, Stangl (isonotype of *I. adaequata*, design. Stangl (in Int. J. Mycol. Lichenol. 2.: 23. 1985), L). — ITALY: prov. Alto Adige, Trento, Parco Gocciadoro, X.1894, Bresadola (authentic material of *I. rhodiola*, S); Colomo, X.1897, Turco-Lazzari (S); prov. Parma, Bedonia, 13.IX.1984, Redhead; Padua, Botanical Garden, 1.X.1981, Kuyper 1875. — SWITZERLAND: Planeyse, 7.VIII.1965, Huijsman; Valangin, 2.IX.1960, Huijsman.

Notes: 1. This species does not contain muscarin (cf. Stijve & al. in *Persoonia* 12: 469. 1985) and is considered the sole edible species of *Inocybe*.

2. For a long time mycologists have tried to subdivide this variable species into two taxa (Bresadola, *Iconogr. mycol.* 15: pl. 724, 725. 1930; Alessio, *Iconogr. mycol.* 29: 126–129. 1980). The main differences used to separate these variants are habit of the basidiocarps and colours of the pileipellis. However, none of these characters is sufficiently reliable as frequently specimens with intermediate characters can be encountered. For that reason these variants are regarded here conspecific, and not even infraspecific status is accorded to them.

3. Distribution maps of this species have been published by Kriegelsteiner (in *Z. Mykol.* 45: 95. 1979, for the Federal Republic of Germany), Kreisell & al. (in *Hercynia* 17: 242. 1980, for the German Democratic Republic), and Heinemann & Thoen (*Distr. Fung. Belg. Lux.* 1: 61. 1982, for Belgium and Luxemburg).

## 7. *Inocybe reisneri* Velen. — Fig. 14

*Inocybe reisneri* Velen., *České Houby*: 384. 1920.

*Inocybe insignissima* Romagn. in *Beih. Sydowia* 8: 350. 1979.

*Inocybe ravaensis* Kalamecs & Shtshukin in *Fol. crypt. est.* 23: 4. 1985.

SELECTED ICON. — Stangl in *Beitr. Kenntn. Pilze Mitteleur.* 1: pl. 3. 1984.

Pileus 18–40 mm, conical to convex, without or with low, broad umbo, pale ochraceous to alutaceous or brown, smooth around disc, outwards radially fibrillose-rimulose, but rather inconspicuously so, initially covered with a thin, greyish, early disappearing velipellis. Lamellae, L = 50, l = 1(–3), somewhat crowded, 2–5 mm broad, not or only indistinctly ventricose, narrowly adnate to almost free, violaceous when young, but violaceous tinges soon disappearing, then brown; edge flocculose, whitish or almost concolorous. Stipe 15–45 x 3–6 mm, somewhat broadened at base to immarginately bulbous, solid, violaceous, most conspicuously so in upper half, but mixed with brownish tinges in lower half, whitish at bulb, subfloculose at apex, downwards slightly fibrillose. Cortina not observed. Context pale lilac, most distinctly so at apex of stipe. Smell faint to strong, somewhat fruit-like or more disagreeable, earth-like. Taste not recorded.

Spores (8.0–)8.5–10.0(–10.5) x 5.0–6.0  $\mu\text{m}$ , on average 9.3–9.7 x 5.5–5.8  $\mu\text{m}$ , Q = 1.6–1.8(–1.9),  $\bar{Q}$  = 1.7, smooth, regular to subphaseoliform but often rather indistinctly so. Pleurocystidia absent. Cheilocystidia 35–60 x 8–14  $\mu\text{m}$ , clavate, sometimes subpyriform, thin-

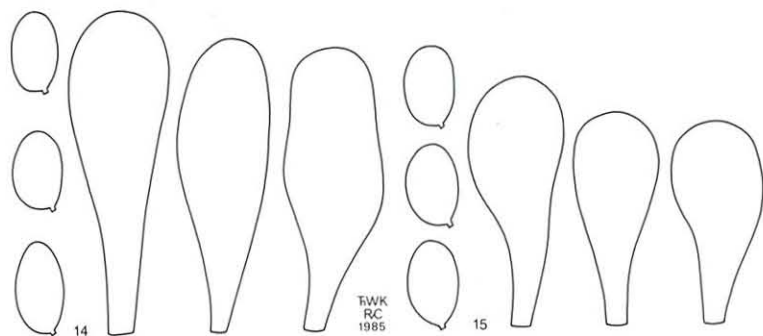


Fig. 14. *Inocybe reisneri*. — Spores, cheilocystidia (from holotype of *I. insignissima*).

Fig. 15. *Inocybe quietiodor*. — Spores, cheilocystidia (from holotype of *I. quietiodor*).

walled, with colourless contents. Basidia 29–38 x 9–12  $\mu\text{m}$ , 4-spored. Caulocystidia only at apex, similar to cheilocystidia.

**HABITAT & DISTRIBUTION.** — Under frondose trees. Associated with *Castanea* and *Fagus*. Widespread but apparently very rare in Europe, known from the Netherlands, France, Italy, and Czechoslovakia. July–Oct.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Gelderland, 29.VIII.1953, *Huijsman*. — CZECHOSLOVAKIA: Bohemia, Chuchle near Praha, VII.1916, *Reisner* (holotype of *I. reisneri*, PRC). — FRANCE: Val d'Oise, Forêt de Carnelle, 20.X.1975, *Delaporte* (holotype of *I. insignissima*, herb. Romagnesi); dpt. Doubs, Lougres, 22.IX.1955, *Huijsman*. — GERMANY: Bavaria, Augsburg, Siebentisch Wald, 12.VII.1985, *Stangl* (M). — ITALY: prov. Alto Adige, Trento, Castagne Calceranica, 8.X.1983, *Stangl* (M).

**Notes:** 1. *Inocybe quietiodor* M. Bon (see below) comes very close and more collections are needed to evaluate its relationship with *I. reisneri*.

2. *Inocybe vinosistipitata* Grund & Stuntz also possesses a violaceous stipe and violaceous lamellae, but differs in having larger spores and broader cheilocystidia.

### 8. *Inocybe quietiodor* M. Bon — Fig. 15

*Inocybe quietiodor* M. Bon in *Docs mycol.* 6(24): 46. 1976.

**MISAPPLIED NAME.** — *Inocybe cookei* sensu Kühner in *Bull. trimest. Soc. mycol. Fr.* 71: 189. ('1955') 1956 pro max. parte.

Pileus 20–41 mm, when young broadly conical with slightly inflexed margin, then convex to plano-convex with straight margin, with low, broad umbo, ochraceous buff to ochraceous yellow, smooth around disc, outwards radially fibrillose but fibrils only slightly diverging, at margin (sub)rimulose, initially covered with a white velipellis persisting around centre.

Lamellae, L = 50–55, l = 1–3, normally crowded, 3–6 mm broad, ventricose or not, narrowly adnate, yellowish brown with greyish tinge, then olivaceous-tinged brown; edge subfloculose, white. Stipe 25–50 x 5–7 mm, equal, clavate to submarginately bulbous (to 10 mm), solid, whitish, becoming pale yellowish on age, exceptionally with a very faint violaceous sheen at apex, almost smooth to minutely subfloculose at apex, downwards indistinctly fibrillose. Context whitish to very pale yellowish. Smell typical, reminding of *Lactarius quietus*, or somewhat farinaceous, sometimes reminding of *I. maculata*, never honey-like as *I. cookei*. Taste indistinct.

Spores 8.0–10.0(–11.0) x 5.0–6.0  $\mu\text{m}$ , on average 8.9–9.7 x 5.3–5.7  $\mu\text{m}$ , Q = (1.5–)1.6–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, regular, not (or hardly) phaseoliform. Pleurocystidia absent. Cheilocystidia (27–)28–58 x 10–17  $\mu\text{m}$ , clavate to slenderly clavate, sometimes tending to subutriform, thin-walled, with colourless contents. Basidia 28–39 x 9–11  $\mu\text{m}$ , 4-spored. Apex of stipe with scattered caulocystidia, similar to cheilocystidia.

**HABITAT & DISTRIBUTION.** — Under frondose trees on rather nutrient-rich, calcareous soil. Associated with *Quercus*, *Castanea*, and *Fagus*. Widespread in Europe, but apparently rare, probably often confused with *I. cookei*. Very rare in the Netherlands. July–Oct.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Gelderland: Neerijnen, 10.VIII.1974, *Noordeloos* 33; Zoelen, 25.IX.1982, *Rubers* 8915; prov. Utrecht, Driebergen, 20.IX.1972, *Huijsman*. — BELGIUM: Barvaux, 6.VIII.1955, *Huijsman*. — FRANCE: Orne, Les Chaises, Bellême, 25.IX.1975, *Bon* (holotype of *I. quietiodor*, herb. Bon); dpt. Doubs, Lougres, 4.IX.1956, *Huijsman*. — GERMANY: Eifel, Gerolstein, Munterley, 9.IX.1970, *Bas* 5345.

**Notes:** 1. *Inocybe quietiodor* M. Bon differs from *I. cookei* Bres. var. *cookei* in having larger, non-phaseoliform spores and a different smell. However, both species seem to have been confused until recently, as the wide range of spore-dimensions in published descriptions of *I. cookei* suggests. Bright forms of *I. maculata* Boud. differ in having a more acutely conical pileus, slightly darker ochraceous tinges on pileus and stipe, and somewhat more slender phaseoliform spores.

2. More material is needed for a better evaluation of the relationships between *I. reisneri* Velen. and *I. quietiodor*.

### 9. *Inocybe cookei* Bres.

*Inocybe cookei* Bres., *Fungi trident.* 2: 17. 1892.

*Inocybe kuthanii* Stangl & Veselsky in *Česká Mykol.* 33: 134. 1979.

? *Inocybe armoricana* R. Heim, *Genre Inocybe*: 295. 1931.

#### KEY TO THE VARIETIES OF *I. COOKEI*

1. Pileus straw-yellow to ochraceous yellow.....var. *cookei*, p. 50
1. Pileus brass-coloured brown or orange-brown.....var. *kuthanii*, p. 51

**Note:** Judging from the description *Inocybe armoricana* R. Heim (*Genre Inocybe*: 195. 1931) comes very close but differs in possessing an equal stipe without marginate bulb. The colour of the pileus was described as dark ochraceous. It seems possible that such collections indicate that both varieties recognised above cannot be separated unambiguously. As I have not seen specimens conforming to Heim's protologue, I refrain from giving a definite opinion on this taxon.

9.1. *I. cookei* var. *cookei* — Fig. 17*Inocybe cookei* Bres.*Inocybe fastigiata* var. *microsperma* Bres., Iconogr. mycol. 15: pl. 745. 1930.

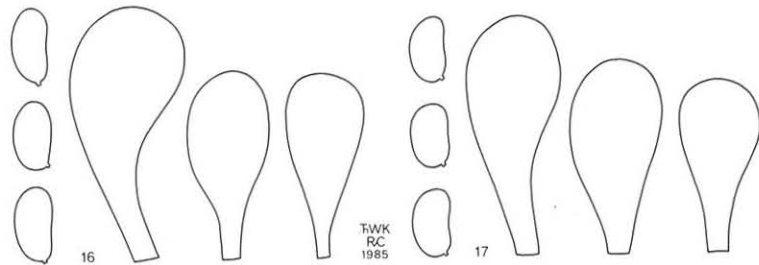
SELECTED ICONES. — Bres., Fungi trident. 2: pl. 121. 1892. — Konr. & M., Ic. sel. Fung. 1: pl. 91. 1927. — Bres., Iconogr. mycol. 15: pl. 745, 748. 1930. — R. Heim, Genre Inocybe: pl. 3, f. 3. 1931. — J. Lange, Fl. agar. dan. 3: pl. 114A. 1938. — Alessio, Iconogr. mycol. 29: pl. 18. 1980. — R. Phillips, Paddst. Schimm.: 149. 1981. — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 6. f. 1. 1985.

Pileus 16–65 mm, conical or campanulate with inflexed margin when young, then convex with straight margin, with or without umbo, straw-yellow to ochraceous yellow, sericeous-smooth around disc, outwards radially fibrillose, but fibrils not or hardly diverging, sometimes at margin (sub)rimulose; velipellis indistinct to distinct, and then with white velar patches around centre. Lamellae, L = 40–60, l = 1–3(–5), moderately crowded, 3–6 mm broad, ventricose or not, sinuate, narrowly adnate, greyish-ochraceous to greyish cinnamon-brown, without olivaceous tinges; edge (sub)floculose, white. Stipe 25–95 x 3–9 mm, at base clavate to conspicuously marginately bulbous (bulb to 16 mm), whitish to pale yellowish, but white at bulb, at apex minutely flocculose, sometimes (almost) smooth, downwards indistinctly fibrillose. Cortina present in young specimens, very fugacious. Context whitish to pale yellowish-ochraceous. Smell honey-like when fresh, but reminding of *Amanita phalloides* when cut. Taste as smell.

Spores 7.0–9.0 x 4.0–5.0(–5.5)  $\mu\text{m}$ , on average 7.6–8.4 x 4.5–4.9  $\mu\text{m}$ , Q = (1.4–)1.5–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, phaseoliform, never regular. Pleurocystidia absent. Cheilocystidia (22–)28–42 x 11–18(–22)  $\mu\text{m}$ , broadly clavate to pyriform, thin-walled, with colourless contents. Basidia 22–32 x 7–9  $\mu\text{m}$ , 4-spored. Hymenophoral trama with refractive hyphae. Stipe apex with a few caulocystidia, more or less similar to cheilocystidia, mixed with patent, cylindrical caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under frondose trees, apparently also under conifers. Associated with *Fagus*, *Quercus*, *Castanea*, and *Corylus*, according to Bresadola with *Picea*. Widespread in Europe, also occurring in North America, not uncommon in the Netherlands. July–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. O v e r i j s s e l: Denekamp, 13.X.1961, *Bas* 2500 & 14.X.1961, *Bas* 2511; 13.VIII.1966, *Kits van Waveren*; prov. G e l d e r l a n d: Apeldoorn, 18.IX.1971, *de Kleuver* 71.054; Doetinchem, 17.VII.1943, *Huijsman* 202; Vorden, VIII.1953, *Huijsman*;



Figs. 16–17. *Inocybe cookei*. — Spores, cheilocystidia (16. from holotype of *I. kuthanii*; 17. from *Kuypers* 2534).

Wageningen, 17.IX.1953, *van der Lek*; prov. Z e e l a n d, Walcheren, 19.IX.1936, *Huijsman* 1383; prov. N o o r d - B r a b a n t: Ulvenhout, 15.VIII.1936, *Huijsman* 1384; Breda, 10.IX.1967, *Jansen*; prov. L i m b u r g, Neercanne, 28.VII.1981, *Kuypers* 1642. — G E R M A N Y: Niedersachsen, near Melle, 22.IX.1977, *Huijsman*; Westfalen, Detmold, 10.IX.1972, *Bas* 5890; Eifel, Pelmer Wald near Gerolstein, 18.IX.1970, *Bas* 5393. — I T A L Y: prov. Parma, Vighini, 13.IX.1984, *Kuypers* 2534. — L U X E M B U R G: near Merkholtz, 19.VIII.1980, *Kuypers* 1400 & 20.VIII.1980, *Kuypers* 1404. — S W E D E N: Småland, Femsjö, Grytskedsången, 19.IX.1947, *Lundell* (Fungi exsiccati suecici 2301, PC); Femsjö, Bösseberg, I.IX.1939, *Moser* 79.438 (IB). — S W I T Z E R L A N D: Schüpfheim, 31.VIII.1955, *Huijsman*; near Ducommun, 14.X.1969, *Huijsman*.

Notes: 1. Although type-material of both *I. cookei* and *I. fastigiata* var. *microsperma* is lacking, I consider these names as mere synonyms, as I have not been able to discern any important discrepancies in their protologues.

2. As already noted on p. 5, pileal shape is phenotypically very variable; specimens growing on sunny places have a rather rigid velipellis which persists in older specimens, and lack an umbo, whereas other specimens, apparently from the same mycelium and growing in shade, are distinctly umbonate and do not possess a velipellis in older specimens. This should be a warning against overrating the importance of velar characters as a specific criterion.

9.2. *I. cookei* var. *kuthanii* (Stangl & Veselsky) Kuyp., *comb. & stat. nov.* — Fig. 16*Inocybe kuthanii* Stangl & Veselský in Česká Mykol. 33: 134. 1979 (basionym).

Pileus 15–35 mm, campanulate when young, finally plano-convex to applanate, with conspicuous, subpapillate umbo as in *I. striata*, pale brown, orange-brown to brass-coloured brown, smooth around disc, outwards radially fibrillose-rimulose, but not distinctly so; no velipellis observed. Lamellae moderately crowded, to 4 mm broad, sinuate, rather narrowly adnate, whitish when young, finally yellowish brown; edge subfloculose, white. Stipe 30–40 x 3–4 mm, subbulbous to marginately bulbous (to 7 mm), solid, whitish, finally brownish, minutely hairy in upper part. Context whitish. Smell faint, slightly farinaceous.

Spores 7.0–8.5(–9.0) x (4.0–)4.5–5.5  $\mu\text{m}$ , on average 7.7–8.3 x 4.7–4.8  $\mu\text{m}$ , Q = (1.5–)1.6–1.8,  $\bar{Q}$  = 1.6–1.8, smooth, subphaseoliform, but sometimes almost regular. Pleurocystidia absent. Cheilocystidia (23–)26–44(–45) x (11–)12–17(–18)  $\mu\text{m}$ , clavate to pyriform, thin-walled, with colourless contents. Hymenophoral trama with scattered refractive hyphae. Basidia 22–33 x 7–10  $\mu\text{m}$ , 4-spored. Caulocystidia similar to cheilocystidia, only present at apex.

HABITAT & DISTRIBUTION. — Under frondose trees. Associated with *Quercus*, *Fagus*, and *Carpinus*. Only known from Czechoslovakia. July–Aug.

COLLECTIONS EXAMINED. — C Z E C H O S L O V A K I A: Moravia, Starý Podvorov near Hodonin, 26.VIII.1975, *Kuthan* (holotype of *I. kuthanii*, PRM); Klimkovic near Ostrava, 24.VIII.1975, *Zámečník* (PRM); Slovakia, Šutovec, 26.VII.1975, *Kuthan* (PRM).

Note: Stangl & Veselský (in Česká Mykol. 33: 134–137. 1979) asserted that *I. kuthanii* was an independent species, differing from *I. cookei* not only in colours of pileus and stipe, but also in its cheilocystidia and habitat. However, none of these characters, except colour of the pileus, were found by me to be constant. For that reason I regard *I. kuthanii* as a variety of *I. cookei*, but more material might eventually show that var. *kuthanii* does not deserve an autonomous status.

10. *Inocybe maculata* Boud. — Fig. 18

*Inocybe maculata* Boud. in Bull. Soc. bot. Fr. 32: 283. 1885

MISAPPLIED NAME: *Inocybe brunnea* sensu J. Lange in Dansk bot. Ark. 2(7): 40. 1917.

SELECTED ICONES: Boud. in Bull. Soc. bot. Fr. 32: pl. 9, f. 2. 1885. — R. Heim, Genre *Inocybe*: pl. 10, f. 3, pl. 12, f. 2. 1931. — J. Lange, Fl. agar. dan. 3: pl. 116E. 1938. — Alessio, Iconogr. mycol. 29: pl. 16. 1980. — R. Phillips, Paddest. Schimm.: 150. 1981. — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 6, f. 2. 1985.

Pileus 21–70 mm, when young conical or conico-convex with inflexed margin, then convex to plano-convex with straight margin, sometimes even applanate, umbonate, but exceptionally without umbo, ochraceous brown, pinkish brown, chestnut-brown, date-brown to dark reddish brown, sometimes with purplish or violaceous sheen, in one collection almost blackish brown, smooth around disc, outwards radially rimulose, fibrils only slightly diverging and with small interstitial spaces; often covered with conspicuous white velar patches, especially around disc, but velipellis sometimes indistinct or even absent. Lamellae, L = 45–80, l = 1–3, moderately crowded, 3–7 mm broad, not ventricose to subventricose, narrowly adnate to almost free, pale greyish brown or pale clay-brown; edge (sub) flocculose, white. Stipe 30–110 x 3–9 mm, almost equal, subbulbous to marginately bulbous, at bulb up to 12 mm wide, whitish, becoming ochraceous brown or dark brown on age, especially in the middle part, but at base and outer side of bulb white, at apex almost smooth, minutely hairy to minutely subflocculose, downwards longitudinally fibrillose. Context whitish to (pale) pinkish buff. Smell strong, reminding of *Tuber* spec. or more like *Amanita phalloides*, rather hard to define; in one population with smell of raw potatoes (as *Amanita citrina*). Taste reminding of smell. Spores (7.5–)8.0–10.5(–11.0) x 4.5–6.0  $\mu$ m, on average 8.2–9.8 x 5.0–5.5  $\mu$ m, Q = 1.5–2.0,  $\bar{Q}$  = 1.6–1.8, smooth, subphaseoliform, but a minority (almost) regular. Pleurocystidia absent. Cheilocystidia (25–)27–66(–71) x (9–)10–25(–26)  $\mu$ m, clavate, slenderly clavate to cylindric-clavate, thin-walled, colourless. Basidia 25–34 x 8–11  $\mu$ m, predominantly 4-spored, a few 2-spored. Caulocystidia only at apex, more or less similar to cheilocystidia or more cylindrical, sometimes almost lacking.

HABITAT & DISTRIBUTION. — Mainly under frondose trees, but exceptionally also under conifers. Associated with *Fagus*, *Carpinus*, *Quercus*, *Betula*, *Tilia*, and *Picea*. Widespread in Europe, also occurring in North America. Common in the Netherlands. (July–)Aug.–Oct. (–Nov.).

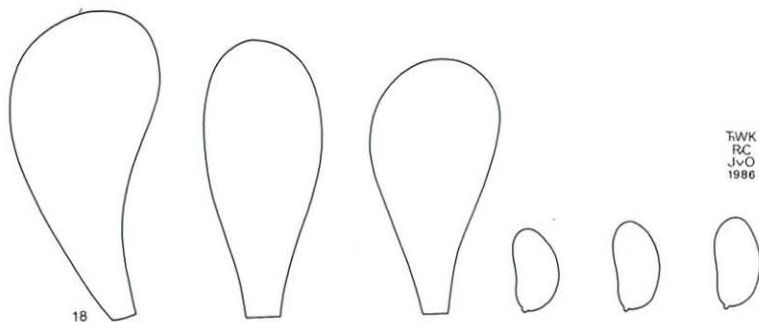


Fig. 18. *Inocybe maculata*. — Spores, cheilocystidia (from holotype of *I. maculata*).

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Overijssele, Rijssen, 10.IX.1955, *Maas Geesteranus 10658*; prov. Gelderland: Ede, 25.VIII.1953, *Ferguson*; Neerijnen, 29.IX.1981, *Vellinga 418*; Ubbergen, 16.X.1971, de *Kleuver 71.083* & 4.X.1980, *Kuyper 1506*; Valburg, 25.IX.1954, *Bas 652*; Winterswijk, 19.IX.1982, *Schreurs*; IJsselmeerpolders, Voorsterbos, 18.IX.1982, *Kuyper 2224*; prov. Utrecht: Amerongen, 2.X.1980, *Kuyper 1502, 1503 & 1504*; Breukelen, 16.IX.1982, *Kuyper 2218*; prov. Noord-Holland: Castricum, 23.IX.1982, *Kuyper 2238*; Haarlem, 12.X.1981, 14.X.1981 & 15.IX.1982, *Vellinga*; Velzen, 13.XI.1962, *Bas 2922*; Vogelenzang, 29.X.1984, *Ypelaar*; prov. Zuid-Holland: Leiden, 17.X.1944, *Maas Geesteranus 3116*; Wassenaar, 27.VIII.1953, *Bas*, 28.VIII.1972, *van der Laan*, 18.VIII.1966, *Bas 4634* & 23. VII.1981, *Kuyper 1627*; prov. Noord-Brabant: Breda, 1.IX.1959, *Bas 1741*; Dorst, 25.IX.1956, *Maas Geesteranus 11750* & 2.X.1960, *Jansen*; Moergestel, 7.X.1980, *Bas 7711*; prov. Limburg: Gulpen, 12.X.1952, *Maas Geesteranus 9123*; Swalmen, 24.IX.1951, *Maas Geesteranus 7961*. — AUSTRIA: Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2176*. — ENGLAND: co. Sussex, Slindon, 12.VIII.1965, *Reid*. — FRANCE: Montmorency, VIII.1881, *Boudier* (holotype of *I. maculata*, PC); Ecouan, VII.1891, *Boudier* (PC). — GERMANY: Niedersachsen, near Melle, 25.VIII.1977, *Huijsman*; Westfalen, Heiligenkirchen, 10.IX.1972, *Huijsman*; Eifel, Gerolstein, Felsenhof, 20.IX.1980, *Kuyper 1453*; Gerolstein, Ammelsbach, 23.IX.1980, *Kuyper 1482*; Eifel, Müllenborn, 21.IX.1980, *Kuyper 1454 & 1460*; Bavaria, Echlichshausen, Bubesheimer Wald, 31.VII.1982, *Kuyper 2065*. — HUNGARY: Com. Salgotarján, near Borosberény, 13.IX.1981, *Kuyper 1780*. — ITALY: Trentino, Levico, Calceranica al Lago, 29.IX.1982, *Bas 7959*; Trento, Villazano, 28.IX.1981, *Kuyper 1869*. — NORWAY: Lillehammer, 21.VIII.1975, *Huijsman*. — SWEDEN: Småland, Femsjö, 9.IX.1949, *Lundell & Stordal* (Fungi exsiccati suecici 2310, PC). — SWITZERLAND: Près de Neuveville, 14.IX.1969, *Huijsman*. — UNITED STATES: Michigan, Cheboygan Co., 15.VII.1963, *Bas 3306* & 18.VII.1963, *Bas 3346*.

Notes: 1. The presence of velar patches on the pileus seems at least partly environmentally determined. Variants lacking these velar patches are for that reason not accorded an autonomous rank.

2. The colour variation exhibited by *I. maculata* is somewhat greater than Kühner (in Bull. trimest. Soc. mycol. Fr. 71: 191. ('1955') 1956) indicated. Variants with distinct ochraceous tinges are occasionally met, but these cannot be separated from the typical variant. Considering the large variation both in colour and in velar covering it seems not unlikely that some related taxa from the United States, viz. *I. fastigiella* Atk. and *I. lanatodisca* C.H. Kauffm., would fall within the range of variation of *I. maculata*. More material is needed to assess their exact relationships.

3. *Inocybe quietiodor* M. Bon differs from ochraceous variants of *I. maculata* in being brighter yellow and in having more regular spores and smaller cheilocystidia. *Inocybe flavella* P. Karst. has a more smooth pileus without diverging fibrils, lacks a distinct smell, and possesses slenderly cylindrical cheilocystidia.

11. *Inocybe flavella* P. Karst.

*Inocybe flavella* P. Karst. in Meddn Soc. Fauna Flora fenn. 16: 100. 1890.

*Inocybe fulvoumbrina* Bres. in Sacc., Fl. ital. crypt. I, 15: 728. 1916.

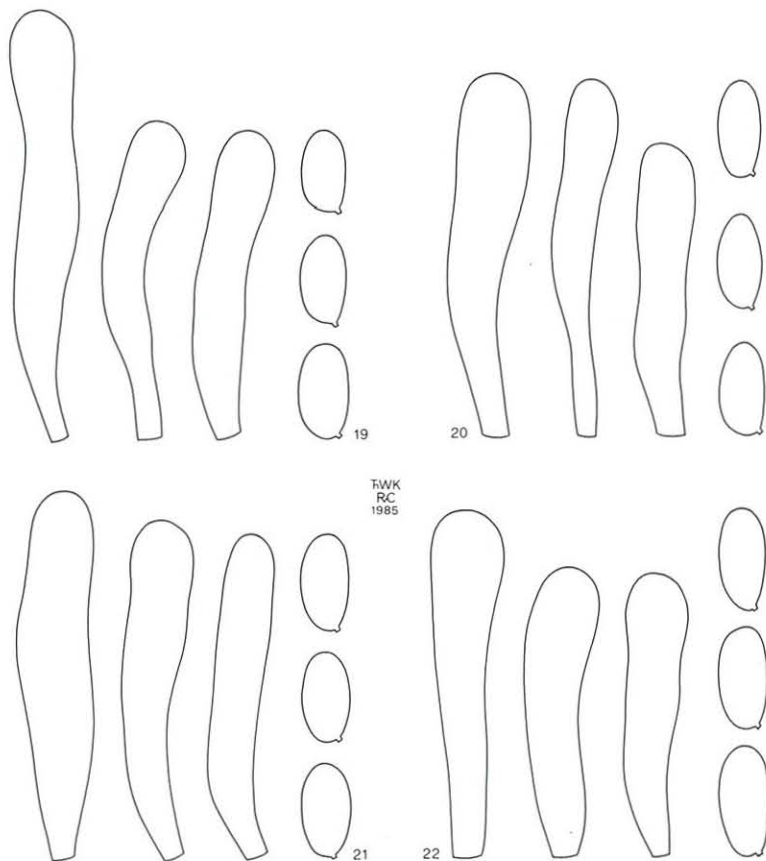
*Inocybe xanthocephala* P.D. Orton in Trans. Br. mycol. Soc. 43: 277. 1960.

KEY TO THE VARIETIES OF *I. FLAVELLA*

1. Pileus pale ochraceous to ochraceous yellow; stipe whitish to pale yellowish. . . . . var. *flavella*, p. 54
1. Pileus slightly olivaceous-tinged ochraceous with somewhat darker centre; stipe especially in lower part salmon-pink to reddish. . . . . var. *roseipes*, p. 55

11.1. *I. flavella* var. *flavella* — Figs. 19–20, 22

Pileus 22–50 mm, conical, convex to plano-convex, indistinctly to prominently umbonate, pale ochraceous to almost whitish around disc, somewhat more ochraceous yellow in outer half [2.5 Y 6/6], sericeous-smooth around disc, even slightly greasy when moist, outwards indistinctly fibrillose, fibrils not or hardly diverging, and at margin not or only indistinctly rimulose; velipellis present around disc, sometimes indistinct. Lamellae, L = 40–60, l =



Figs. 19–22. *Inocybe flavella*. — Spores, cheilocystidia (19. from holotype of *I. flavella*; 20. from holotype of *I. fulvoumbrina*; 21. from holotype of *I. xanthocephala* f. *roseipes*; 22. from holotype of *I. xanthocephala*).

1–3, moderately crowded, 2–4 mm broad, not or hardly ventricose, narrowly adnate to emarginate, greyish yellow; edge subfloculose, somewhat paler to whitish. Stipe 33–100 x 4–5 mm, equal to somewhat clavate (6 mm), but without marginate bulb, whitish, with age discolouring to pale yellowish, hairy-pruinose at apex, downwards longitudinally fibrillose. Cortina not observed. Context whitish in pileus, faintly yellowish-tinged in stipe. Smell and taste indistinct.

Spores 8.0–12.0 x 4.5–6.0  $\mu$ m, on average 8.9–10.8 x 5.1–5.7  $\mu$ m, Q = 1.6–2.2(–2.3),  $\bar{Q}$  = 1.7–2.1, smooth, regular to subphaseoliform. Pleurocystidia absent. Cheilocystidia (26–)27–62(–67) x 8–14  $\mu$ m, cylindrical, never clavate nor utriform, thin-walled, colourless. Basidia 28–42 x 9–13  $\mu$ m, 4-spored. Caulocystidia at apex similar to cheilocystidia, exceptionally slightly articulate.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees. Associated with *Fagus*, *Corylus*, *Populus* cv. *canadensis*, and *Picea*. Widespread in Europe but probably rare, not yet recorded from the Netherlands. July–Oct.

COLLECTIONS EXAMINED. — ENGLAND: co. Surrey, Elstead, 9.X.1954, *Orton 307* (holotype of *I. xanthocephala*, K). — FINLAND: Tammela, Särkjärvi, VIII.1889, *E. Karsten* (holotype of *I. flavella*, H). — FRANCE: Bois de Champrans, 15.VIII.1942, *Bride* (herb. Métrod, PC). — ITALY: prov. Alto Adige, Trento, Parco Gocciadoro, VII.1889, *Bresadola* (holotype of *I. fulvoumbrina*, S); Trento, Sopramonte, 24.IX.1981, *Kuyper 1823, 1826 & 1827*.

11.2. *I. flavella* var. *roseipes* (M. Bon) Kuyp., *comb. & stat. nov.* — Fig. 21

*Inocybe xanthocephala* f. *roseipes* M. Bon in Docs mycol. 12(48): 44. ('1982') 1983 (basionym).

Pileus 10–30 mm, conical, umbonate, rather prominently so, olivaceous yellow, somewhat more orange ochraceous around centre, smooth, radially fibrillose but not rimulose at margin, no velipellis observed. Lamellae, L = 50–75, normally crowded, not ventricose, buff, without olivaceous tinges; edge fimbriate, whitish. Stipe 30–45 x 4–6 mm, somewhat swollen towards base (7–8 mm), but without marginate bulb, bright ochraceous-reddish to salmon-pink, more distinctly so on damage, at apex minutely flocculose, downwards sericeous-fibrillose. Context whitish in pileus, pinkish in stipe and more distinctly so in older specimens, especially near base. Smell indistinct.

Spores 8.5–10.5(–11.0) x (4.5–)5.0–6.0  $\mu$ m, on average 9.5–10.5 x 5.2–5.3  $\mu$ m, Q = (1.6–)1.7–2.1(–2.2),  $\bar{Q}$  = 1.8–2.0, smooth, regular to subphaseoliform. Pleurocystidia absent. Cheilocystidia (40–)42–62(–75) x (8–)10–14  $\mu$ m, (slenderly) cylindrical, thin-walled, colourless. Basidia 29–36 x 9–10  $\mu$ m, 4-spored. Hymenophoral trama without refractive hyphae. Caulocystidia at apex similar to cheilocystidia.

HABITAT & DISTRIBUTION: Under frondose trees on marshy ground. Associated with *Salix*. Known from France and the Netherlands. Aug.–Sept.

COLLECTIONS EXAMINED. — NETHERLANDS: prov Gelderland, Staverden, 14.VIII.1971, *de Kleuver*. — FRANCE: dpt. Somme, Pendé, Source de l'Amboise, 22.IX.1975, *Bon* (holotype of *I. xanthocephala* f. *roseipes*, herb. Bon).

12. *Inocybe arenicola* (R. Heim) M. Bon

*Inocybe fastigiata* f. *arenicola* R. Heim, Genre *Inocybe*: 178. 1931. — *Inocybe arenicola* (R. Heim) M. Bon in Docs mycol. 12(48): 44. ('1982') 1983.

KEY TO THE VARIETIES OF *I. ARENICOLA*

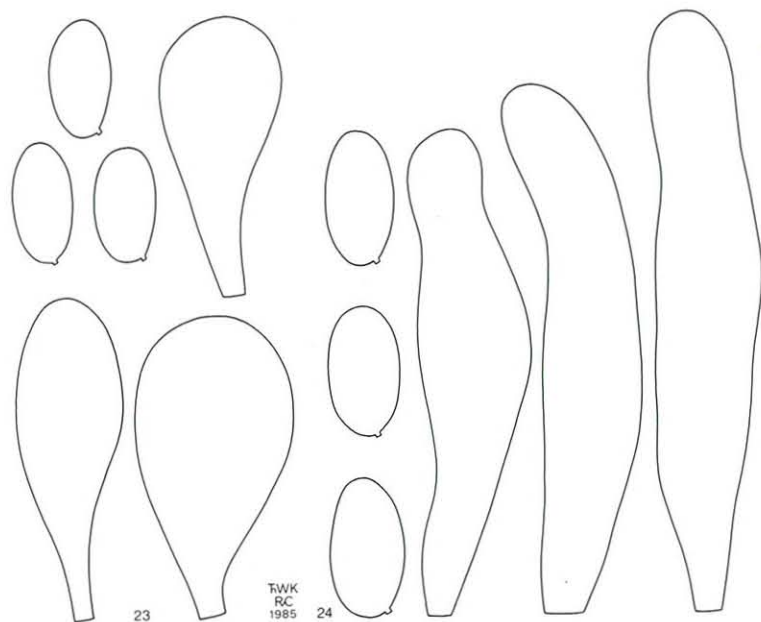
1. Cheilocystidia (slenderly) cylindrical, sometimes subutriform.....var. *arenicola*, p. 56  
 1. Cheilocystidia clavate to cylindrico-clavate.....var. *mediterranea*, p. 57

12.1. *I. arenicola* var. *arenicola* — Fig. 24

*Inocybe arenicola* f. *albida* M. Bon in Docs mycol. 14(53): 16. 1984.

SELECTED ICON. — R. Heim, Genre *Inocybe*: pl. 9, f. 3. 1931.

Pileus 24–68 mm, campanulate when young with inflexed margin, soon convex to plano-convex with straight margin and broad obtuse umbo, exceptionally without umbo, initially completely white because of thick sericeous velipellis persisting with age or disappearing from outer half and showing smooth to minutely fibrillose covering, with fibrils not diverging, at margin not rimulose, straw-yellow to pale ochraceous [10 YR 7/6, 6/6], but disc persistently white with adhering sand-grains. Lamellae, L = 55–90, l = 1–3, moderately crowded, 4–9



Figs. 23–24. *Inocybe arenicola*. — Spores, cheilocystidia (23. from holotype of *I. arenicola* var. *mediterranea*; 24. from neotype of *I. arenicola*).

mm broad, (sub)ventricose, narrowly adnate to almost free, at first white (but pinkish in one collection), then greyish yellow to greyish brown, without olivaceous tinges; edge subfloculose, white. Stipe 29–75 x 5–13 mm, equal, somewhat swollen at base to subbulbous (bulb to 18 mm broad), often rather deeply buried in sand, solid, white, discolouring to pale ochraceous yellow but subterranean part persistently white, at apex almost smooth, somewhat hairy to subfloculose, downwards longitudinally fibrillose to almost smooth. Context whitish, with age with a faint yellowish tinge. Smell and taste indistinct.

Spores (11.5–)12.0–16.5(–18.0) x 6.0–8.5(–9.0)  $\mu$ m, on average 13.0–15.4 x 6.3–8.0  $\mu$ m, Q = (1.6–)1.7–2.4(–2.5),  $\bar{Q}$  = 1.8–2.1, smooth, regular, a minority subphasecoliform. Pleurocystidia absent. Cheilocystidia (42–)43–83(–105) x (9–)10–17(–20)  $\mu$ m, cylindrical, a minority slenderly (sub)utriform, somewhat flexuose, thin-walled, colourless. Basidia 33–50 x 11–15  $\mu$ m, somewhat swollen in apical part, predominantly 4-spored. Caulocystidia at stipe apex similar to cheilocystidia.

HABITAT & DISTRIBUTION. — In pure dune-sand. Associated with *Salix repens*, *Populus* cv. *canadensis*, and *Pinus maritima*, but sometimes without any trees nearby, and then perhaps associated with *Ammophila arenaria*. Known from France and the Netherlands where it is not uncommon in the dunes, probably occurring along the entire Atlantic coast of Europe. May–Oct. (–Nov.).

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland, Terschelling, 22.X.1981, *Kuyper* 1978; prov. Noord-Holland, Vogelenzang, 5.IX.1965, *Reijnders* & 11.X.1981, *Kuyper* 1933; prov. Zuid-Holland: Oostvoorne, 7.VIII.1972, *de Kleuver* 72.059; Wassenaar, 3.IX.1950, *Maas Geesteranus* 7122, 18.IX.1955, *Maas Geesteranus* 10688 & 14.VI.1981, *Bas* 7783; prov. Zeeland: Haamstede, 6.XI.1972, *Huijsman*; Westerschouwen, 27.VI.1981, *Rubers* 7959. — FRANCE: dpt. Manche, Biville, 18.V.1983, *Kuyper* 2341 (neotype of *I. arenicola*, design. mihi, L.), 2343, 2351 & 22.V.1983, *Kuyper* 2356.

Notes: 1. The behaviour of the velipellis with age shows some variation. In some specimens it persists and consequently the pileus remains pure white; in other specimens it is somewhat thinner and soon disappears from the outer half, and the pileus becomes ochraceous yellow with age. However, both variants occur together and probably represent only a phenotypical modification.

2. On rather moist places in the dunes, associated with *Salix repens*, occurs a variant of *I. rimosa* (Bull.: Fr.) Kumm. which differs from *I. arenicola* in being less robust, having a fulvous brown pileus under the velipellis, a more distinctly flocculose stipe apex, and a rather strong smell. So far intermediates have not been found.

12.2. *I. arenicola* var. *mediterranea* *Kuyper*, nov. var. — Fig. 23

A varietate typica differt cheilocystidiis clavatis, pileo obscuriori sub velipelli. — Holotypus: *Th. W. Kuyper* 1870, 29.IX.1981, Lido di Classe, Ravenna, Italy (L).

SELECTED ICON. — Alessio, Iconogr. mycol. 29: pl. 11, f. 2. 1980 (as *I. fastigiata* f. *arenicola*).

Pileus convex to plano-convex, without umbo, when young pale buff with whitish disc because of velipellis, somewhat darkening with age especially in outer half to (ochraceous) brown. Lamellae at first whitish, finally brownish; edge subfloculose, white. Stipe equal

to slightly clavate, for the greater part buried in sand, at first white, discolouring to pale brown, subfloculose at apex, downwards rather coarsely fibrillose. Context white. Smell and taste indistinct.

Spores 12.0–15.0(–16.0) x 6.0–7.0  $\mu\text{m}$ , average 13.2 x 6.6  $\mu\text{m}$ ,  $Q = 1.8\text{--}2.2(2.3)$ ,  $\bar{Q} = 2.0$ , smooth, (almost) regular. Pleurocystidia absent. Cheilocystidia (36–)38–51(–57) x (13–)16–20(–26)  $\mu\text{m}$ , clavate, sometimes cylindrico-clavate, thin-walled, colourless. Basidia 36–44 x 11–14  $\mu\text{m}$ , 4-spored. Caulocystidia scarce at apex, somewhat more slender than cheilocystidia.

HABITAT & DISTRIBUTION. — Under *Pinus pinea* in dune-sand. Hitherto known only from Italy, but probably more widespread along the Mediterranean Coast. Sept.

COLLECTION EXAMINED. — I T A L Y: Ravenna, Lido di Classe, 29.IX.1981, *Kuyper 1870* (holotype of *I. arenicola* var. *mediterranea*, L).

Note: Besides by the clavate cheilocystidia *Inocybe arenicola* var. *mediterranea* differs from var. *arenicola* in having a somewhat darker, more brownish-coloured pileus. More information on the distribution of both varieties is needed to ascertain whether both taxa are geographically isolated.

### 13. *Inocybe mimica* Mass. — Fig. 25

*Inocybe mimica* Mass. in Ann. Bot. 18: 492. 1904.

Pileus 50–65 mm, conical to plano-convex with a very prominent umbo, with incurved margin when young, with reddish brown covering on slightly olivaceous-tinged background, at first remarkably squamulose because of small appressed scales around centre, towards margin minutely flocculose, on age spotted with larger scales, the umbo remaining sub-tomentose and somewhat metallic-shiny, red-brown. Lamellae subdistant, 6–8 mm broad, subventricose, adnexed to almost free, at first pale beige with a faint olivaceous tinge, finally olivaceous brown; edge flocculose, white. Stipe 35–77 x 8–10 mm, somewhat swollen towards base (12–14 mm), but not bulbous, solid, whitish, then reddish brown, white-floculose at apex, downwards fibrillose. Context whitish, at base of stipe with a reddish brown tinge. Smell faint, not spermatic.

Spores 12.0–18.0(–18.5) x 6.0–8.0(–9.0)  $\mu\text{m}$ , on average 13.3–14.9 x 6.7–7.0  $\mu\text{m}$ ,  $Q = (1.8\text{--})1.9\text{--}2.3(2.5)$ ,  $\bar{Q} = 2.0\text{--}2.1$ , smooth, regular to indistinctly phaseoliform. Pleurocystidia absent. Cheilocystidia (44–)45–56(–60) x (14–)15–19  $\mu\text{m}$ , cylindrical to slenderly clavate, thin-walled, colourless. Basidia 29–39 x 9–12  $\mu\text{m}$ , 4-spored. Hymenophoral trama without refractive hyphae. Covering of stipe not studied.

HABITAT & DISTRIBUTION. — Under frondose trees. Very rare in Europe, up to now known only from France and England. Oct.

COLLECTIONS EXAMINED. — E N G L A N D: co. Yorkshire, Malton, Castle Howard, X.1902 (holotype of *I. mimica*, K). — F R A N C E: near Paris, X.1963 (herb. Romagnesi).

Note: The macroscopical description is a translation of the description as given by Romagnesi (in Beih. Sydowia 8: 349. 1979).

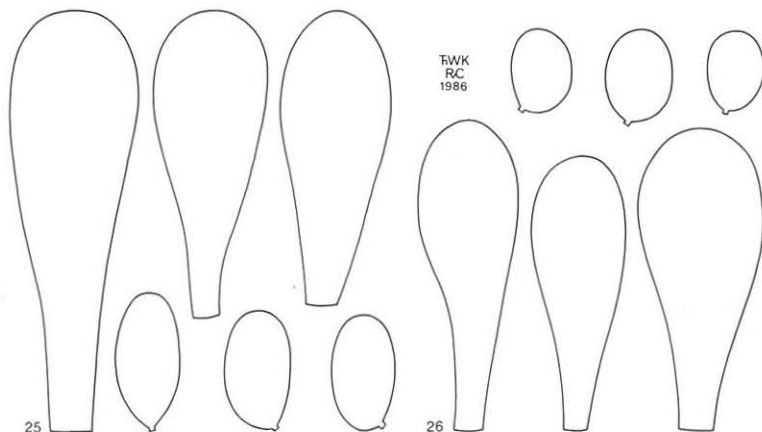


Fig. 25. *Inocybe mimica*. — Spores, cheilocystidia (from Romagnesi).

Fig. 26. *Inocybe squamata*. — Spores, cheilocystidia (from *Kuyper 1662*).

### 14. *Inocybe squamata* J. Lange — Fig. 26

*Inocybe squamata* J. Lange in Dansk bot. Ark. 2(7): 39. 1917.

EXCLUDED. — *Inocybe squamata* sensu A. Pears. in Trans. Brit. mycol. Soc. 32: 260. 1949 (= *I. agardhii*).

SELECTED ICONES. — R. Heim, Genre *Inocybe*: pl. 11, f. 1. 1931. — J. Lange, Fl. agar. dan. 3: pl. 115D. 1938. — Alessio, Iconogr. mycol. 29: pl. 13. 1980. — Stangl & Enderle in Mitt. Ver. Naturw. Math. Ulm 31: 140. 1981.

Pileus 15–49 mm, conical, conico-convex to plano-convex, finally applanate, not or rather indistinctly umbonate, brown to dark brown around disc [7.5 YR 3/3, 3/4, 4/4], outwards paler, half-way ochraceous brown [7.5 YR 4/6–10 YR 5/6], near margin ochraceous yellow [2.5 Y 6/6, 7/8, 8/8], sometimes with olivaceous yellow tinge, around disc with appressed scales, but sometimes without scales, outwards radially fibrillose, but fibrils only slightly diverging, at margin rimulose, never rimose; velipellis absent to indistinctly present around disc. Lamellae, L = 45–75, l = 1–3, moderately crowded, 3–5 mm broad, not ventricose to subventricose, emarginate, narrowly adnate to almost free, at first pale yellowish, then yellowish buff, finally olivaceous yellow-brown [2.5 Y 5/4]; edge flocculose, white, sometimes yellow-brown on bruising. Stipe 20–66 x 4–8 mm, equal to slightly broadened towards base, solid, whitish, discolouring from base upwards to yellowish-ochraceous [2.5 Y 7–8/6], brownish ochraceous [10 YR 5–6/8] or brown [10 YR 4–5/6], at apex hairy-pruinose to minutely flocculose, downwards smooth to indistinctly longitudinally fibrillose. Cortina not observed. Context white in pileus and stipe, but somewhat ochraceous in cortex. Smell none to somewhat acidulous, or even reminding of sourish apples. Taste indistinct.

Spores (8.5–)9.0–11.0 x 5.5–7.0(–7.5)  $\mu\text{m}$ , on average 9.2–10.4 x 5.9–6.8  $\mu\text{m}$ ,  $Q = (1.3\text{--})1.4\text{--}1.7$ ,  $\bar{Q} = 1.4\text{--}1.6$ , smooth, regular, but a minority tending to subphaseoliform. Pleurocystidia absent. Cheilocystidia (30–)37–58(–66) x 10–18(–20)  $\mu\text{m}$ , cylindrical to cy-

lindrico-clavate, sometimes subutriform, thin-walled, colourless. Basidia 30–37 x 11–14  $\mu\text{m}$ , predominantly 4-spored, a minority 2-spored. Caulocystidia at apex similar to cheilocystidia, sometimes more articulate hairs present with cheilocystidioid terminal element. Hyphae of pileipellis around centre with sclerified walls, especially with age.

**HABITAT & DISTRIBUTION.** — Under frondose trees on somewhat moist, nutrient-rich clay. Associated mainly with *Populus*, but also with *Salix* and *Alnus*. Widespread in West Europe, apparently less common in Central Europe. Rather common in the western part of the Netherlands and in the IJsselmeerpolders. June–Oct.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Drenthe, Geelbroek, 19.X.1967, *Bas* 4982; IJsselmeerpolders: Kuinderbos, 6.X.1981, *Kuyper* 1918; Voorsterbos, 8.X.1981, *Kuyper* 1914 & 1919; Bremerberg, 11.IX.1980, *Kuyper* 1434, & 1442 & 1.VIII.1981, *Kuyper* 1662; Houtribbos, 28.VIII.1982, *Kuyper* 2133; Jagersveld, 16.VI.1981, *Kuyper* 1591 & 7.VII.1981, *Kuyper* 1601; Strandgaperweg, 7.X.1981, *Kuyper* 1894; prov. Utrecht: Breukelen, 8.VI.1974, *Daams* 74.12 & 12.VIII.1972, *Huijsman*; Linschoten, 2.VII.1982, *Kuyper* 2032; prov. Noord-Holland, Amsterdam, 16.VI.1960, *Bas* 1905; prov. Zuid-Holland: Delft, 18.IX.1955 & 20.VIII.1956, *Bakker*; Leiden, 6.VII.1958, *Bas* 1487 & 20.VIII.1958, *Bas* 1518; Rotterdam, 12.IX.1965, *Bas* 4526; Warmond, 14.VII.1960, *Bas* 1939; prov. Noord-Brabant, Eindhoven, 27.IX.1961, *Siteur*; prov. Limburg, Savelsbos, 5.VIII.1981, *Kuyper* 1666. — ENGLAND: co. Bedfordshire, Maulder Wood, 6.X.1974, *Reid* (K). — FRANCE: Nans-les-Pins, 7.X.1960, *Huijsman*. — GERMANY: Bavaria, Augsburg, Wittelsbacher Park, 5.VIII.1982, *Kuyper* 2111.

Notes: 1. Occasionally specimens with an almost smooth pileus are met. The hyphae in the centre of the pileipellis do not or hardly sclerify in these specimens, and for that reason the pileus does not break into appressed scales. This character seems to be only a phenotypic response to moisture. In one collection, viz. *Kuyper* 1662, both character variants were found. Specimens growing in sheltered conditions were relatively smooth, but specimens growing in exposed situations were distinctly appressedly scaly. No taxonomic status can therefore be accorded to those smooth variants.

2. *Inocybe squamata*, especially its variant with a rather smooth pileus, cannot always easily be separated from the extremely variable *I. rimosa* (Bull.: Fr.) Kumm. The latter species, however, has a more prominent umbo, a more strongly radially rimose pilical covering, a different smell and somewhat larger spores. I did not yet meet truly intermediate collections, and for that reason *I. squamata* is considered an autonomous species.

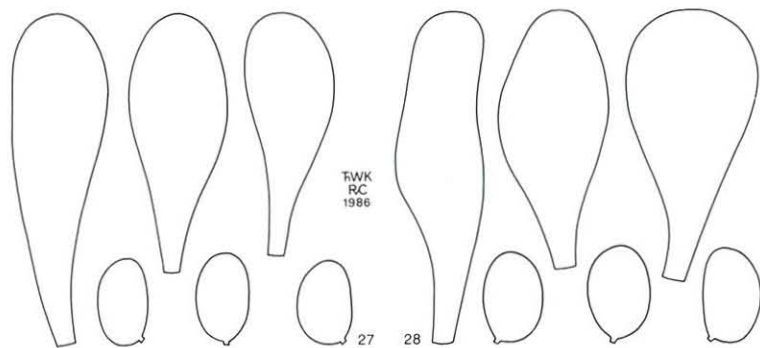
### 15. *Inocybe vinosistipitata* Grund & Stuntz — Figs. 27–28

*Inocybe vinosistipitata* Grund & Stuntz in *Mycologia* 75: 269. 1983.

*Inocybe fastigiata* subsp. *lilofastigiata* Stangl & Veselský in *Česká Mykol.* 31: 190. 1977.

SELECTED ICON. — Dermek & Veselský in *Česká Mykol.* 31: pl. 92. 1977.

Pileus 27–60(–80) mm, conical, umbonate, whitish around umbo, sometimes mixed with lilac tinges, outwards pale ochraceous buff to brownish, radially fibrillose, at margin rimulose, smooth, viscid when moist, shiny. Lamellae moderately crowded, 4 mm broad, subventricose, deeply emarginate, narrowly adnate, greyish clay, when young with subtle violaceous tinges. Stipe 48–60(–70) x 4–8 mm, somewhat swollen at base but not bulbous, solid, at apex violaceous or purplish violaceous, downwards whitish cream, almost smooth at apex, downwards



Figs. 27–28. *Inocybe vinosistipitata*. — Spores, cheilocystidia (27. from isotype of *I. vinosistipitata*; 28. from holotype of *I. fastigiata* subsp. *lilofastigiata*).

indistinctly longitudinally fibrillose. Context whitish, but somewhat violaceous or purplish in apex of stipe. Smell faint, reminiscent of soap. Taste indistinct.

Spores 9.5–11.5(–12.0) x 5.5–7.0(–7.5)  $\mu\text{m}$ , on average 10.2–10.6 x 6.0–6.6  $\mu\text{m}$ , smooth, regular, not phaseoliform. Pleurocystidia absent. Cheilocystidia (30–)33–58(–63) x 12–21(–22)  $\mu\text{m}$ , clavate to cylindrico-subclavate, not utriform, thin-walled. Basidia 22–38 x 8–14  $\mu\text{m}$ , 4-spored. Caulocystidia scarce at apex, slenderly clavate to cylindrical, similar to cheilocystidia.

**HABITAT & DISTRIBUTION.** — Under frondose and coniferous trees. Associated with *Pinus*, *Quercus*, *Fagus*, and *Betula*. Very rare in Europe and North America, not yet recorded from the Netherlands. July–Sept.

**COLLECTIONS EXAMINED.** — CZECHOSLOVAKIA: Slovakia, Senica, Kopčany, 17.IX.1975, *Přihoda* (holotype of *Inocybe fastigiata* subsp. *lilofastigiata*, BRA). — UNITED STATES: Michigan, Cheboygan Co., Maple Bay at Burt Lake, 18.VII.1963, *Bas* 3348. — CANADA: Nova Scotia, Kings Co., Lloyd's (isotype of *Inocybe vinosistipitata*, WTU).

Note: The macroscopical description has been copied in part from Dermek & Veselský (in *Česká Mykol.* 31: 190. 1977) and Grund & Stuntz (in *Mycologia* 75: 269. 1983).

Despite small differences between the European and American collections, I have assumed that these taxa have descended from a common ancestor. Should, however, a polyphyletic origin for this taxon be more likely, it could better be reduced to varietal status under *I. rimosa* (Bull.: Fr.) Kumm.

### 16. *Inocybe rimosa* (Bull.: Fr.) Kumm. — Figs. 29–37

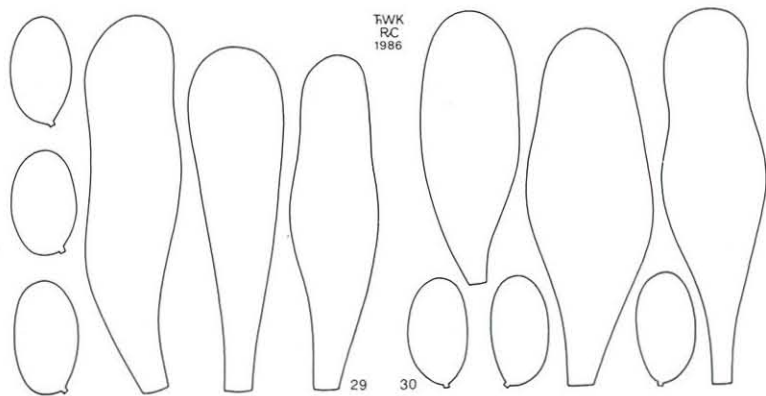
*Agaricus rimosus* Bull., *Herb. France*: pl. 388. 1789. — *Agaricus rimosus* Bull.: Fr., *Syst. mycol.* 1: 258. 1821. — *Inocybe rimosa* (Bull.: Fr.) Kumm., *Führ. Pilzk.*: 78. 1871.



- Agaricus fastigiatus* Schaeff., Fung. Bavaricae 4: 13. 1774. — *Inocybe fastigiata* (Schaeff.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 180. 1872.
- Agaricus aurivenius* Batsch, Elench. Fung. Cont. 1: 137. 1786. — *Inocybe aurivenia* (Batsch) Bres., Iconogr. mycol. 15: pl. 726<sup>1</sup>. 1930.
- Agaricus curreyi* Berk., Outl. Brit. Fungol.: 155. 1860. — *Inocybe curreyi* (Berk.) Sacc., Syll. Fung. 5: 775. 1887. — *Inocybe fastigiata* var. *curreyi* (Berk.) R. Heim, Genre Inocybe: 184. 1931.
- Inocybe brunnea* Quél. in Bull. Soc. Amis Sci. nat. Rouen, sér. II, 15: 162. ('1879') 1880.
- Agaricus injunctus* Britz., Dermis Südbayern: 5. 1882. — *Inocybe injuncta* (Britz.) Sacc., Syll. Fung. 5: 776. 1887.
- Agaricus servatus* Britz. in Ber. naturw. Ver. Augsburg 28: 154. 1885. — *Inocybe servata* (Britz.) Sacc., Syll. Fung. 11: 53. 1895.
- Agaricus perlatus* Cooke in Grevillea 15: 40. 1886. — *Inocybe perlata* (Cooke) Sacc., Syll. Fung. 5: 774. 1887.
- Agaricus schista* Cooke & W.G. Sm. in Cooke, Handb. Brit. Fungi: 154. 1886. — *Inocybe schista* (Cooke & W.G. Sm.) Sacc., Syll. Fung. 5: 774. 1887.
- Inocybe confusa* P. Karst. in Meddn Soc. Fauna Flora fenn. 16: 39. 1888.
- Inocybe umbrinella* Bres. in Annlis mycol. 3: 161. 1905. — *Inocybe fastigiata* var. *umbrinella* (Bres.) R. Heim, Genre Inocybe: 188. 1931.
- Inocybe infracta* Velen., České Houby: 384. 1920.
- Inocybe pseudofastigiata* Rea in Trans. Br. mycol. Soc. 12: 210. 1927.
- Inocybe conica* Larsen in Kolderup-Rosenvinge & Warming, Bot. Iceland 1: 534. 1931.
- Inocybe nana* F. Möller, Fungi Farøes 1: 224. 1945, non *I. nana* Raitelhuber 1977.
- Inocybe pusilla* F. Möller, Fungi Farøes 1: 225. 1945.
- Inocybe obsoleta* Romagn. in Bull. trimest. Soc. mycol. Fr. 74: 145. 1958.
- Inocybe orbata* Malenç. in Mal. & Bert., Fl. Champ. sup. Maroc 1: 386. 1970.
- Inocybe holoxantha* Grund & Stuntz in Mycologia 73: 667. 1981.
- Agaricus fastigiatus* var. *superba* Fr., Ic. sel. Hymenomyc. 2: 7. 1877. — *Inocybe fastigiata* var. *superba* (Fr.) Sacc., Syll. Fung. 5: 780. 1887.
- Inocybe fastigiata* var. *cerina* Malenç. in Mal. & Bert., Fl. Champ. sup. Maroc 1: 359. 1970.
- Inocybe obsoleta* var. *lutea* M. Bon & Chevassut in Docs mycol. 3(11): 18. 1973.
- Inocybe fastigiata* var. *validior* Alessio in Boll. Gruppo Micol. G. Bresadola, Trento 27: 31. 1984.
- Inocybe fastigiata* f. *alpina* R. Heim, Genre Inocybe: 185. 1931.
- Inocybe fastigiata* f. *argentata* Kühner in Bull. trimest. Soc. mycol. Fr. 71: 169. ('1955') 1956.
- Inocybe fastigiata* f. *subcandida* Malenç. in Mal. & Bert., Fl. Champ. sup. Maroc. 1: 361. 1970.
- Inocybe pseudocookei* Métrod in Schweiz. Z. Pilzk. 31: 158. 1953. (inval., Art. 36.1.)
- Inocybe laeta* Alessio in Econ. Trent., Suppl. 1: 98. 1979. (inval., Art. 37.1.)
- Inocybe fastigiata* var. *aurantiaca* J. Schaeff. in Ber. bayer. bot. Ges. 27: 207. 1947. (inval., Art. 36.1.)
- Inocybe fastigiata* f. *alpestris* R. Heim, Genre Inocybe: 176. 1931. (inval., Art. 34.1.)
- Inocybe fastigiata* f. *alpina* R. Heim, Genre Inocybe: 177. 1931. (inval., Art. 34.1.), non *I. fastigiata* f. *alpina* R. Heim, Genre Inocybe: 185. 1931.
- Inocybe fastigiata* f. *heimii* Sing. in Collect. bot. 1: 233. 1947. (inval., Art. 36.1.)
- EXCLUDED. — *Agaricus fastigiatus* sensu Berk., Outl. Brit. Fungol.: 155. 1860 (= *I. margaritispora*); sensu Fr., Hymenomyc. eur.: 231. 1874 (= *I. margaritispora*).
- Inocybe aurivenia* sensu Bres., Iconogr. mycol. 15: pl. 726<sup>1</sup>. 1930 (= *Inocybe spec.*); sensu Alessio, Iconogr. mycol. 29: 243. 1980 (= *Inocybe spec.*).
- Inocybe curreyi* sensu C.H. Kauffm., N. Amer. Fl. 10: 258. 1924 (= *I. rimosoides?*).
- Inocybe brunnea* sensu J. Lange in Dansk bot. Ark. 2(7): 40. 1917 (= *I. maculata*); sensu Bres., Iconogr. mycol. 15: pl. 742. 1930 (= *I. splendens* var. *phaeoleuca?*); sensu R. Heim, Genre Inocybe: 208. 1931 (= *Inocybe spec. div.*).
- Inocybe confusa* sensu R. Heim, Genre Inocybe: 333. 1931 (= *I. cryptocystis*); sensu Alessio, Iconogr. mycol. 29: 233. 1980 (= *I. cryptocystis*).
- Inocybe fastigiata* var. *superba* sensu Bres., Iconogr. mycol. 15: pl. 746. 1930 (= *Inocybe spec.*).
- Inocybe rimosa* sensu Bres., Iconogr. mycol. 15: pl. 741. 1930. (= *I. fuscidula*).
- SELECTED ICONES. — Bull., Herb. France: pl. 388. 1789. — Konr. & M., Ic. sel. Fung. 1: pl. 92 (as *I. fastigiata*). 1925. — Bres., Iconogr. mycol. 15: pl. 738 (as *I. umbrinella*), pl. 744 (as *I. fastigiata*). 1930. — J. Lange, Fl. agar. dan. 3: pl. 114B (as *I. fastigiata*), pl. 115F (as *I. perlata*). 1938. — Mal. & Bert., Fl. Champ. sup. Maroc 1: pl. 12 (as *I. fastigiata* var. *cerina*), pl. 14 (as *I. orbata*). 1970.

— Alessio, Iconogr. mycol. 29: pl. 10 (as *I. fastigiata*), pl. 12, f. 1 (as *I. fastigiata* var. *umbrinella*), pl. 12, f. 2 (as *I. obsoleta*), pl. 14 (as *I. laeta*), pl. 15 (as *I. perlata*). 1980. — R. Phillips, Paddest. Schimm.: 150. 1981 (as *I. fastigiata*).

Pileus (13–)18–75(–110) mm, when young campanulate or conical with somewhat inflexed margin and without umbo, soon spreading, then convex or plano-convex, finally even applanate with deflexed or straight margin, conspicuously obtusely to subacutely umbonate (and then without or only with ephemeral velipellis), or only slightly umbonate to not umbonate at all (and then generally with well-developed sericeous velipellis), very variable in colour, ranging from almost whitish or pale buff all over [10 YR 8/2–7/3] because of velipellis, or with brown centre [10 YR 5/4, 4/4] and buff to pale ochraceous outer part, or with whitish centre and brown outer part, sometimes even reddish brown [7.5 YR 4/6], via yellow, sometimes very conspicuous and bright yellow, but more often ochraceous yellow to ochraceous brown [10 YR 7/8, 6/8, 6/6, 5/6, to 4/6] or orange-brown [7.5 YR 5/8] to dark brown, sometimes even blackish brown [7.5 YR 4/4, 3/3, to 2/2–3], generally darkest around centre, smooth around disc, sometimes somewhat greasy because of velipellis, outwards radially fibrillose, fibrils diverging, at margin radially rimose, but sometimes only rimulose, with rather broad interstitial spaces, but sometimes smooth all over because of velipellis and then at margin even subappendiculate, often torn at margin, dull or shiny. Lamellae, L = (40–)50–100(–115), 1 = 1(–3), often crowded to very crowded, (1.5–)2–6(–8) mm broad, very narrow to ventricose, narrowly adnate to almost free, when young white, pale grey to pale yellow, sometimes bright yellow, then greyish yellow to greyish buff [2.5 Y 7/2–7/3] or ochraceous yellow [2.5 Y 6/4], finally yellow-brown [10 YR – 2.5 Y 5/4] to olivaceous yellow-brown [5 Y 5/4], almost always with distinct olivaceous tinges when old; edge denticulate-flocculose, white, sometimes becoming yellow-brown on damage. Stipe 20–125(–175) x 2–11 mm, sometimes partly subterranean, equal to somewhat clavate, rarely submarginately bulbous with fringed margin, solid, sometimes twisted, whitish, sometimes yellow, discolouring with age and on handling to yellowish or brownish-yellowish [2.5 Y 7/6, 6/6, 6/4], but subterranean part remaining white, sometimes even discolouring to (dark)



Figs. 29–30. *Inocybe rimosa*. — Spores, cheilocystidia (29. from Kuyper 1530; 30. from holotype of *I. holoxantha*).

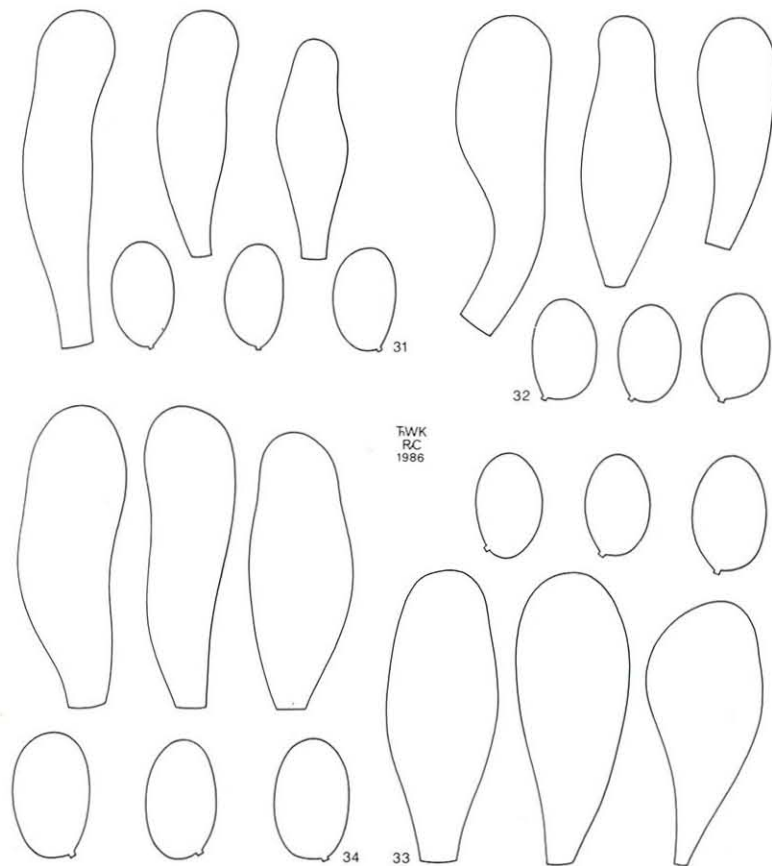
brown [10 YR 4/6], sometimes hardly discolouring at all, flocculose at apex or woolly-hairy in upper part, but sometimes only indistinctly so, downwards longitudinally white-fibrillose. Cortina present in young specimens, (very) soon disappearing, leaving no remnants on stipe. Context whitish to pale yellowish or yellowish-brownish, especially in stipe. Smell indistinct to distinct, rather disagreeable, spermiatic, or more as *Amanita phalloides*, or reminiscent of acorns. Taste as smell.

Spores (9.0–)9.5–14.5(–15.5) x (5.5–)6.0–8.5  $\mu\text{m}$ , on average 9.8–13.7 x 6.1–7.8  $\mu\text{m}$ , Q = 1.4–2.1(–2.2),  $\bar{Q}$  = 1.5–2.0, smooth, regular, in some collections partly subphaseoliform. Pleurocystidia absent. Cheilocystidia (28–)30–65(–80) x (9–)10–22(–23)  $\mu\text{m}$ , (broadly) cylindrical to (sub)utriform or subclavate, thin-walled, sometimes with yellowish brown contents. Basidia 26–44 x 10–15  $\mu\text{m}$ , often swollen towards apex, 4-spored, a few 2-spored. Caulocystidia in clusters at apex, similar to cheilocystidia (when stipe apex flocculose) or as long catenate hairs with cheilocystidioid terminal element (when stipe apex woolly-hairy) or as a mixture of both types. Pileitrama with scarce to abundant refractive hyphae with yellow-brown contents.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees, also in alpine vegetation. Associated with *Pinus*, *Picea*, *Larix*, *Cedrus*, *Abies*, *Fagus*, *Quercus*, *Tilia*, *Corylus*, *Carpinus*, *Betula*, *Populus*, *Alnus*, *Salix repens*, and *Salix retusa*. Widespread in Europe and North America. Common in the Netherlands. (May-) June-Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland, Terschelling, 20.X.1981, *Kuyper* 1964; prov. Gelderland: Beek-Bergh, 27.VII.1952, *Huijsman*; Doetinchem, 28.VIII.1943, *Huijsman*; Neerijnen, 30.VII.1973, *de Kleuver* 73.004, 9.VIII.1980, *Kuyper* 1390, 6.IX.1980, *Kuyper* 1413, 1426 & 1427, 14.X.1980, *Kuyper* 1530 & 1531 & 29.IX.1981, *Vellinga* 417; Ubbergen, 4.X.1980, *Kuyper* 1505; IJsselmeerpolder: Kuinderbos, 6.X.1981, *Kuyper* 1918; Voorsterbos, 8.X.1981, *Kuyper* 1914 & 12.X.1983, *Kuyper* 2470; Bremerberg, 4.X.1981, *Kuyper* 1879; Roggeboezand, 5.VII.1984 & 28.VI.1985, *Tjallingii-Beukers*; prov. Utrecht: Breukelen, 7.VII.1972 & 12.VIII.1972, *Tjallingii-Beukers*; Bunnik, 4.VIII.1981, *Kuyper* 1663; Utrecht, 4.IX.1945, *Huijsman* & 22.VII.1954, *Bas* 534; Vleuten, 13.VIII.1981, *Kuyper* 1680; prov. Noord-Holland: Castricum, 8.IX.1954, *Maas Geesteranus* 10138; Velsen, 22.VIII.1981, *Kuyper* 1694; prov. Zuid-Holland: 's-Gravenhage, 24.VIII.1981, *Kuyper* 1695; Leiden, 8.VI.1960, *Maas Geesteranus* 13079; Oegstegeest, 20.VIII.1981, *Kuyper* 1691 & 2.VIII.1962, *Bas* 2594; Oostvoorne, 18.VIII.1981, *Kuyper* 1689, 28.VI.1972, *Bas* 5836, 14.IX.1960, *Bas* 2273, 21.X.1955, *Bas* 931 & 4.XI.1981, *Kuyper* 2012; Rockanje, 18.VIII.1981, *Kuyper* 1684; Wassenaar, 27.VIII.1978, *Bas* 7304, 14.VIII.1980, *Bas* 7640, 2.IX.1982, *Kuyper* 2149, 23.VII.1981, *Kuyper* 1625, & 7.IX.1952, *Maas Geesteranus* 9001 & 9002; prov. Noord-Brabant: Boxel, 5.IX.1981, *Vellinga* 393; Dorst, 23.VIII.1954, *Bas* 545, 10.VII.1956, *Bas* 1040 & 24.VIII.1968, *Bas* 4994; Ulvenhout, 18.VIII.1959, *Maas Geesteranus* 12912; prov. Limburg: Meerssen, 18.VIII.1982, *Kuyper* 2121; Gronsveld, 5.VIII.1981, *Kuyper* 1664; Tegelen, 6.IX.1954, *Bas* 598 & 24.IX.1961, *Bas* 2449. — AUSTRIA: Tirol, Paznauntal, Ischgl, Madleiner Bach, 13.VII.1960, *Maas Geesteranus* 13095; Kramsach, Zirainer See, 7.IX.1982, *Kuyper* 2162; — BELGIUM: prov. Namur, Olloy-sur-Viroin, 30.IX.1984, *Kuyper* 2621; Resteigne, Bois de Resteigne, 3.IX.1981, *Vellinga* 392. — CZECHOSLOVAKIA: Slovakia, Nižke Tatry, Stanišovská Dolina, 12.IX.1981, *Kuyper* 1759 & 1762. — ENGLAND: Epping Forest, VIII.1886 (holotype of *Agaricus perlatus*, K); Fineshade, 8.VIII.1859, *Berkeley* (holotype of *Agaricus curreyi*, K); co. Northumberland, Ross Links near Alnwick, 22.IX.1971, *Bas* 5851; co. Oxfordshire, Blenheim Park, 31.VII.1965, *Sinnot*. — FARÖES: Frangisvag, Kvallö, 30.VIII.1938, *Möller* (holotype of *Inocybe nana*, C). — FRANCE: dpt. Seine-et-Oise, Yerves, Château de la Grange, 18.VIII.1942, *Romagnesi* 42.59 (authentic material of *I. obsoleta*, herb. Romagnesi); dpt. Seine-et-Marne, Polligny, Forêt de Polligny, 4.VIII.1984, *Vellinga* 603; dpt. Doubs, Lougres, 22.IX.1955, 18.VII.1956, 29.VII.1956, 16.VIII.1956, *Huijsman*; Bois de Sapois, 25.VIII.1945, *Métrod* 1484 & 28.IX.1955, *Métrod* 2885 (herb. Métrod, PC). — GERMANY: Benthheim, Benthheimer Wald, 9.IX.1980, *Schreurs* 478; Eifel, Müllenborn, near Gerolstein, IX.1980, *Kuyper* 1461; Bavaria, Augsburg, Gögginger Wäldchen, 29.VII.1982, *Kuyper* 2059; Augsburg, Siebentisch Wald, 28.VII.1982, *Kuyper* 2046, 2049 & 2054, 3.VIII.1982, *Kuyper* 2094; Augsburg, Siebentisch Park, 2.VIII.1982, *Kuyper* 2080; Augsburg, Wittelsbacher Park, 27.VII.1982, *Kuyper* 2043, 1.VIII.1982, *Kuyper* 2073 & 5.VIII.1982, *Kuyper* 2109, 2114 & 2116; Haspelmoor, 4.VIII.1982, *Kuyper* 2104. — ITALY: prov. Alto Adige: Trento, Desert, 3.VI.1889, *Bresadola* (holotype of *Inocybe umbrinella*, S); Trento, Parco Gocciadoro, 26.IX.1981, *Kuyper*

1848; Trento, Sopramonte, 24.IX.1981, *Kuyper* 1820; Levico, Parco di Levico, 25.IX.1981, *Kuyper* 1832, 1837, 1838 & 1839; Padua, Botanical Garden, 1.X.1981, *Kuyper* 1876; prov. Parma, Santa Donna, 14.IX.1984, *Kuyper* 2542 & 2543. — MOROCCO: Azrou, 22.X.1940, *Malençon* 1031 (holotype of *Inocybe fastigiata* var. *cerina*, MPU); Azrou, 1.XI.1943, *Malençon* 1416 (holotype of *I. orbata*, MPU). — NORWAY: Lillehammer, 23.VIII.1975, *Huijsman*. — SCOTLAND: co. Perthshire, Kindrogan Field Centre, 21.IX.1983, *Kuyper* 2408. — SWEDEN: Femsjö, Hägnen, 11.IX.1975, *Huijsman*; Uppland, Norra Varleda, 2.IX.1973, *Huijsman*. — SWITZERLAND: Kt. Bern, Steingletscher, 21.IX.1984,



Figs. 31–34. *Inocybe rimosa*. — Spores, cheilocystidia (31. from holotype of *I. curreyi*; 32. from holotype of *I. perlata*; 33. from holotype of *I. umbrinella*; 34. from holotype of *I. nana*).

*Kuyper 2575*; Kt. Luzern, Willisau, 17.IX.1984, *Kuyper 2554*; Kt. Vaud, Pont-de-Nant sur Bex, 5.IX.1984, *Kuyper 2517*; Hutwil, 24.VIII.1978, *Huijsman*. — UNITED STATES: Washington, Isle San Juan, 16.VII.1948, *Stuntz 3671* (holotype of *Inocybe holoxantha*, WTU).

Notes: 1. In my opinion there can hardly be any doubt that the species as depicted by Bulliard sub nomine *Agaricus rimosus* (Herb. France: pl. 388. 1789) is identical with the taxon commonly called *I. fastigiata*. The name *I. rimosa*, being sanctioned, has priority over *I. fastigiata*.

2. *Inocybe rimosa*, as circumscribed here, is an extremely variable taxon. It consists of a number of variants, some of which have fairly constant characters, but some intergradation into other variants can be observed. Some of these variants seem to occupy a rather large area, whereas other such variants may represent nothing more than local ecotypes. It seems likely that some variants (e.g. variants with bright yellow colours, known as *I. holoxantha* or *I. fastigiata* var. *cerina*) are of a polyphyletic origin. Considering this variability it seems therefore impossible to give a formal well-founded infraspecific taxonomy of this species.

3. Part of the character variability (e.g. pileal form and development of velipellis) seems to be environmentally determined and therefore devoid of any systematic significance. However, another part of this variability seems to be genetically determined, and could in principle be used for a formal subdivision of the species. My observations indicate that some kind of character displacement takes place, and for that reason sympatric populations are generally more different than populations from geographically more distant areas. Therefore to mycologists who are working on a local scale it would seem that many taxa can be recognised; however, the recognition of such taxa on a more regional scale cannot be maintained.

4. An outline of the character variability and the correlation between different characters shows the following picture:

The form of the pileus ranges from conical, often with a prominent, obtuse to subacute umbo, to plano-convex or applanate and hardly umbonate. In the latter case a velipellis is usually well-developed, whereas in the former case the velipellis is absent or ephemeral. The degree of development of the velipellis is partly determined by the substrate where the specimens are growing, a rather compact soil leading to a well-developed velipellis. Specimens growing on loose soil (e.g. in *Picea*-plantations) are typically highly conical.

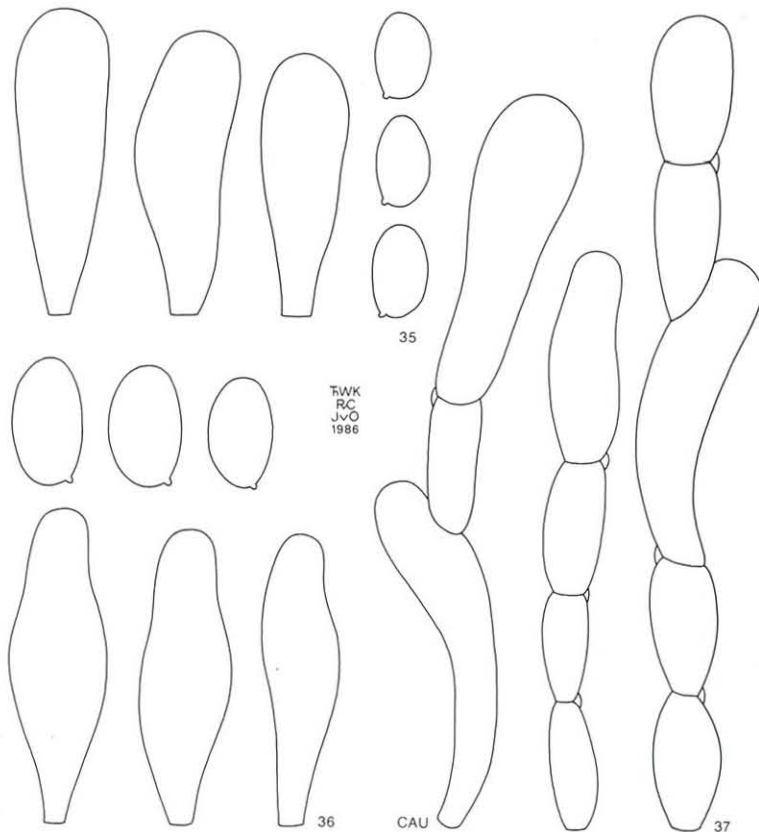
The incrusting pigment of the pileipellis (under the velipellis) becomes more abundant under the influence of exposure. Quite often one encounters young specimens that are rather pale buff all over, growing together with older specimens where the velipellis around the centre of the pileus has disappeared and where the umbo is rather dark brown. Such pale specimens are often referred to *I. obsoleta* or *I. fastigiata* f. *argentata*.

Two main types of stipe-covering can be distinguished, viz. a flocculose apex, consisting of clusters of caulocystidia, and a woolly-hairy apex, consisting of catenate hairs with a cheilocystidioid terminal element. The latter type is mostly encountered in specimens that are conical and prominently umbonate. The flocculose apex of stipe is generally found in specimens that occur in parks and other anthropogenic habitats. However, many intermediates between both types of stipe-covering can be encountered.

Much attention has been given to the presence of olivaceous tinges in the lamellae

as a taxonomic character. Colour of the lamellae is dependent on spore colour, presence of greyish and/or yellowish pigments in the young lamellae and the abundance of yellow-brown refractive hyphae in the hymenophoral trama. Generally speaking it can be stated that the more common these refractive hyphae are, the more distinct is the olivaceous tinge in the lamellae. The yellow pigment can be very conspicuous and such specimens have been described as *I. holoxantha* or *I. fastigiata* var. *cerina*, but this character is too gradual to allow taxonomic separation of these bright yellow variants.

It seems likely that the refractive hyphae contain the olfactory substances of *I.*



Figs. 35–37. *Inocybe rimosa*. — Spores, cheilocystidia, caulocystidioid hairs (35. from authentic material of *I. obsoleta*; 36. from holotype of *I. orbata*; 37. from *Kuyper 2059*).

*rimosa* as specimens with grey lamellae have a rather indistinct smell, whereas specimens with distinctly olivaceous lamellae have a rather strong smell. The fact that specimens referred to *I. obsoleta* are often odourless points in the same direction.

In contrast with the wide variability in macroscopical characters stands the relative uniformity in microscopical characters. There is some variation in spore size and form and dimension of cheilocystidia but this variation is uncorrelated with macroscopical differences.

Spore dimensions are quite constant but specimens from the Alpine Zone and from the coastal dunes (both associated with *Salix* div. spp.) possess somewhat longer and more slender spores. Such variants resemble *I. arenicola* in spore characters but can easily be separated on account of the colour of the pileus, the rather strongly rimose pileipellis, and the distinct smell.

5. Summarising the above picture it seems that four widely distributed variants can be recognised besides a fairly large number of very local variants. Although I wish to emphasise again that these variants do not deserve a formal taxonomic status, they are keyed out as follows:

A. Pileus with well-developed velipellis, whitish when young; lamellae greyish, without olivaceous tinges; smell absent. Variant A (conforming to *I. obsoleta*). (Intermediates between variants A and C have been described as *I. fastigiata* f. *argentata*.)

A. Pileus without well-developed velipellis but sometimes with persisting white patch around centre; lamellae usually olivaceous-tinged; smell usually present.

B. Pileus usually applanate, dark brown. Variant B (conforming to *I. perlata*). (Intermediates between variant B and C have been described as *I. umbrinella*.)

B. Pileus usually conical, ochraceous yellow to ochraceous brown.

C. Stipe at apex flocculose, consisting of clusters of caulocystidia. Lamellae ventricose. Usually in parks and along avenues. Variant C (conforming to *I. rimosa*).

C. Stipe at apex woolly-hairy, consisting of catenate hairs with cheilocystidioid terminal element. Lamellae narrow. Usually in coniferous forests. Variant D (conforming to *I. fastigiata*).

(Intermediates between variant C and D occur not infrequently in Northwestern Europe, less often in Central Europe).

6. It seems likely that incipient speciation takes place in *I. rimosa* but that these variants are not yet sufficiently distinct to be worthy of formal recognition. The occurrence of specimens with intermediate characters probably indicates that genetic exchange between those variants is still possible.

Only *I. arenicola* (R. Heim) M. Bon, *I. squamata* J. Lange, and *I. vinosistipitata* Grund & Stuntz are sufficiently distinct in constant characters without intergradation to be worthy of specific rank. Hitherto no intermediates between *I. rimosa* and these three species have been encountered.

## INOCYBE subgenus INOCYBE

Pleurocystidia present (absent in *I. leptophylla*, but cheilocystidia then crystalliferous), thick-walled and with crystalliferous apex; cheilocystidia of two kinds, both pleurocystidioid cheilocystidia and clavate to spheropedunculate paracystidia present; spores smooth, angular or nodulose, with fairly large apiculus; caulocystidia absent or present over a shorter or longer part of length of stipe; cortina present or absent.

DISTRIBUTION. — Probably 200-300 species, mainly in the Northern Hemisphere, but also occurring in the Neotropics and Palaeotropics.

Notes: 1. Only the smooth-spored species are treated here. The reasons for including *I. lacera* and *I. vulpinella*, and for excluding *I. ambigua* are given on p. 8.

2. The smooth-spored species of subgen. *Inocybe* do not form a monophyletic unit (see p. 22). It seems therefore not meaningful to elaborate on an infrasubgeneric classification. For convenience I recognise two groups on the (informal) level of 'supersection', viz. *Cortinatae* and *Marginatae*. Both groups differ in mode of development and hence absence or presence of a cortina and the nature of stipe covering. This subdivision is also applicable to the species with angular-nodulose spores.

### KEY TO THE SMOOTH-SPORED SPECIES OF SUBG. INOCYBE

1. Cortina present in young specimens; caulocystidia absent or only present in upper 1/3rd of stipe (but sometimes with caulocystidioid hairs in lower half).
2. Spores with a (indistinct) germ-pore.
  3. Stipe yellow. . . . . *I. luteipes*, p. 96
  3. Stipe red-brown, especially in upper part. . . . . *I. subporospora*, p. 95
2. Spores without germ-pore (but sometimes with an apical thinning).
  4. Pileus sericeous-smooth, often somewhat viscid when moist; spores with obtuse apex.
    5. Pileus white, yellowish or violaceous, not reddening. . . . . *I. geophylla*, p. 85
    5. Pileus white, soon reddening with age and/or damage. . . . . *I. whitei*, p. 90
  4. Pileus not sericeous-smooth; spores mostly with (sub)conical apex, but sometimes with indistinctly obtuse apex.
  6. Smell strong, sweet, reminiscent of Peruvian balsam or methyl-cinnamate; context often reddening.
    7. Pleurocystidia lageniform; smell when fresh disagreeable, reminiscent of urin, but as Peruvian balsam on drying. . . . . *I. haemacta*, p. 77
    7. Pleurocystidia fusiform to cylindrical; smell when fresh of Peruvian balsam.
      8. Pleurocystidia fusiform; spores on average more than 6.0  $\mu$ m broad, partly with apical papilla. . . . . *I. fraudans*, p. 78
      8. Pleurocystidia cylindrical; spores on average less than 6.0  $\mu$ m broad, without apical papilla. . . . . *I. tricolor*, p. 81
    9. Stipe discolouring to dark vinaceous red in lower part; pileus dark vinaceous brown.
      9. Stipe not or only faintly reddening; pileus with other colours, often with greenish tinges.
        10. Lamellae very narrow and crowded; pileus recurvately squamulose-subsquarrose; basidiocarps small. . . . . *I. coelestium*, p. 82
        10. Lamellae rather broad, ventricose, not very crowded; pileus smooth or appressedly squamose around disc; basidiocarps rather large. . . . . *I. corydalina*, p. 82

6. Smell different; context only rarely reddening.
11. Pileus and/or stipe discolouring to glaucous green with age.
12. Context strongly reddening; pleurocystidia lageniform. . . . . *I. haemacta*, p. 77
12. Context not reddening; pleurocystidia fusiform, subutriform or subclavate. . . . . *I. aeruginascens*, p. 129
11. Pileus and/or stipe without green tinges.
13. Pileus strongly involute when young, covered with a thick velipellis, at margin often appendiculate-dentate; smell strong, as rotten meat or mortar. . . . . *I. appendiculata*, p. 75
13. Pileus inflexed when young, without conspicuous appendiculate-dentate margin; smell different.
14. Caulocystidia completely absent or only present in a very narrow zone (less than 1/10th of length of stipe).
15. Pleurocystidia completely thin-walled, without double membrane. . . . . *I. leptocystis*, p. 111
15. Pleurocystidia slightly to conspicuously thick-walled, wall 0.5–5.0  $\mu\text{m}$  thick.
16. Spores on average more than 11.0  $\mu\text{m}$  long.
17. Pileus hygrophanous, grey-brown or ochraceous brown when moist, pale grey to almost whitish when dry, strongly fibrillose to squarrose. . . . . *I. impexa*, p. 106
17. Pileus not hygrophanous, not pallescent on drying.
18. Spores partly very slightly angular, not completely smooth; pleurocystidia often mucronate. . . . . *I. lacera*, p. 98
18. Spores smooth, never minimally angular; pleurocystidia not mucronate.
19. Pleurocystidia with bright yellow wall; stipe orange brown to reddish brown. . . . . *I. rufuloides*, p. 109
19. Pleurocystidia with colourless to pale yellowish wall; stipe without orange or reddish tinges.
20. Spores on average 12.2–14.8 x 7.2–7.8  $\mu\text{m}$  with almost obtuse apex. . . . . *I. similis*, p. 107
20. Spores on average 11.0–12.3 x 6.3–6.7  $\mu\text{m}$  with distinctly subconical apex. . . . . *I. abjecta*, p. 120
16. Spores on average less than 10.5  $\mu\text{m}$  long.
21. Pleurocystidia only slightly thick-walled, wall thinner than 0.5(–1.0)  $\mu\text{m}$ .
22. Pileus squarrose to squarrose, yellowish brown, covered with a whitish arachnoid velipellis. . . . . *I. squarrosa*, p. 132
22. Pileus fibrillose to squamulose, without conspicuous arachnoid velipellis.
23. Stipe darkening downwards, brown to blackish brown at base. . . . . *I. melanopus*, p. 115
23. Stipe not darkening in lower half.
24. Stipe pinkish lilac near apex. . . . . *I. huijsmanii*, p. 134
24. Stipe without lilac tinges.
25. Pleurocystidia often flexuose with yellow wall; pileus brown; smell of *Pelargonium*. . . . . *I. obscurabadia*, p. 112
25. Pleurocystidia straight, with colourless wall; pileus yellowish buff to ochraceous buff; smell subspermatic. . . . . *I. albovelutipes*, p. 118
21. Pleurocystidia distinctly thick-walled, wall thicker than 1.0  $\mu\text{m}$ .
26. Spores very small, on average less than 7.5  $\mu\text{m}$  long. . . . . *I. glabripes*, p. 124
26. Spores on average longer, 8.0–10.5  $\mu\text{m}$ .
27. Stipe (and often also young lamellae) with violaceous tinges.
28. Pileus hygrophanous, pallescent on drying.
29. Pileus when moist dark sepiaecous brown, in marginal part with violaceous tinges, dirty ochraceous on drying; lamellae bluish-violaceous when young. . . . . *I. hygrophana*, p. 142
29. Pileus when moist red-brown with an olivaceous tinge, in marginal part without violaceous tinges, olivaceous-ochraceous on drying; lamellae pale buff when young. . . . . *I. ionochlora*, p. 142
28. Pileus not hygrophanous, not pallescent on drying.
30. Smell on drying as leaves of *Pelargonium*; pleurocystidia partly subcapitate.

31. Pileus brown to grey-brown; stipe greyish violaceous for the greater part. . . . . *I. griseolilacina*, p. 133
31. Pileus pale alutaceous or pale café-au-lait; stipe pinkish lilac near apex. . . . . *I. huijsmanii*, p. 134
30. Smell different; pleurocystidia never subcapitate.
32. Pileus at centre recurvately squamulose-squarrose; paracystidia often with brown-incrusted wall. . . . . *I. phaeocomis*, p. 138
32. Pileus at centre smooth to appressedly squamulose; paracystidia mostly colourless.
33. Pleurocystidia lageniform with yellow wall; pileus at margin not rimulose. . . . . *I. amethystina*, p. 135
33. Pleurocystidia fusiform, almost colourless; pileus radially rimulose to subrimulose. . . . . *I. pusio*, p. 147
27. Stipe without violaceous tinges.
34. Stipe in lower half with woolly, appressed (dark) brown scales; pileus with pointed scales. . . . . *I. hystrix*, p. 130
34. Stipe in lower half without woolly scales; pileus without pointed scales.
35. Stipe dark or darkening with age, especially in lower half, becoming (dark) brown.
36. Pleurocystidia partly mucronate. . . . . *I. lacera*, p. 98
36. Pleurocystidia not mucronate.
37. Pleurocystidia cylindrical, often flexuose or constricted subapically. . . . . *I. maculipes*, p. 115
37. Pleurocystidia clavate to cylindrical, never flexuose or constricted subapically.
38. Spores with apical papilla; pleurocystidia cylindrical to cylindric-clavate. . . . . *I. rupestris*, p. 128
38. Spores without apical papilla; pleurocystidia clavate.
39. Apex of stipe with true caulocystidia; pileus with darkening velipellis. . . . . *I. brunneotomentosa*, p. 127
39. Apex of stipe with somewhat differentiated, cylindrical caulocystidioid hairs; pileus covered with a thick, whitish velipellis, often extending over margin. . . . . *I. appendiculata*, p. 75
35. Stipe not darkening with age.
40. Pleurocystidia very small, usually not exceeding 40  $\mu\text{m}$ ; stipe with a (sub)marginate bulb. . . . . *I. cryptocystis*, p. 144
40. Pleurocystidia longer, 50–90(–110)  $\mu\text{m}$ ; stipe never (sub)marginately bulbous.
41. Pileus with distinctly darker centre, two-coloured. . . . . *I. phaeodisca*, p. 122
41. Pileus more or less uniformly coloured, without contrasting darker centre.
42. Pleurocystidia often flexuose in upper part; smell of *Pelargonium*. . . . . *I. obscurabadia*, p. 112
42. Pleurocystidia not flexuose; smell different.
43. Pleurocystidia lageniform, with (bright) yellow wall; pileus becoming recurvately squamulose-subsquarrose around centre. . . . . *I. flocculosa*, p. 159
43. Pleurocystidia cylindrical, fusiform or subutriform, with colourless to pale yellow wall.
44. Lamellae broadly adnate to subdecurrent, olivaceous-tinged. . . . . *I. olivaceobrunnea*, p. 117
44. Lamellae narrowly to broadly adnate, without olivaceous tinges.
45. Pileus dark brown. . . . . *I. griseovelata*, p. 126
45. Pileus pale ochraceous brown to ochraceous buff.
46. Spores on average 8.8–9.3 x 5.0–5.4  $\mu\text{m}$ ; pleurocystidia (42–)46–69 (–74)  $\mu\text{m}$  long. . . . . *I. albovelutipes*, p. 118
46. Spores on average 10.1–10.4 x 5.8  $\mu\text{m}$ ; pleurocystidia 61–87(–94)  $\mu\text{m}$  long. . . . . *I. monochroa*, p. 119
14. Caulocystidia descending to about 1/6th–1/3rd of length of stipe (sometimes with caulocystidioid hairs in lower half).
47. Pileus dark brown to blackish brown, irregularly breaking up concentrically; stipe red-brown to orange-brown. . . . . *I. furfurea*, p. 184

47. Pileus not breaking up concentrically; stipe not red-brown or orange-brown throughout (but often with reddish tinges in upper part).
48. Stipe with violaceous tinges.
49. Pileus hygrophanous; margin not radially rimulose. . . . . *I. hygrophana*, p. 142
49. Pileus not hygrophanous; margin radially rimulose. . . . . *I. pusio*, p. 147
48. Stipe without violaceous tinges.
50. Stipe brown to dark brown in lower half (see under 39).
50. Stipe not (dark) brown in lower half.
51. Pileus and/or stipe with greenish tinges . . . . . *I. aeruginascens*, p. 129
51. Pileus and stipe without greenish tinges.
52. Pleurocystidia (very) small, usually not exceeding 40  $\mu\text{m}$ ; stipe with a (sub)marginate bulb. . . . . *I. cryptocystis*, p. 144
52. Pleurocystidia longer, 50–90  $\mu\text{m}$ ; stipe with or without bulb.
53. Spores on average more than 12.0  $\mu\text{m}$  long.
54. Smell strong, reminiscent of *Amanita phalloides*; velipellis viscid with adhering grains of sand. . . . . *I. serotina*, p. 167
54. Smell absent or indistinctly subspermatic; velipellis without adhering grains of sand.
55. Spores on average 10.8–12.6 x 6.0–6.6  $\mu\text{m}$ , Q = 1.8–2.0 . . . . . *I. inodora*, p. 117
55. Spores on average 12.1–15.5 x 5.5–6.4  $\mu\text{m}$ , Q = 2.1–2.5. . . . . *I. pruinosa*, p. 169
53. Spores on average less than 11.0  $\mu\text{m}$ , long.
56. Spores narrow, on average 8.4–9.7 x 3.8–4.5  $\mu\text{m}$ , remarkably pale; pileus whitish to pale ochraceous, sericeous-smooth. . . . . *I. sambucina*, p. 175
56. Spores not so narrow, on average more than 4.5  $\mu\text{m}$  wide, brown; pileus not both very pale and sericeous-smooth.
57. Spores cylindrical, Q = 2.1; stipe conspicuously longitudinally striate. . . . . *I. grammopodia*, p. 174
57. Spores ellipsoid to elongate,  $\bar{Q} < 2.0$ ; stipe not longitudinally striate.
58. Pleurocystidia (very) large, 15–29  $\mu\text{m}$  wide.
59. Pileus brownish with indistinct velipellis; caulocystidia descending to about 1/6th of length. . . . . *I. frigidula*, p. 165
59. Pileus whitish in centre because of velipellis; caulocystidia descending to half-way of stipe. . . . . *I. inodora*, p. 171
58. Pleurocystidia not so large, usually less than 20(–25)  $\mu\text{m}$  wide.
60. Pileus rather pale, whitish, isabella to (ochraceous) yellow.
61. Lamellae lemon-yellow when young. . . . . *I. xantholeuca*, p. 157
61. Lamellae whitish when young.
62. Stipe under cortinal zone with well-differentiated caulocystidioid hairs (simulating true caulocystidia) but without cauloparacystidia; pleurocystidia on average less than 15  $\mu\text{m}$  wide. . . . . *I. sindonia*, p. 117
62. Stipe without differentiated caulocystidioid hairs under cortinal zone; pleurocystidia on average more than 15  $\mu\text{m}$  wide.
63. Pileipellis covered with a well-developed velipellis.
64. Stipe 6–12 mm thick; wall of pleurocystidia up to 3.0  $\mu\text{m}$  thick; early aestival species. . . . . *I. queletii*, p. 158
64. Stipe 3–7 mm thick; wall of pleurocystidia 1.5–2.0  $\mu\text{m}$  thick; late aestival and autumnal species. . . . . *I. fuscidula*, p. 153
63. Pileipellis not covered with a well-developed velipellis, but sometimes with scattered velar patches around centre.
65. Pileus around centre recurvately squamulose-subsquarrose. . . . . *I. flocculosa*, p. 159
65. Pileus around centre smooth to subtomentose, with age sometimes subsquamulose.
66. Stipe pure white when young, 2–3 mm thick; pleurocystidia with (bright) yellow wall. . . . . *I. auricoma*, p. 145
66. Stipe pale greyish when young, 5–10 mm thick; pleurocystidia with colourless to pale yellow wall. . . . . *I. posterula*, p. 146

60. Pileus (ochraceous) brown to dark brown.
67. Stipe with conspicuous bright yellow tinges.
68. Lamellae whitish when young; spores broad,  $\bar{Q} = 1.4$ , with almost obtuse apex. . . . . *I. luteipes*, p. 96
68. Lamellae sulphur-yellow to safran-yellow when young; spores not so broad,  $\bar{Q} = 1.7$ –1.9, with (sub) conical apex. . . . . *I. flocculosa*, p. 159
67. Stipe without bright yellow tinges.
69. Pileus around centre recurvately squamulose-subsquarrose; pleurocystidia with yellow wall. . . . . *I. flocculosa*, p. 159
69. Pileus around centre smooth to subtomentose, with age becoming subsquamulose; pleurocystidia with colourless wall.
70. Pileus towards margin not radially rimulose.
71. Spores with almost obtuse apex. . . . . *I. subporospora*, p. 95
71. Spores with distinctly conical apex. . . . . *I. nitidiuscula*, p. 150
70. Pileus towards margin radially rimulose to rimose.
72. Pileus shiny; lamellae usually with cream or yellow tinges. . . . . *I. pseudodestructa*, p. 152
72. Pileus dull; lamellae whitish. . . . . *I. fuscidula*, p. 153
- I. Cortina absent in young specimens (but often with remnants of velipellis at margin of pileus); caulocystidia descending to base of stipe (but sometimes scarce in lower 1/3rd, and exceptionally completely lacking there).
73. Pileus whitish to pale creamy buff, conspicuously reddening with age and/or on damage. . . . . *I. godeyi*, p. 182
73. Pileus not reddening with age.
74. Stipe distinctly darkening in lower half, becoming orange-brown, (dark) brown to blackish.
75. Spores very large, on average 13.0–16.0 x 7.3–8.4  $\mu\text{m}$ . . . . . *I. vulpinella*, p. 180
75. Spores smaller, on average 7.8–10.6 x 4.7–6.4  $\mu\text{m}$ .
76. Stipe discolouring to olivaceous black near base, often with raspberry-red tomentum. . . . . *I. tenebrosa*, p. 209
76. Stipe discolouring to orange-brown or dark brown towards base, without olivaceous tinges; tomentum never raspberry-red.
77. Pleurocystidia clavate, partly subutriform to subfusiform; apex of spores almost obtuse; stipe orange-brown. . . . . *I. tjallingtorum*, p. 192
77. Pleurocystidia fusiform to utriform, partly sublageniform; apex of spores conical; stipe dark brown near base. . . . . *I. splendens*, p. 215
74. Stipe not darkening in lower half.
78. Pileus irregularly breaking up concentrically, dark brown to blackish brown; stipe red-brown to orange-brown; pileipellis with short and broad elements . . . . . *I. furfurea*, p. 184
78. Pileipellis not breaking up concentrically; stipe not so dark, when red-brown tinges present, then only in upper part; pileipellis with rather long and narrow elements.
79. Stipe at base with a (sub)marginate bulb.
80. Stipe white to yellowish.
81. Pileus ochraceous yellow to ochraceous brown, without velipellis; smell strong, as *Pelargonium*. . . . . *I. pelargonium*, p. 205
81. Pileus brownish ochraceous to (dark) brown, with conspicuous velipellis with adhering earth; smell reminiscent of *Amanita phalloides* . . . . . *I. splendens*, p. 215
80. Stipe reddish to brownish.
82. Spores on average less than 8.0  $\mu\text{m}$  long; pileus radially rimose at margin (as in *I. asterospora*). . . . . *I. albomarginata*, p. 186
82. Spores on average more than 8.0  $\mu\text{m}$  long; fibrils of pileus less diverging, at margin with closed covering or radially rimulose (as in *I. oblectabilis*).
83. Pileus radially rimulose; spores with distinctly conical apex. . . . . *I. pseudoreducta*, p. 190
83. Pileus with closed covering; spores with almost obtuse apex.
84. Marginate bulb very conspicuous; pileus shiny or dull; wall of pleurocystidia up to 1.0(–1.5)  $\mu\text{m}$  thick. . . . . *I. amblyospora*, p. 188
84. Stipe only with an indistinct marginate bulb; pileus shiny, subviscid when moist; wall of pleurocystidia up to 2.5(–3.0)  $\mu\text{m}$  thick. . . . . *I. leioccephala*, p. 190
79. Stipe equal to clavate, never (sub) marginately bulbous.

85. Caulocystidia cylindrical, often somewhat irregular-flexuose, dissimilar from cheilocystidia. .... *I. hirtelloides*, p. 202
85. Caulocystidia similar to cheilocystidia.
86. Hymenium with smell of bitter almonds.
87. Pleurocystidia clavate, subutriform or subfusiform. .... *I. hirtella*, p. 195
87. Pleurocystidia lageniform; smell of almonds weak. .... *I. muricellata*, p. 199
86. Hymenium without smell of bitter almonds.
88. Spores on average less than 7.5  $\mu\text{m}$  long.
89. Spores very broad, (5.5–)6.0–7.0 x 4.5–5.0  $\mu\text{m}$ ,  $\bar{Q} = 1.3$ ; lamellae lemon-yellow; pileus hazel-brown. .... *I. stangliana*, p. 213
89. Spores less broad,  $\bar{Q} = 1.5$ –1.8; lamellae white, grey or pale yellow; pileus ochraceous yellow to ochraceous brown.
90. Lamellae grey when young; smell indistinct. .... *I. langei*, p. 204
90. Lamellae white to pale yellow when young; smell strong, as *Pelargonium*.  
..... *I. pelargonium*, p. 205
88. Spores on average more than 8.0  $\mu\text{m}$  long.
91. Stipe conspicuously longitudinally striate. .... *I. grammopodia*, p. 174
91. Stipe not conspicuously striate.
92. Pileus whitish to pale sordid ochraceous; velipellis absent or indistinct.
93. Stipe in lower half with true caulocystidia and cauloparacystidia; spores (8.5–)9.0–10.5 x (5.0–)5.5–6.5  $\mu\text{m}$ ; stipe pink to pinkish red. .... *I. roseipes*, p. 213
93. Stipe in lower half with differentiated caulocystidioid hairs without cauloparacystidia; spores 7.0–9.5 x 4.0–5.5  $\mu\text{m}$ ; stipe whitish to yellowish, sometimes with pink tinges at apex. .... *I. sindonia*, p. 177
92. Pileus (ochraceous) yellow to (dark) brown, when paler than with conspicuous, sericeous velipellis.
94. Pileus with conspicuous velipellis.
95. Spores on average more than 11.0  $\mu\text{m}$  long (see under 55).
95. Spores on average less than 10.5  $\mu\text{m}$  long.
96. Pleurocystidia clavate; velipellis without adhering earth. .... *I. ochroalba*, p. 206
96. Pleurocystidia fusiform to utriform; velipellis viscid with adhering earth.  
..... *I. splendens*, p. 215
94. Pileus without conspicuous velipellis.
97. Pleurocystidia cylindrical to (sub)lageniform with pale to bright yellow wall.
98. Spores broad, (8.5–)9.0–10.0 x 6.5–7.5  $\mu\text{m}$ ,  $Q = (1.2)$ –1.3–1.4(–1.5); pleurocystidia cylindrical. .... *I. squamosa*, p. 201
98. Spores less broad, (8.0–)8.5–12.0 x 5.0–6.5(–7.0)  $\mu\text{m}$ ,  $Q = 1.5$ –2.0(–2.1); pleurocystidia (sub)lageniform. .... *I. muricellata*, p. 199
97. Pleurocystidia utriform to fusiform or clavate, when cylindrical then less than 50  $\mu\text{m}$  long and with pale yellow wall.
99. Pleurocystidia clavate. .... *I. ochroalba*, p. 206
99. Pleurocystidia not clavate.
100. Pleurocystidia less than 50  $\mu\text{m}$  long, cylindrical.
101. Habit mycenoid; lamellae yellow when young. .... *I. mycenoides*, p. 210
101. Habit collybioid; lamellae white when young. .... *I. brevicystis*, p. 212
100. Pleurocystidia longer than 50  $\mu\text{m}$ , utriform or fusiform.
102. Pileus with bright, orange-brown tinges. .... *I. vaccina*, p. 218
102. Pileus not so brightly coloured.
103. Smell of *Pelargonium*; pileus and stipe with yellow to ochraceous tinges.  
..... *I. pelargonium*, p. 205
103. Smell different; pileus with red-brown to dark brown tinges.
104. Smell reminiscent of *Tricholoma saponaceum*. .... *I. saponacea*, p. 195
104. Smell indistinct, subspermatric or somewhat acidulous.
105. Stipe pure white, forming a conspicuous contrast with the (dark) brown pileus. .... *I. splendens*, p. 215
105. Stipe yellowish or orange ochraceous.
106. Spores with distinctly conical apex. .... *I. glabrescens*, p. 219
106. Spores with (almost) obtuse apex. .... *I. leiocephala*, p. 190

17. *Inocybe appendiculata* Kühner — Figs. 38–41

*Inocybe appendiculata* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 4. 1955.

*Inocybe piricystis* J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: 201. 1955.

*Inocybe ovoideicystis* Métrod in Bull. trimest. Soc. mycol. Fr. 72: 127. 1956 (inval., Art. 36.1).

*Inocybe pedemontana* Alessio, Iconogr. mycol. 29: 197. 1980 (inval., Art. 37.1).

SELECTED ICONES. — J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: pl. 7, f. 14. 1955 (as *I. piricystis*). — Mos. in Fung. rar. Ic. col. 7: pl. 56b. 1978. — Alessio, Iconogr. mycol. 29: pl. 45. 1980 (as *I. pedemontana*). — Enderle & Stangl in Mitt. Ver. Naturw. Math. Ulm 31: 103. 1981.

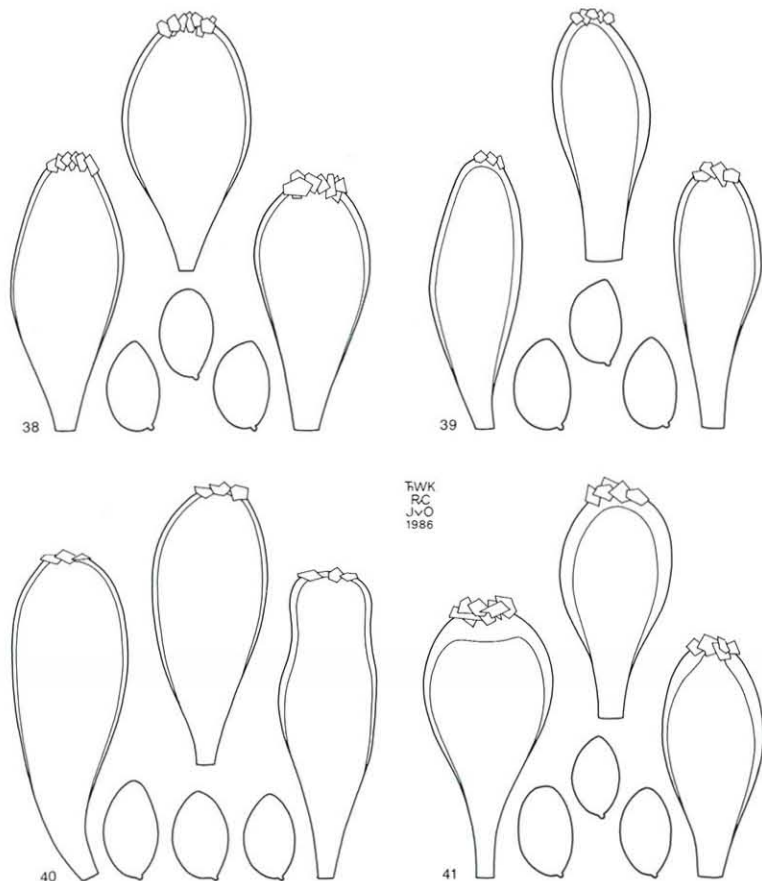
Pileus 6–40 mm, campanulate when young, then convex or plano-convex, finally applanate, young specimens without umbo, then umbonate, with strongly involute margin when young, later at margin dentate-appendiculate, but sometimes only vaguely so, when young almost whitish, then (pale) yellowish buff [10 YR–2.5 Y 7/4] to ochraceous [10 YR 6/6], finally ochraceous brown [7.5 YR 5/4–5/6], sericeous-smooth when young, soon fibrillose, in outer half becoming subsquamulose, slightly breaking up in centre with age and becoming somewhat subsquamose; velipellis present in young specimens, persisting around centre or all over. Lamellae, L = 30–55, l = 1–3, rather crowded, 1–4 mm broad, not ventricose, sometimes subventricose, rather narrowly adnate, white when young, then isabella-brown [10 YR 6/3] to olivaceous-tinged brown [10 YR–2.5 Y 4/3]; edge fimbriate to subflocculose, white. Stipe 14–92 x 2–10 mm, equal to somewhat clavate, not bulbous, solid, white, discolouring to ochraceous or (pale) brown [2.5 Y 7/4–10 YR 6/6, 6/3] especially in lower half, somewhat hairy in apical part, not pruinose, downwards longitudinally fibrillose. Cortina present in young specimens. Context whitish, not discolouring on exposure, with  $\text{NH}_4\text{OH}$  often becoming bright orange to brick-red, finally red-brown. Smell when young spermatric, with age more disagreeable, like rotten meat or mortar, sometimes persisting in exsiccates. Taste somewhat disagreeable-musty.

Spores (7.5–)8.0–11.0(–11.5) x 5.0–6.5  $\mu\text{m}$ , on average 8.3–10.6 x 5.1–6.1  $\mu\text{m}$ ,  $Q = (1.4)$ –1.5–1.8,  $\bar{Q} = 1.5$ –1.7, smooth, subamygdaliform with (sub)conical apex, a minority with indistinct apical papilla. Pleurocystidia (33–)36–56(–58) x 14–22(–23)  $\mu\text{m}$ , broadly to slenderly clavate, thick-walled, wall to 1.5–2.0  $\mu\text{m}$ , colourless to pale yellow, with crystalliferous apex, frequent. Cheilocystidia somewhat more slenderly clavate than pleurocystidia, rather frequent. Paracystidia pyriform to broadly clavate, thin-walled, colourless, frequent. Basidia 24–35 x 8–11  $\mu\text{m}$ , 4-spored. Caulocystidia absent, apex of stipe with differentiated to undifferentiated, cylindrico-clavate to cylindrical caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Predominantly under conifers, sometimes also under frondose trees. Associated with *Picea*, *Quercus*, and *Carpinus*. Widespread and rather common in mountainous regions in Central Europe, also in the alpine zone, much rarer in Northwestern Europe. Rare in the Netherlands, known from 4 localities. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Overijssel, Markelo-Rijssen, 30.VIII.1972, Kramer (WBS); prov. Gelderland, Putten, 28.IX.1954, Reijnders; 1.J.III.1955, Meerpoorders, Roggeboezand, 11.VI.1983, 5.VII.1984, 1.VI.1985, 28.VI.1985 & 3.VIII.1985, Tjallingii-Beukers; prov. Noord-Holland, Castricum, 23.X.1955, Maas Geesteranus 10850. — AUSTRIA: Tirol, Achenwald near Achenkirch, 6.IX.1982, Kuyper 2173. — CZECHOSLOVAKIA: Slovakia, Nižke Tatry, Demanovská Dolina, 10.IX.1981, Kuyper 1747; Nižke Tatry, Stanišovská Dolina, 12.IX.1981, Kuyper 1766. — FRANCE: dpt. Doubs, Forêt de Villers-Chalamont, 8.IX.1975, Romagnesi 75.170 (herb. Romagnesi). — GERMANY: Bavaria, Wellenburg, 4.VIII.1982, Kuyper 2096. — ITALY: prov. Alto Adige, Trento, Parco Gocciadoro, 26. IX.1981, Kuyper 1852. — SWITZERLAND: Sins, 19.VIII.1950, Métrod (authentic material of *I. ovoideicystis*, herb. Métrod, PC); Kt. Graubünden, Val S-charl, Piz Mezdi, alt. 2500 m, 29.VIII.1951, Favre (lectotype of *I. piricystis*, design. Monthoux & Kuyper, G); Kt. Luzern, Willisau, 16.IX.1984, Kuyper 2544.

Notes: 1. The thickness and the rigidity of the velipellis exert an important influence on the colour of the pileus and the appendiculate margin. Under exposed conditions the velipellis is rigid and at margin only slightly appendiculate-dentate. This character has been observed in the very rich collections from the Roggebotzand where also all transitions towards 'typical' *I. appendiculata* have been found. No autonomous status can therefore be given to taxa such as *I. ovoideicystis* Métrod and *I. pedemontana* Alessio.



Figs. 38–41. *Inocybe appendiculata*. — Spores, pleurocystidia (38. from Kuyper 2096; 39. from lectotype of *I. piricystis*; 40. from holotype of *I. ochroleuca*; 41. from authentic material of *I. ovoideicystis*).

2. *Inocybe ochroleuca* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks, N.F.* 5: 201 (1955) comes in its microscopical characters very close to *I. appendiculata* but seems macroscopically different, judging from Favre's description. It might be, however, only a depauperate variant of *I. appendiculata*. Additional collections of this taxon are necessary for a better assessment of its systematic status.

3. As I was unable to determine the dates of effective publication of *I. appendiculata* and *I. piricystis*, I have assumed that Kühner's publication appeared earlier than Favre's.

#### 18. *Inocybe haemacta* (B. & Cooke) Sacc. — Fig. 42

*Agaricus haemactus* B. & Cooke in *Grevillea* 11: 70. 1882. — *Inocybe haemacta* (B. & Cooke) Sacc., *Syll. Fung.* 5: 763. 1887.

*Agaricus corydalinus* var. *roseolus* Pat., *Tab. anal. Fung.* 6: 23. 1886.

*Inocybe haemacta* var. *rubra* Rea, *Brit. Basidiomyc.*: 203. 1922.

SELECTED ICONES. — Cooke, *Hand. Brit. Fungi*: pl. 410 (390). 1884. — Pat., *Tab. anal. Fung.* 6: pl. 553. 1886 (as *Agaricus corydalinus* var. *roseolus*). — J. Lange, *Fl. agar. dan.* 3: pl. 112B. 1938. — Stangl in *Z. Pilzk.* 37: pl. 8. 1971. — Alessio, *Iconogr. mycol.* 29: pl. 25. 1980. — Kobler in *Schweiz. Z. Pilzk.* 61: 78. 1983.

Pileus 14–65 mm, conical when young, soon spreading to conico-convex or plano-convex, finally applanate to even subfundibuliform, when young with subinvolute to inflexed, later straight margin, with or without umbo, with margin sometimes extending over lamellae, exceptionally even subappendiculate, pale isabella-brown, brown-grey to dark brownish grey in outer part, on damage with some reddish patches especially near margin, radially fibrillose

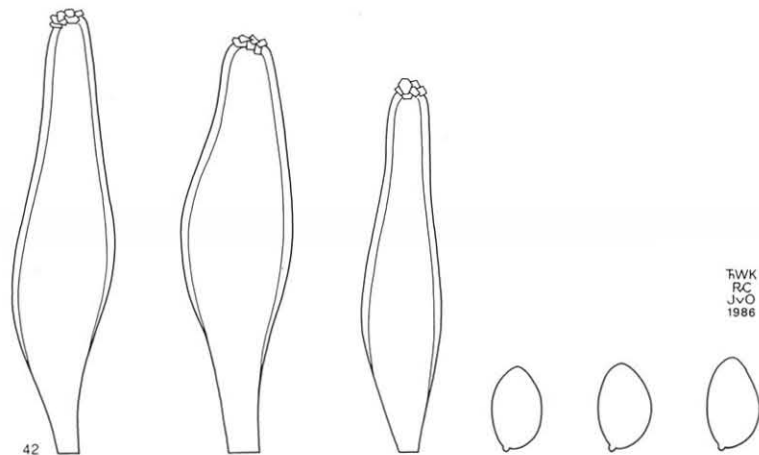


Fig. 42. *Inocybe haemacta*. — Spores, pleurocystidia (from holotype of *I. haemacta*).



with slightly diverging fibrils, at margin (sub)rimulose, later on fibrillose-subsquamous to even subscaaly, at centre greenish grey to dark grey-green because of subtomentose velipellis. Lamellae, L = 45–80, l = 1–3, crowded, 3–7 mm broad, not ventricose to subventricose, (narrowly) adnate to almost free, pale brown [10 YR 6/2, 7/3], then brown, sometimes with an olivaceous tinge [10 YR 5/3, 5/4, 2.5 Y 5/4], with reddish patches where damaged; edge fimbriate to subfloculose, whitish, discolouring on age to red-brown. Stipe 17–83 x 3–8(–10) mm, equal to somewhat broadened below, but exceptionally attenuated downwards, solid, dirty whitish, discolouring to pale or bright pink especially in upper part, at base mostly greyish green, sometimes darkening on age to almost blackish, at apex minutely hairy to subfloculose under lens, downwards longitudinally fibrillose. Context whitish in pileus, pale greenish-greyish in centre, in stipe pale pinkish, but at base greenish to dark greyish green, rapidly or slowly reddening on exposure. Smell strong, unpleasant, reminding of urin, but on drying faintly *I. corydalina*-like (as Peruvian balsam), in one collection without smell. Taste indistinct to somewhat disagreeable.

Spores (8.0–)8.5–11.0(–11.5) x (5.0–)5.5–6.5  $\mu\text{m}$ , on average 9.1–10.3 x 5.7–6.1  $\mu\text{m}$ , Q = 1.5–1.8,  $\bar{Q}$  = 1.6–1.7, smooth, (sub)amygdaliform, with conical apex, not limoniform. Pleurocystidia (55–)57–85(–87) x (13–)14–21(–22)  $\mu\text{m}$ , sublageniform to lageniform, exceptionally slenderly utriform, thick-walled, with wall up to 2.0(–2.5)  $\mu\text{m}$  thick, almost colourless to (very) faintly yellowish, with crystalliferous apex. Cheilocystidia similar to pleurocystidia. Paracystidia clavate, thin-walled, colourless. Basidia 30–39 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia absent or present along a very narrow apical zone (less than 2 mm), similar to cheilocystidia, mixed with some cauloparacystidia.

HABITAT & DISTRIBUTION. — Under deciduous trees on rather nutrient-rich, calcareous soil. Associated with *Quercus* and *Fagus*. Widespread in Europe, rare in the Netherlands in alluvial forests on clay. Sept.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Neerijnen, 29.IX.1982, *Rubers 8917*; prov. Utrecht, Utrecht, 22.IX.1981, *Schreurs 635*; prov. Noord-Holland, Amsterdam, 9.IX.1956 & 22.X.1973, *van der Laan*. — AUSTRIA: Tirol, Angerberg, 10.IX.1982, *Kuyper 2204*. — BELGIUM: prov. Namur, Houyet, 6.X.1982, *Kuyper 2278*. — DENMARK: Fyn, Høgholt, 8.X.1938, *Lange (C)*. — ENGLAND: Credinhill Court, X.1882 (holotype of *I. haemacta*, K). — FRANCE: Haute Savoie, Samoens, 13.IX.1955, *Kühner* (herb. Romagnes). — GERMANY: Eifel, Gerolstein, Felsenhof, 30.IX.1979, *Kuyper 1313*; Bavaria, Kisdendorf, Bubesheimer Wald, 23.IX.1984, *Enderle*; Unterfahlheim, 4.IX.1982, *Enderle*.

### 19. *Inocybe fraudans* (Britz.) Sacc. — Figs. 43–44

*Agaricus fraudans* Britz., *Dermini Südbayern*: 5. 1882. — *Inocybe fraudans* (Britz.) Sacc., *Syll. Fung.* 5: 778. 1887.

*Agaricus indissimilis* Britz. in *Ber. naturw. Ver. Augsburg* 27: 157. 1883. — *Inocybe indissimilis* (Britz.) Sacc., *Syll. Fung.* 5: 778. 1887.

*Inocybe incarnata* Bres., *Fungi trident.* 1: 49. 1884.

*Agaricus albidulus* Britz. in *Ber. naturw. Ver. Augsburg* 28: 153. 1885. — *Inocybe albidula* (Britz.) Sacc., *Syll. Fung.* 5: 767. 1887.

*Agaricus inscriptus* Britz. in *Ber. naturw. Ver. Augsburg* 30: 20. 1890. — *Inocybe inscripta* (Britz.) Sacc., *Syll. Fung.* 11: 54. 1895.

*Agaricus explanatus* Britz. in *Ber. naturw. Ver. Augsburg* 30: 19. 1890. — *Inocybe explanata* (Britz.) Sacc., *Syll. Fung.* 11: 54. 1895.

*Inocybe corydalina* var. *albidopallens* J. Lange, *Fl. agar. dan., taxon. Consp.*: iv. 1940.

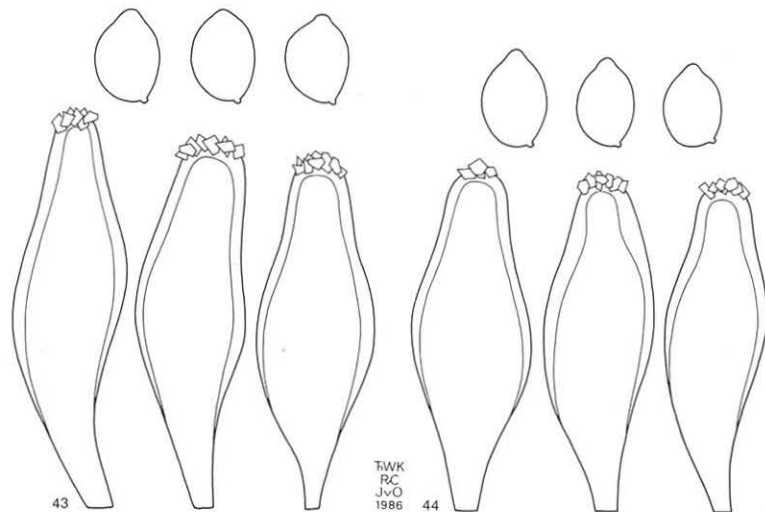
EXCLUDED. — *Inocybe indissimilis* sensu R. Heim, *Genre Inocybe*: 291. 1931 (= *Inocybe spec.*).

MISAPPLIED NAMES. — *Inocybe pyriodora* sensu auct.

*Inocybe erinaceomorpha* sensu Enderle & Stangl in *Mitt. Ver. Naturw. Math. Ulm* 31: 110. 1981.

SELECTED ICONES. — Bres., *Fungi trident.* 1: pl. 53. 1884 (as *I. incarnata*). — Konr. & M., *Iconogr. Fung.* 1: pl. 93 (as *I. pyriodora*), pl. 94 (as *I. pyriodora* subsp. *incarnata*). 1927. — Bres., *Iconogr. mycol.* 15: pl. 728 (as *I. incarnata*), pl. 729 (as *I. pyriodora*). 1930. — J. Lange, *Fl. agar. dan.* 3: pl. 110C. 1938 (as *I. incarnata*). — Alessio, *Iconogr. mycol.* 29: pl. 22 (as *I. pyriodora*), pl. 23 (as *I. pyriodora* var. *incarnata*). 1980. — R. Phillips, *Paddest. Schimm.*: 151. 1981 (as *I. pyriodora*). — Mos. & Jülich, *Farbatl. Basidiomyc.*: pl. 12, f. 1. 1985 (as *I. pyriodora*).

Pileus 19–86 mm wide, campanulate, convex, plano-convex to applanate, with or without umbo, with margin involute or inflexed when young, straight later on, with margin somewhat extending over lamellae and then even appendiculate-subdentate, almost pure white when young because of smooth, sericeous, even greasy-subviscid velipellis, discolouring in outer part to ochraceous, orange ochraceous, orange-brown to brown [7.5 YR 7/6, 7/8, 6/6, 6/8, 5/4, 5/6, 4/4], with velipellis mostly persisting around disc and then centre of pileus therefore remaining white, but velipellis sometimes disappearing and then centre pale brown to brown [10 YR 6/4, 5/4, 7.5 YR 4/4, even to 3/4]; surface becoming felty-fibrillose, sometimes finally cracking and then appressedly to subrecurvately scaly. Lamellae, L = 35–100, l = 1–3, crowded, subventricose or not ventricose, 3–7 mm broad, narrowly adnate to almost free, when young whitish, then pale yellowish grey to yellowish brown [2.5 Y 7/2–3, 2.5 Y 6/3–4, 10 YR 5/4], but with reddish spots in damaged places; edge fimbriate to subfloculose, whitish, but sometimes pale reddish brown. Stipe 22–108 x 3–15 mm, equal to subbulbous, solid, whitish when young, then pale yellow-brown to orange brownish, especially in middle part, discolouring from base upwards via orange ochraceous to brownish red or vinaceous, most conspicuously so at damaged places, hairy at apex (not pruinose), downwards smooth to longitudinally fibrillose. Cortina present when young, leaving no remnants on the stipe.



Figs. 43–44. *Inocybe fraudans*. — Spores, pleurocystidia (43. from holotype of *I. incarnata*; 44. from neotype of *I. fraudans*).

Context whitish at first, discolouring from base upwards to vinaceous red, but only slightly orange-tinged in pileus, with  $\text{NH}_4\text{OH}$  orange to brick-red, then vinaceous to vinaceous black. Smell strong, similar to Peruvian balsam. Taste as smell.

Spores 8.0–11.0(–12.0)  $\times$  5.5–7.5(–8.0)  $\mu\text{m}$ , on average 9.0–10.2  $\times$  6.0–7.1  $\mu\text{m}$ ,  $Q = 1.3$ –1.7,  $\bar{Q} = 1.4$ –1.6, smooth, amygdaliform, with apical papilla. Pleurocystidia (38–)43–70(–83)  $\times$  14–25(–26)  $\mu\text{m}$ , fusiform to fusiform-clavate, a few cylindrical-subfusiform, somewhat thick-walled, with wall up to 2.0–3.0  $\mu\text{m}$  thick, almost colourless to yellowish tinged, at apex with an amorphous mass to somewhat crystalliferous, not abundant. Cheilocystidia similar to pleurocystidia, scarce, sometimes almost lacking. Paracystidia slenderly clavate to spheropedunculate, thin-walled, colourless, (very) abundant. Basidia 28–43  $\times$  8–12  $\mu\text{m}$ , 4-spored. Refractive hyphae abundant in hymenophoral trama, almost hyaline. Caulocystidia absent, at extreme apex with only a few undifferentiated caulocystidioid hairs.

**HABITAT & DISTRIBUTION.** — Under frondose and coniferous trees on nutrient-rich, calcareous soil. Associated with *Fagus*, *Quercus*, *Tilia*, *Picea*, and *Pinus*. Widespread in Europe, not common in the Netherlands on alluvial clay. July–Oct.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Utrecht: De Bilt, 30.VIII.1968, *Arnolds* 327; Breukelen, 9.X.1955, *Maas Geesteranus* 10763, 1.IX.1956, *Daams* & 19.X.1983, *Kuyper* 2490; Utrecht, 31.VIII.1953, *Bas*; Vleuten, 13.VIII.1981, *Kuyper* 1678 & 1681 & 15.X.1981, *Kuyper* 1950; Zeist, 21.X.1984, *Schreurs* 883, 23.VIII.1952 & 29.IX.1953, *Reijnders* & 19.IX.1968, *Arnolds* 319; prov. Zuid-Holland, Ridderkerk, 27.VIII.1977, *Noordeloos* 415 & *Kuyper* 855. — CZECHOSLOVAKIA: Slovakia, Male Fatra, Parmila, 9.IX.1981, *Kuyper* 1729; Slovakia, Nižke Tatry, near Jasna, 11.IX.1981, *Kuyper* 1751. — FRANCE: dpt. Vaucluse, X.1974, *Bas*. — GERMANY: Westfalen, Heiligenkirchen, 12.IX.1972, *Huijsman* 72.178; Teutoburgerwald, Remmighausenerberg, 24.IX.1965, *Bas* 4553; Hessen, Laubach-Schotten, 31.VIII.1967, *Maas Geesteranus* 15111; Bavaria: Augsburg, Haunstetter Wald, 3.VIII.1982, *Kuyper* 2083 (neotype of *I. fraudans*, design. mihi, L; isoneotype BP, H, GZU) & 2095; Augsburg, Siebentisch Wald, 28.VII.1982, *Kuyper* 2047; Augsburg, Gögginger Wäldchen, 29.VII.1982, *Kuyper* 2055 & 2056; Unterfahlheim, 11.X.1980 (M, sub nom. *I. erinaceomorpha*) & 28. IX.1984, *Enderle*. — ITALY: Val di Sole, Terkolasio, VIII.1882, *Bresadola* (holotype of *I. incarnata*, S); prov. Alto Adige, Trento, Sopramonte, 24.IX.1981, *Kuyper* 1817. — SCOTLAND: co. Perthshire, Inver, The Hermitage, 26.IX.1983, *Kuyper* 2432. — SWITZERLAND: Villaret, 11.VIII.1961, *Huijsman*; Kt. Vaud, Pont-de-Nant sur Bex, 7.IX.1984, *Kuyper* 2523.

Notes: 1. As will be explained on p. 232, I consider the name *Inocybe pyriodora* (Pers.: Fr.) Kumm. a nomen dubium. For that reason a new name was needed. The oldest available is based on *Agaricus fraudans* Britz., a name also neotypified by me (see above).

2. Most mycologists have been inclined to recognise two different species based on differences in habit and pileal covering. The name *I. pyriodora* was used for the smaller taxon with a somewhat appressedly scaly pileus, whereas the name *I. incarnata* was used for the robust species with a smooth, even somewhat greasy pileus. However, I came to the conclusion that this character difference is at least partly phenotypically determined. Moreover, too many intermediates were encountered (even in collections found at the same locality in different years) to allow for taxonomic separation of these variants.

3. Variants without or with only a faint smell show less distinct reddening of the context.

## 20. *Inocybe tricolor* Kühner — Fig. 45

*Inocybe tricolor* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 6. 1955.  
SELECTED ICON. — Mos. in Fung. rar. Ic. col. 7: pl. 56c. 1978.

Pileus 38 mm, applanate, with straight margin and a broad obtuse umbo, dark vinaceous brown, paler vinaceous towards margin (colours reminding of *I. adaequata*), fibrillose-subsquamous to squamulose, at margin subrimulose. Lamellae,  $L = 55$ ,  $l = 3$ –7, very crowded, 3 mm broad, not ventricose, adnate, greyish-yellowish; edge flocculose, white, on damage becoming dark vinaceous. Stipe 50  $\times$  5 mm, equal, solid, whitish at apex, downwards soon orange-red to vinaceous red, subpruinose at extreme apex, somewhat fibrillose downwards. Context whitish in pileus, orange-red to dark vinaceous in stipe. Smell of Peruvian balsam. Taste reminding of smell.

Spores (7.0–)7.5–9.0  $\times$  5.0–6.0  $\mu\text{m}$ , average 8.0  $\times$  5.4  $\mu\text{m}$ ,  $Q = 1.4$ –1.6,  $\bar{Q} = 1.5$ , smooth, regular to subamygdaliform, with slightly conical apex. Pleurocystidia (42–)44–57(–60)  $\times$  13–15(–16)  $\mu\text{m}$ , cylindrical to slenderly cylindrico-clavate, only slightly thick-walled, with less than 1.0  $\mu\text{m}$  thick, colourless wall, without crystalliferous apex, scarce, sometimes 1–2-septate. Cheilocystidia similar to pleurocystidia, very scarce. Paracystidia (broadly) clavate, thin-walled, colourless, abundant. Basidia 31–38  $\times$  8–10  $\mu\text{m}$ , 4-spored. Caulocystidia absent, at extreme apex only scattered undifferentiated hairs present.

**HABITAT & DISTRIBUTION.** — Under *Picea abies* on calcareous soil. Very rare in Central Europe, not known from the Netherlands. Sept.

**COLLECTION EXAMINED.** — A U S T R I A: Tirol, Pertisau, Falzthurntal, 6.IX.1982, *Kuyper* 2158.

Note: *Inocybe tricolor* has the same microscopical characters as *I. corydalina* and it also contains psilocybin (cf. Besl & Mack in Z. Mykol. 51: 184. 1985). More collections might eventually show that *I. tricolor* is better regarded as an infraspecific taxon of *I. corydalina*.

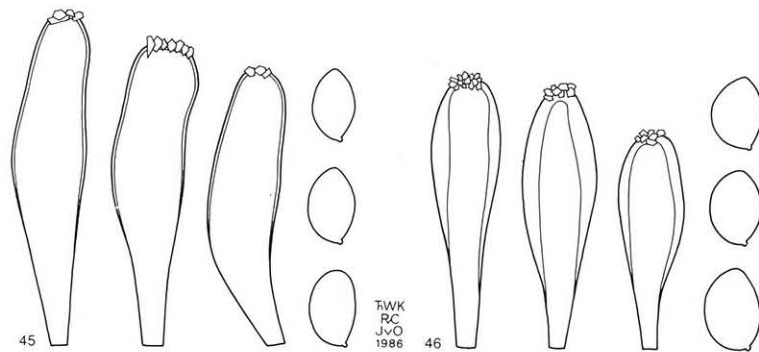


Fig. 45. *Inocybe tricolor*. — Spores, pleurocystidia (from *Kuyper* 2158).

Fig. 46. *Inocybe coelestium*. — Spores, pleurocystidia (from holotype of *I. coelestium*).

21. *Inocybe coelestium* Kuyp. — Fig. 46

*Inocybe coelestium* Kuyp. in Persoonia 12: 479. 1985.

SELECTED ICON. — Stangl & Kuyp. in Z. Mykol. 51: pl. 2, f. C. 1985.

Pileus 15–32 mm, conico-convex, convex to plano-convex, with margin inflexed when young, straight later on, without or with low, broad umbo, not appendiculate at margin, ochraceous brown [10 YR 5/6, 6/6], at centre with (pale) greenish-greyish tinges, sometimes almost whitish around disc, coarsely woolly-felty to recurvately squamulose-subsquarrose, but subtomentose around disc because of velipellis. Lamellae, L = 45–60, l = 3–5, very crowded, very narrow, segmentiform, 1–3 mm broad, rather broadly adnate, yellowish-greyish [2.5 Y 7/3, 7/4], then sordid brown [10 YR 6/4, 5/4]; edge almost even to fimbriate, concolorous to whitish. Stipe 23–52 x 3–5 mm, equal to subbulbous (5–6 mm), solid, at apex white to pale ochraceous, brownish half-way, at base mixed with greenish-greyish tinges, darkening with age and becoming dark olivaceous grey at base, at apex smooth to hairy, not pruinose, downwards with aciferous longitudinal striation or smooth. Context whitish in pileus, brownish with a greyish-greenish tinge in stipe, not reddening on exposure. Smell faint, as of Peruvian balsam, sometimes also with a faint, disagreeable, chemical component.

Spores (7.0–)7.5–9.0(–9.5) x 5.0–6.0(–6.5)  $\mu$ m, on average 7.7–8.5 x 5.5–6.0  $\mu$ m, Q = 1.3–1.6,  $\bar{Q}$  = 1.4–1.5, smooth, subamygdaliform, with subconical apex. Pleurocystidia (29–)31–53(–65) x (10–)11–16(–18)  $\mu$ m, cylindrical, somewhat thick-walled, with wall up to 2.0(–2.5)  $\mu$ m thick, hyaline to very pale yellow, with crystalliferous apex, but sometimes hardly so, moderately abundant. Cheilocystidia identical to pleurocystidia, scarce. Paracystidia (slenderly) clavate, thin-walled, hyaline, abundant. Basidia 25–32 x 8–10  $\mu$ m, 4-spored. Caulocystidia absent, stipe apex with scattered, rather undifferentiated to caulocystidioid hairs, without cauloparacystidia, downwards soon disappearing.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil. Associated with *Fagus* and *Picea*. Rare in Central Europe, not found in the Netherlands. Aug.–Oct.

COLLECTIONS EXAMINED. — A U S T R I A: Tirol, Pertisau, Dristenautal, 6.IX.1982, *Kuyp* 2154. — G E R M A N Y: Bavaria, Haspelmoor, 4.VIII.1982, *Kuyp* 2106; Augsburg, Haunstetter Wald, 3.VIII.1982, *Kuyp* 2088 (holotype of *I. coelestium*, L), 22.IX.1981, *Stangl* (M) & 12.VIII.1982, *Stangl* (M); Augsburg, Gögginger Wäldchen, 20.X.1984, *Stangl* (M).

22. *Inocybe corydalina* Quél.

*Inocybe corydalina* Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 543. 1875.

*Inocybe erinaceomorpha* Stangl & Veselský in Česká Mykol. 33: 72. 1979.

*Agaricus erinaceus* Pers., Mycol. eur. 3: 191. 1828, non *A. erinaceus* Fr. 1828: Fr.

KEY TO THE VARIETIES OF *I. CORYDALINA*

1. Pileus with greenish-greyish, smooth-subtomentose velipellis around disc. . . . var. *corydalina*, p. 83
1. Pileus with appressed dark brown scales, and without greenish-tinged velipellis  
var. *erinaceomorpha*, p. 84

Note: These taxa are regarded here as mere varieties of one species on account of their identical microscopical characters and the common occurrence of psilocybin and baecocystin (cf. Stijve & al. in Persoonia 12: 470. 1985). I have seen at least one collection of var. *erinaceomorpha* with some greenish tinges in the pileus and at the base of the stipe, and for that reason I consider it not unlikely that even the rank of variety is an overestimation of its taxonomic independence.

22.1. *I. corydalina* var. *corydalina* — Fig. 48

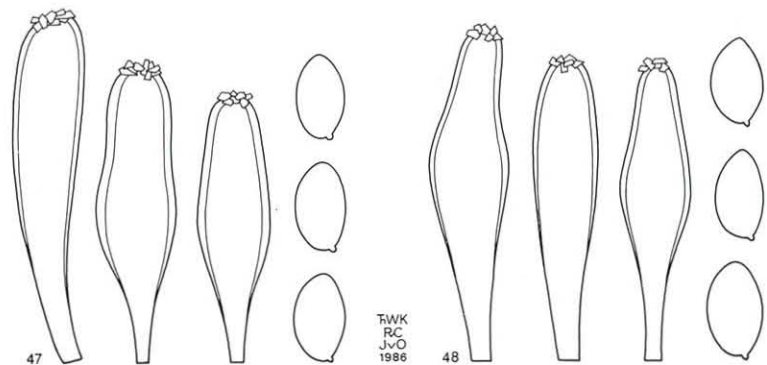
*Inocybe corydalina* Quél.

*Inocybe pyridodora* var. *aerugineoumbonata* Ade in Hedwigia 64: 288. 1923.

*Inocybe corydalina* var. *montana* F. Möller, Fungi Farões 1: 228. 1945.

SELECTED ICONES. — Quél. in Bull. Soc. bot. Fr. 24: pl. 5, f. 10. (1877) 1878. — Bres., Iconogr. mycol. 15: pl. 739. 1930. — Alessio, Iconogr. mycol. 29: pl. 24. 1980.

Pileus 23–90 mm, campanulato-convex, convex, finally plano-convex, umbonate or without umbo, when young with involute to inflexed margin, later with straight margin, when young sometimes subappendiculate at margin, greyish or greenish-greyish around centre, outwards brownish-greyish, sometimes with somewhat darker grey-brown squamules, smooth to subtomentose around disc, but sometimes slightly greasy when moist, outwards radially fibrillose to squamulose, fibrils not or hardly diverging, at margin not (distinctly) rimulose; velipellis present around disc, but sometimes covering pileus completely, and then with glaucous tinges all over. Lamellae, L = 45–70, l = 1–3, (sub)crowded, 3–5 mm broad, ventricose or not, (narrowly) adnate, sometimes almost free, yellowish-greyish or pale yellowish brown; edge indistinctly fimbriate, concolorous or whitish, sometimes reddening on damage but only slowly and faintly so. Stipe 24–95 x 5–12 mm, equal to subbulbous, solid, whitish, then discolouring in lower half to greyish isabella or greyish-brownish ochraceous, at base often with greyish-greenish tinges, at apex almost smooth to indistinctly hairy under lens,



Figs. 47–48. *Inocybe corydalina*. — Spores, pleurocystidia (47. from holotype of *I. erinaceomorpha*; 48. from *Bas 1091*).

downwards smooth to longitudinally fibrillose-striate. Context whitish in pileus and stipe, often glaucous grey at base of stipe, sometimes also at centre of pileus, not or only slowly and indistinctly reddening, with  $\text{NH}_4\text{OH}$  not discolouring. Smell strong, of Peruvian balsam, but somewhat less agreeable than in *I. fraudans*. Taste as smell, but sometimes with a disagreeable component.

Spores (7.0–)7.5–9.5 x 5.0–6.0  $\mu\text{m}$ , on average 7.6–8.9 x 5.2–5.6  $\mu\text{m}$ ,  $Q = 1.4$ –1.8,  $\bar{Q} = 1.4$ –1.6, smooth, subamygdaliform; apex almost obtuse to indistinctly conical. Pleurocystidia (33–)38–62(–67) x (9–)10–20(–21)  $\mu\text{m}$ , cylindrical to cylindrico-clavate, sometimes tending to subfusiform, slightly thick-walled, with wall up to 1.5(–2.0)  $\mu\text{m}$  thick and colourless, in one collection with a yellowish tinge, with minutely crystalliferous apex, rather infrequent. Cheilocystidia similar to pleurocystidia, (very) scarce. Paracystidia (broadly) clavate, thin-walled, colourless, numerous. Basidia 26–35 x 7–10  $\mu\text{m}$ , predominantly 4-spored, a few 2-spored. Hymenophoral trama with colourless to pale greyish-yellowish refractive hyphae. Stipe at apex without true caulocystidia and with only a few slenderly cylindrical, undifferentiated caulocystidioid hairs.

**HABITAT & DISTRIBUTION.** — Under frondose and (less often) under coniferous trees on calcareous soil. Associated with *Fagus*, *Carpinus*, *Quercus*, and *Picea*. Widespread in Europe and North America, rather rare in the Netherlands. Aug.–Oct.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Utrecht: Utrecht, 19.IX.1968, *Arnolds 318*, 5.X.1952, *Reijnders* & 13.X.1981, *Kuyper 1936*; Zeist, 18.VIII.1960, *Bas 2023*, 21.X.1984, *Schreurs 884*, 20.X.1957, *Bas 1324* & 19.IX.1968, *Arnolds 317*; prov. Noord-Brabant, Bostel, 17.IX.1969, *Benjaminen 67.9.20*. — AUSTRIA: Salzburg, St. Georgen am Attersee, Lichtberg, 28.IX.1962, *Bas 2714*; Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2159*. — BELGIUM: prov. Namur, Ave-et-Auffe, Fond d'Auffe, 3.X.1982, *Kuyper 2255*; Resteigne, Bois de Resteigne, 27.IX.1974, *van der Laan*. — FRANCE: dpt. Doubs, Lougres, 16.IX.1956, *Bas 1091*; Oise, Forêt de Hez-Froidmont, 24.IX.1977, *Noordeloos 463*; Pas de Calais, Forêt de Boulogne, 14.X.1973, *Noordeloos 10*. — GERMANY: Teutoburgerwald, Remminghausener Berg, 24.IX.1965, *Bas 4552*; Eifel; Gerolstein, Gerolsteinerwald, 13.IX.1970, *Bas 5361*; Gees, Reisrod, 25.IX.1980, *Kuyper 1499*; Bavaria, Echlichshausen, Bubesheimer Wald, 20.IX.1984, *Enderle*; Unterfahlheim, 4.IX.1982, *Enderle*. — ITALY: prov. Alto Adige, Trento, Parco Gocciadoro, 26.IX.1981, *Kuyper 1849*.

## 22.2. *I. corydalina* var. *erinaceomorpha* (Stangl & Veselsky) Kuyper. — Fig. 47

*Inocybe erinaceomorpha* Stangl & Veselsky. — *Inocybe corydalina* var. *erinaceomorpha* (Stangl & Veselsky) Kuyper in *Personia* 12: 481. 1985. — *Agaricus erinaceus* Pers.

EXCLUDED. — *Inocybe erinaceomorpha* sensu Enderle & Stangl in *Mitt. Ver. Naturw. Math. Ulm* 31: 110. 1981 (= *I. fraudans*).

MISAPPLIED NAME. — *Inocybe scabra* sensu auct.

SELECTED ICONES. — Bres., *Iconogr. mycol.* 15: pl. 726, f. 2. 1930 (as *I. scabra*). — J. Lange, *Fl. agar. dan.* 3: pl. 111G. 1938 (as *I. scabra*). — Stangl & Kuyper in *Z. Mykol.* 51: pl. 2, f. D. 1985.

Pileus 38–52 mm, convex, plano-convex to almost applanate, when young with involute margin, straight later on, margin extending somewhat beyond lamellae, sometimes even denticulate, umbonate or not, dark brown to almost blackish brown at centre, outwards brown to brownish buff, with appressed, polygonal or somewhat irregular scales at centre, towards margin squamulose or fibrillose-subsquamose, with pileipellis later excoriate in outer half; velipellis usually absent, in one collection present but rather indistinct, slightly greenish-tinged grey. Lamellae,  $L = 50$ –75,  $l = 1$ –3, crowded, 3–5 mm broad, subventricose, narrowly adnate, buff, pale brown or pale greyish brown, with minutely fimbriate, concolorous or paler edge. Stipe 39–85 x 5–8 mm, cylindrical or broadened at apex and somewhat tapering

below, at first whitish, then sordid greyish buff or sordid brownish, white at apex, sometimes with reddish tinges, exceptionally with greenish-greyish tinges at base, at apex minutely hairy under lens, downwards indistinctly fibrillose. Context whitish to pale greyish buff, only slightly reddening on exposure. Smell faint to strong, of Peruvian balsam. Taste indistinct.

Spores 7.0–10.0(–10.5) x 5.0–6.0  $\mu\text{m}$ , on average 7.8–9.4 x 5.1–5.8  $\mu\text{m}$ ,  $Q = 1.4$ –1.7(–1.8),  $\bar{Q} = 1.5$ –1.6, smooth, (sub)amygdaliform, with (sub)conical apex. Pleurocystidia (36–)37–64(–70) x 10–16(–18)  $\mu\text{m}$ , cylindrical to slenderly fusiform, thick-walled, with wall up to 2.0  $\mu\text{m}$  thick, colourless to very pale yellow, at apex not or hardly crystalliferous, scarce. Cheilocystidia similar to pleurocystidia, (very) scarce. Paracystidia clavate, thin-walled, hyaline, abundant. Basidia 27–34 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia absent, at extreme apex only some undifferentiated hairs present.

**HABITAT & DISTRIBUTION.** — Under frondose trees, but occasionally also under coniferous trees on calcareous, nutrient-rich soil. Associated with *Fagus*, *Carpinus*, *Quercus*, and *Picea*. Widespread in Europe, rare in the Netherlands on alluvial, clayey soil. Aug.–Oct.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Gelderland, Rheden, 19.VIII.1961, *Bas 2359*; prov. Utrecht: Utrecht, 16.X.1968, *Arnolds 326* & 20.X.1984, *Bas 8346*; prov. Zuid-Holland, Oegstgeest, 16.VIII.1960, *Bas 2015*. — BELGIUM: prov. Namur, Houyet, 6.X.1982, *Kuyper 2277*. — GERMANY: Bavaria, Augsburg, Siebentischpark, 6.IX.1964, *Stangl 345* (holotype of *I. erinaceomorpha*, M); Augsburg, Wittelsbacherpark, 8.IX.1984, *Stangl* (M); Unterfahlheim, 4.IX.1982, *Enderle*; Kissendorf, Bubesheimer Wald, 14.IX.1983, *Enderle*; Eifel, Gerolstein, 24.IX.1966, *Bas 4758*.

## 23. *Inocybe geophylla* (Fr.: Fr.) Kumm.

*Agaricus geophyllus* Fr.: Fr., *Syst. mycol.* 1: 258. 1821. — *Inocybe geophylla* (Fr.: Fr.) Kumm., *Führ. Pilzk.* 78. 1871.

*Agaricus candidus* Batsch, *Elench. Fung. Cont.* 1: 133. 1786, non *A. candidus* Schaeff. 1774, nec *A. candidus* Huds. 1778.

*Agaricus argillaceus* Pers., *Observ. mycol.* 1: 51. 1796. — *Inocybe argillacea* (Pers.) Fay. in *Ann. R. Acad. Agric. Torino* 35: 91. ('1892') 1893.

*Agaricus affinis* Pers., *l.c. Descr. Fung. minus cognit.* 1: 1. 1798. — *Inocybe affinis* (Pers.) Fay. in *Ann. R. Acad. Agric. Torino* 35: 91. ('1892') 1893.

*Agaricus geophyllus* Sow., *Col. Fig. English Fungi* 2: 4. 1799, non *A. geophyllus* Fr. 1821: Fr. *Agaricus geophilus* Pers., *Syn. meth. Fung.*: 340. 1801 (illeg., nom. superfl. for *A. affinis* Pers.).

*Agaricus albus* Schum., *Enum. Plant. Saellandia* 2: 309. 1803, non *A. albus* Schaeff. 1774: Fr. *Agaricus geophilus* Bull., *Herb. France*: pl. 522, f. 2. 1791 (inval., Art. 32.1 and Note 1). — *Agaricus geophilus* Bull. ex Bull. in *Ventenat, Hist. Champ.*: 546. 1812, non *A. geophilus* Pers. 1801.

*Agaricus sterilis* Jungh. in *Linnaea* 5: 404. 1830.

*Agaricus clarkii* B. & Br. in *Ann. Mag. Nat. Hist. Ser. IV*, 11: 340. 1873. — *Inocybe clarkii* (B. & Br.) Sacc., *Syll. Fung.* 5: 784. 1887.

*Agaricus geophyllus* var. *lilacinus* Peck in *Ann. Rep. N.Y. State Mus.* 26: 90. 1874 — *Inocybe lilacina* (Peck) C.H. Kauffm., *Agaricaceae Michigan* 1: 466. 1918.

*Tricholoma cystidiosum* A.H. Smith in *Mycologia* 33: 14. 1941. — *Inocybe cystidiosa* (A.H. Smith) Sing. in *Lilloa* 22: 534. ('1949') 1951.

**Nomenclatural note:** The extensive synonymy bears witness of the convoluted history of the correct name of this species. First of all it should be noted that the epithets *geophilus* and *geophyllus* are not to be considered as orthographic variants as they have a completely different meaning: *geophilus* meaning earth-loving, *geophyllus* meaning lamellae being earth-coloured.

Bulliard (*Herb. France*: pl. 522, f. 2. 1791) illustrated the white variety of this

species under the name *Agaricus geophilus*. As only a macroscopical illustration without details aiding identification (Art. 42.2 & 44.2) was provided, this name is invalid. The next author referring to that species was Sowerby (Col. Fig. English Fungi 2: 4. 1799) who depicted the violaceous variety and provided a formal diagnosis under the name *A. geophyllus*. As noted above, this epithet is not an orthographic error of Bulliard's name, and Sowerby's species must therefore be typified with the violaceous variety.

Persoon (Syn. meth. Fung.: 340. 1801) referred to Sowerby's violaceous taxon, which he had formerly described as *Agaricus affinis*, but preferred to use the epithet *geophilus*. The name *Agaricus geophilus* Pers. is clearly illegitimate, being a superfluous name change for *A. affinis*. However, this Persoonian name barred the legitimacy of *A. geophilus* Bull. in Ventenat (Hist. Champ.: 546. 1812), intended as a validation of *A. geophilus* Bull. 1791, and typified by the white variety.

This Gordian knot was finally cut by Fries (Syst. mycol. 1: 258. 1821 and Elench. Fung. 1: 33. 1828), who sanctioned the name *A. geophyllus*, and typified it with the white variety. He made even explicit that his use of the epithet *geophyllus* for the taxon typified by Bulliard's white variety was not a mistake, but a deliberate choice, as he felt that the epithet should express the earth-colour of the lamellae. As Fries's name *A. geophyllus* is sanctioned, the name *A. geophyllus* Sow. must be rejected as it is a homonym of the Friesian name.

Summarizing the above, it can be concluded that *Agaricus geophyllus* is the correct name, that the epithet must be ascribed to Fries solely, and that the species must be typified by Bulliard's illustration (pl. 522, as *A. geophilus*).

#### KEY TO THE VARIETIES OF *I. GEOPHYLLA*

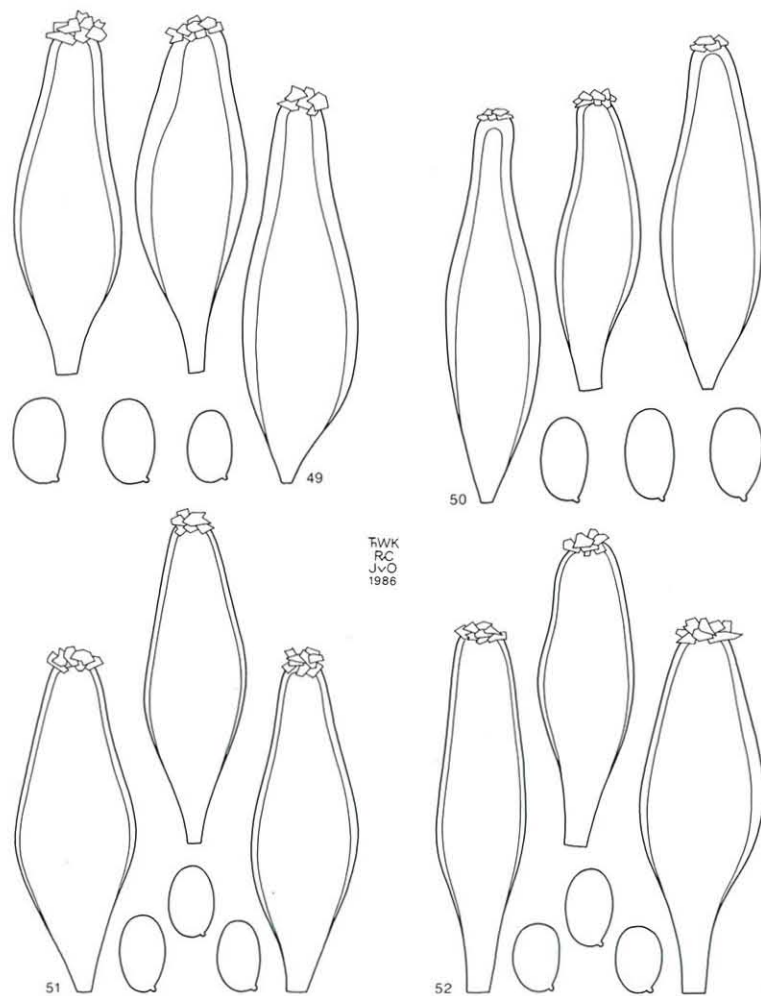
1. Pileus when young pure white, with age sometimes discolouring to pale buff to yellowish.  
var. *geophylla*, p. 86
1. Pileus when young pale to bright violaceous (except umbo which is yellowish), pallescent with age.....var. *lilacina*, p. 89

Notes: 1. It seems likely that both varieties differ only in one allele of the same gene. The character has been found to be constant within basidiocarps originating from the same mycelium.

2. The name *Inocybe cystidiota* (A.H. Smith) Sing. refers to an albinistic variant of this species. I studied the holotype (United States, Oregon, McKenzie Pass, 23.X.1937, A.H. Smith 8118, MICH) and I could not discover any difference with *I. geophylla* except with regard to the colourless spores.

#### 23.1. *I. geophylla* var. *geophylla* — Figs. 49–51

*Agaricus geophyllus* Fr.: Fr. — *Agaricus candidus* Batsch — *Agaricus argillaceus* Pers. — *Agaricus albus* Schum. — *Agaricus geophilus* Bull. ex Bull. in Ventenat — *Agaricus clarkii* B. & Br.  
*Inocybe geophylla* f. *magna* Killerm. in Denkschr. bayer. bot. Ges. Regensburg 16: 113. 1925.  
*Inocybe geophylla* f. *alba* Hruby in Hedwigia 70: 277. 1930.



Figs. 49–52. *Inocybe geophylla*. — Spores, pleurocystidia (49, from holotype of *I. cystidiota*; 50, from holotype of *I. clarkii*; 51, from Kuyper 1594; 52, from Kuyper 1771).

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 100 (pro parte). 1928. — Bres., Iconogr. mycol. 16: pl. 752 (pro parte). 1930. — Alessio, Iconogr. mycol. 29: pl. 27. 1980. — R. Phillips, Paddest. Schimm.: 151. 1981.

Pileus 9–35 mm, campanulate, conical or convex and with margin slightly inflexed when young, spreading, finally plano-convex to almost applanate, without umbo or with broad, obtuse umbo, sometimes even prominently umbonate, initially almost pure white, but on age sometimes discolouring to pale buff, isabella-brown or ochraceous, yellowish tinges more conspicuous around centre, sericeous-smooth to sericeous-fibrillose, at margin not rimulose, subviscid when moist; no velipellis observed. Lamellae, L = 25–55, l = 1–3, moderately crowded, 2–4 mm broad, ventricose or not, narrowly adnate to almost free, almost white when young, finally greyish-yellowish or yellowish-brownish; edge fimbriate, white. Stipe 13–52 x 1.5–5 mm, equal, clavate to subbulbous (to 6 mm), but never marginately bulbous, solid, whitish, at base sometimes buff to pale ochraceous yellow, at apex pruinose to hairy-pruinose, downwards almost smooth to longitudinally fibrillose. Cortina present in (very) young specimens, but leaving no remnants on the stipe. Context whitish. Smell and taste spermiatic.

Spores (7.0–)7.5–10.5 x 4.5–6.0  $\mu\text{m}$ , on average 8.0–9.3 x 4.7–5.7  $\mu\text{m}$ , Q = 1.5–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, regular to subamygdaliform, with obtuse apex. Pleurocystidia (38–)41–74(–76) x 10–21(–25)  $\mu\text{m}$ , (sub)utriform, sometimes cylindrical, thick-walled, with up to 2.0  $\mu\text{m}$ , colourless to faintly yellowish tinged wall, with crystalliferous apex, frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia clavate to pyriform, thin-walled, colourless, frequent. Basidia 22–33 x 7–11  $\mu\text{m}$ , 4-spored. Caulocystidia present at extreme apex, similar to cheilocystidia and mixed with a few cauloparacystidia, sometimes completely lacking, below with an intermediate zone of undifferentiated to slightly differentiated caulocystidioid hairs, sometimes descending to 1/3rd from apex.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on somewhat calcareous and/or nutrient-rich soil, but not strongly calciphilic. Associated with *Quercus*, *Fagus*, *Carpinus*, *Tilia*, *Betula*, *Picea*, *Pinus*, and *Larix*. Common and widespread in Europe and North America, common in the Netherlands. June–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland: Dokkum, 27.IX.1969, Wisman; Terschelling, 23.X.1981, *Kuyper* 1980; prov. Overijssel, Duurse Waarden, 9.X.1977, Piepenbroek 1046; IJsselmeerpolder, Roggebotzand, 9.X.1981, *Kuyper* 1908; prov. Utrecht, Linschoten, 31.VIII.1951, *Maas Geesteranus* 7766 & 20.IX.1951, *van der Voo* 48; prov. Noord-Holland: Egmond Binnen, 23.IX.1982, *Kuyper* 2235; Velsen, 19.XI.1976, *Kits van Waveren*; prov. Zuid-Holland: Leiden, 30.V.1981, *Kuyper* 1573, 30.VI.1981, *Kuyper* 1594 & 14.VIII.1960, *Maas Geesteranus* 13247; Oegstgeest, 15.IX.1982, *Bas* 7934; Rockanje, 7.X.1980, *Kuyper* 1522; Warmond, 28.VII.1973, *Bas* 6035 & 6036; prov. Noord-Brabant: Breda, 4.X.1936, *Huijsman* 1450; Chaam, 29.IX.1959, *Maas Geesteranus* 13010; Nuenen, 27.X.1980, *Kuyper* 1556; prov. Limburg, Gronsveld, 5.VIII.1981, *Kuyper* 1665. — AUSTRIA: Tirol, Roskogel, alt. 1900 m, 7.IX.1982, *Kuyper* 2166. — BELGIUM: prov. Namur, Houyet, 6.X.1982, *Kuyper* 2275; Nieuw Moresnet, Castle Emmaburg, 3.X.1964, *van Brummelen* 1794. — CZECHOSLOVAKIA: Bohemia, Karlštejn, Srbsko, 7.IX.1981, *Kuyper* 1724; Slovakia, Nižke Tatry, near Jasna, 10.IX.1981, *Kuyper* 1735, 1739 & 1750; Moravia, Brno, Hadyberg, IX.1924 (authentic material of *I. geophylla* f. *alba*, K). — ENGLAND: co. Bedfordshire, Odell Great Wood, 27.IX.1953, *Dennis*; co. Surrey, Boxhill, 23.IX.1963, *Pegler*; Street, X.1871, *Clarke* (holotype of *I. clarkii*, K). — FRANCE: dpt. Doubs, Lougres, 23.IX.1956, *Bas* 1125; Pas de Calais, Boulogne sur Mer, Bois de Boulogne, 14.X.1973, *Noordeloos*; Forêt Hardelet, 16.X.1973, *Noordeloos*. — GERMANY: Oldenburg, Jeverland, 25.VIII.1962, *Bas* 2644; Heiligenkirchen, IX.1972, *Huijsman*; Eifel, Gerolstein, Gindorf, 26.IX.1980, *Jansen*. — HUNGARY: Salgótarján, near Borosbényen, 13.IX.1981, *Kuyper* 1774. — ITALY: prov. Alto Adige: Trento, Sopramonte, 24.IX.1981, *Kuyper* 1818, 1819 & 1825; Levico, Levico Parco, 25.IX.1981, *Kuyper* 1835; Trento, Villazano, 28.IX.1981, *Kuyper* 1860 & 1867. — NORWAY: Akershus, Jar, along Lysaker, 11.IX.1961, *Maas Geesteranus* 13750; Telemark, Bamble, Sundby Kasa, 27.IX.1981, *Weholt*. —

SWEDEN: Småland, Femsjö, Grytskedsängen, 19.IX.1943, *Lundell* (Fungi exsiccati suecici 2304, PC); Uppland, Uppsala, 11.X.1938, *Lundell & Smith* (Fungi exsiccati suecici 911, as *I. sindonia*, PC). — SWITZERLAND: Kt. Vaud, Pont-de-Nant sur Bex, 5.IX.1984, *Kuyper* 2516. — UNITED STATES: Michigan, Cheboygan Co., Maple River near Burt Lake, 19.VII.1963, *Bas* 3361; Cheboygan Co., Hermit Bog near Burt Lake, 22.VII.1963, *Bas* 3401.

Notes: 1. Old specimens sometimes become slightly hygrophanous and then show some striation at the margin of the pileus. No taxonomic value can be given to this character.

2. Young specimens of *I. whitei* (B. & Br.) Sacc. f. *armeniaca* (Huijsman) Kuyp. are not always separable from *I. geophylla* var. *geophylla*, although a prominent and even subacute papilla is almost always indicative of the former species.

3. *Inocybe posterula* (Britz.) Sacc. differs from yellowish variants of *I. geophylla* var. *geophylla* in being more robust, having spores with a somewhat subconical apex and more thick-walled pleurocystidia. The covering of the stipe is also somewhat different.

4. *Inocybe phaeodisca* var. *geophylloides* Kühner has a somewhat more radially rimose pileus and spores with a conical apex.

### 23.2. *I. geophylla* var. *lilacina* (Peck) Gillet — Fig. 52

*Agaricus geophyllus* var. *lilacinus* Peck in Ann. Rep. N.Y. State Mus. 26: 90. 1874. — *Inocybe geophylla* var. *lilacina* (Peck) Gillet, Hyménomycetes: 520. 1876. — *Inocybe lilacina* (Peck) C.H. Kauffm., Agaricaceae Michigan 1: 466. 1918.

*Agaricus affinis* Pers. — *Agaricus geophyllus* Sow. — *Agaricus geophilus* Pers. — *Agaricus sterilis* Jungh.

*Agaricus geophilus* var. *violacea* Pat., Tab. anal. Fung. 6: 21. 1886. — *Inocybe geophylla* var. *violacea* (Pat.) Sacc., Syll. Fung. 5: 785. 1887.

*Inocybe geophylla* var. *amethystina* Over. in Meded. Ned. mycol. Ver. 11: 125. 1921.

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 100 (pro parte). 1928. — Bres., Iconogr. mycol. 16: pl. 752 (pro parte). 1930. — J. Lange, Fl. agar. dan. 3: pl. 112G. 1938. — Alessio, Iconogr. mycol. 29: pl. 28, f. 1, 2. 1980. — R. Phillips, Paddest. Schimm.: 151. 1981.

Pileus 16–25 mm, campanulate, conical to convex, finally plano-convex, with or without umbo, sometimes rather prominently umbonate, violaceous [17 E 2–3 to 19 A–B 2], especially when young, discolouring and pallescent with age to very pale violaceous grey, sometimes finally even without violaceous tinges, around centre persistently yellowish-brownish to ochraceous, sericeous-smooth, outwards sericeous-fibrillose, at margin not rimulose, somewhat viscid when moist. Lamellae, L = 25–45, l = 1–3, moderately crowded, 2–5 mm broad, ventricose or not, narrowly adnate to almost free, violaceous when young, but violaceous tinges soon disappearing, then yellowish-greyish to yellowish-brownish; edge fimbriate, sometimes subflocculose, whitish. Stipe 21–37 x 2.5–4 mm, equal to slightly clavate (to 5 mm), not bulbous, solid, (pale) violaceous when young, concolorous with pileus, but at base ochraceous, at apex pruinose to hairy-pruinose to 1/3rd of length of stipe downwards, below smooth to indistinctly fibrillose. Cortina present in young specimens. Context pale violaceous to whitish. Smell and taste spermiatic.

Spores (7.0–)7.5–10.5 x 4.5–6.5  $\mu\text{m}$ , on average 8.0–9.9 x 4.8–5.9  $\mu\text{m}$ , Q = 1.5–1.8,  $\bar{Q}$  = 1.6–1.7, smooth, regular, sometimes subamygdaliform, with obtuse apex. Pleurocystidia (41–)42–69(–70) x (11–)12–21(–22)  $\mu\text{m}$ , (sub)utriform to (sub)utriform, sometimes more cylindrical, thick-walled, with up to 2.0(–3.0)  $\mu\text{m}$ , (almost) colourless wall, apex crystalliferous,

frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia pyriform to clavate, thin-walled, colourless, frequent. Basidia 22–29 x 7–10  $\mu\text{m}$ , 4-spored. Stipe at extreme apex with true caulocystidia similar to cheilocystidia mixed with a few cauloparacystidia, soon forming an intermediate zone of undifferentiated to differentiated caulocystidioid hairs descending at most to 1/3rd from apex.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees, ecologically identical with var. *geophylla*. Widespread in Europe and North America, in the Netherlands somewhat less common than var. *geophylla*. June–Oct.

COLLECTIONS EXAMINED: — NETHERLANDS: prov. Friesland, Terschelling, 21.X.1981, *Kuyper 1973* & 23.X.1981, *Kuyper 1986*; prov. Gelderland: Gorsseel, 30.IX.1951, *Maas Geesteranus 8026*; Neerijnen, 14.X.1980, *Kuyper 1535*; Valburg, 25.IX.1954, *Bas 653*; prov. Utrecht, Linschoten, 20.IX.1951, *van der Voo 47*; prov. Zuid-Holland: Leiden, 14.VIII.1960, *Maas Geesteranus 13248* & 14.IX.1952, *Maas Geesteranus 9030*; Rockanje, 18.VIII.1981, *Kuyper 1687*; Wassenaar, 30.X.1955, *Bas 953*; prov. Limburg, Gronsveld, 26.X.1958, *Bas 1641*. — AUSTRIA: Tirol, Paznauntal, Ischgl-Mathon, 14.VII.1960, *Maas Geesteranus 13139*. — BELGIUM: prov. Luxembourg, Daverdisse, Barbouillon, 4.X.1982, *Kuyper 2272*. — ENGLAND: co. Bedfordshire, Odell Great Wood, 27.IX.1953, *Dennis*. — FRANCE: Pas de Calais, Boulogne sur Mer, Forêt de Boulogne, 14.X.1973, *Noordeloos 11*. — HUNGARY: Salgótarján, Borosberény, 13.IX.1981, *Kuyper 1771*. — NORWAY: Akershus, Jar, along Lysaker, 11.IX.1961, *Maas Geesteranus 13751*. — SWEDEN: Stockholm, near University, 9.IX.1977, *van der Laan*. — SWITZERLAND: Planeyse, 16.IX.1968, *Huijsman*; La Chau-d'abel, 22.IX.1969, *Huijsman*.

Note: The intensity of the violaceous tinges of the basidiocarp is quite variable and partly age-dependent. Variants differing only in colour intensity therefore do not deserve a formal taxonomic rank.

#### 24. *Inocybe whitei* (B. & Br.) Sacc.

*Agaricus whitei* B. & Br. in Ann. Mag. Nat. Hist., Ser. IV, 17: 131. 1876. — *Inocybe whitei* (B. & Br.) Sacc., Syll. Fung. 5: 790. 1887.

*Agaricus flavidolilacinus* Britz., Hymenomyc. Südbayern: 7. 1891. — *Inocybe flavidolilacina* (Britz.) Sacc., Syll. Fung. 11: 53. 1895.

*Inocybe pudica* Kühner in Ann. scient. Franche-Comté 2: 26. 1947.

*Inocybe armeniaca* Huijsman in Bull. mens. Soc. Linn. Lyon 43(No spéc.): 201. 1974.

#### KEY TO THE FORMS OF *I. WHITEI*

- Habit robust; pileus 22–35 mm, without umbo or with a broad conical umbo; stipe 40–81 x 2.5–8 mm; pleurocystidia usually with bright yellow wall.....f. *whitei*, p. 91
- Habit slender; pileus 8–32 mm, with a prominent, even subacute papilla; stipe 18–57 x 1.5–5 mm; pleurocystidia usually with colourless wall.....f. *armeniaca*, p. 93

Note: Intermediates between both taxa occur both in Europe and North America (cf. Bruylants in Bull. trimest. Soc. mycol. Fr. 68: 369. (\*1952\*) 1953), but in most cases the collections can easily be referred to one of those forms. Both forms seem to be parapatric in Europe with only a small zone of contact, where occasional mixing may occur.

#### 24.1. *I. whitei* f. *whitei* — Figs. 53–56

*Agaricus whitei* Berk. & Br. — *Agaricus flavidolilacinus* Britz. — *Inocybe pudica* Kühner.

*Agaricus geophyllus* var. *lateritius* B. & Br. in Ann. Mag. Nat. Hist., Ser. IV, 6: 466. 1870. — *Inocybe geophylla* var. *lateritia* (B. & Br.) W.G. Smith, Syn. Brit. Basidiomyc.: 141. 1908.

*Inocybe geophylla* f. *perplexa* C.H. Kauffm. in Pap. Mich. Acad. Sci. 5: 134. 1925.

EXCLUDED. — *Inocybe geophylla* var. *lateritia* sensu J. Lange, Fl. agar. dan. 3: 76, pl. 112E. 1938 (= *I. whitei* f. *armeniaca*).

*Inocybe geophylla* f. *perplexa* sensu Huijsman in Bull. mens. Soc. Linn. Lyon 43 (No spéc.): 201. 1974 (= *I. whitei* f. *armeniaca*).

MISAPPLIED NAMES. — *Inocybe trinii* sensu Rick., Blätterpilze: 105. 1911.

*Inocybe rubescens* sensu J. Lange, Fl. agar. dan. 3: 76, pl. 112H. 1938.

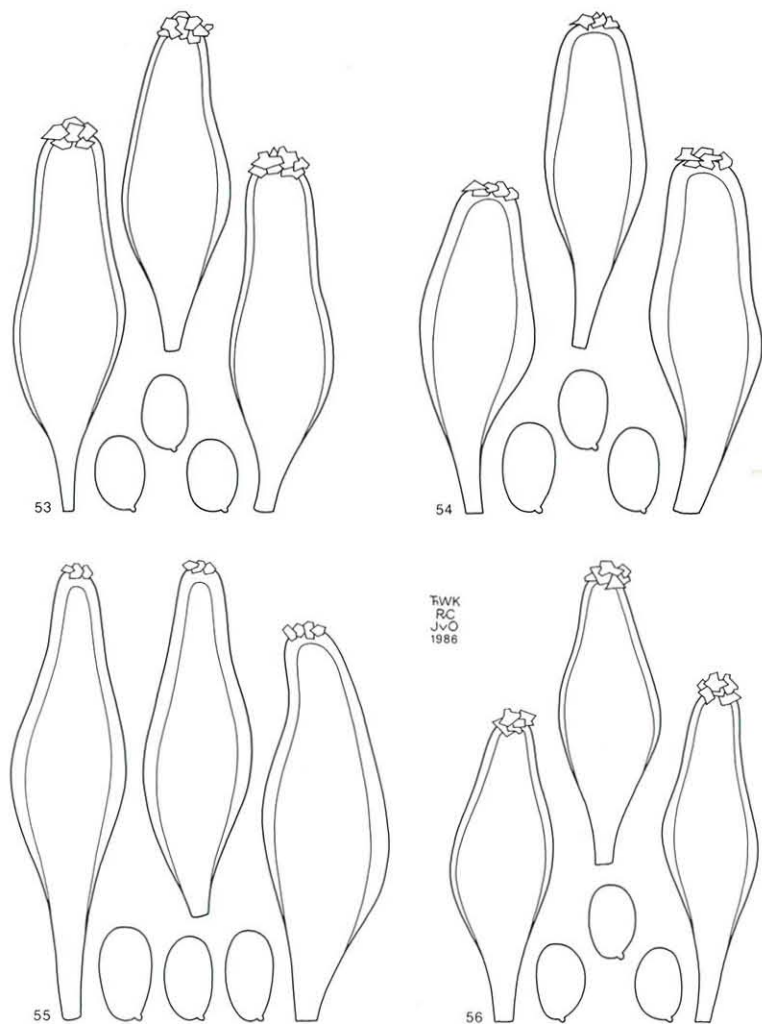
SELECTED ICONES. — Rick., Blätterpilze: pl. 30, f. 3. 1911 (as *I. trinii*). — J. Lange, Fl. agar. dan. 3: pl. 112H. 1938 (as *I. rubescens*). — Alessio, Iconogr. mycol. 29: pl. 26, f. 2. 1980 (as *I. pudica*). — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 11, f. 1. 1985 (as *I. pudica*).

Pileus 22–35 mm, when young acutely conical with inflexed margin, later plano-convex with pronounced to even highly conical umbo, finally appanate, without or with rather low, broad umbo, margin at first subappendiculate, whitish when young, discolouring to brick-pink or orange-red [7.5 YR 7/6, 5 YR 6/6, 2.5 YR 6/8], sericeous-fibrillose all over, fibrils not diverging, at margin not rimulose, somewhat greasy when moist, somewhat shiny. Lamellae, L = 40–60, l = 1–3, moderately crowded, 3–6 mm broad, not ventricose to subventricose, narrowly adnate to almost free, whitish to pale clay when young, then ochraceous brown [10 YR 5/4]; edge fimbriate, whitish. Stipe 40–81 x 2.5–8 mm, somewhat swollen to subbulbous at base (to 10 mm), but never marginately bulbous, solid, white when young, discolouring to pinkish or pale orange-red (somewhat paler than pileus), pruinose to slightly hairy in upper 1/3rd part, below sericeous-fibrillose. Cortina present in young specimens, leaving no remnants on the stipe. Context whitish, discolouring to pinkish or orange, especially in stipe. Smell and taste spermatric.

Spores (7.5–)8.0–9.5(–10.0) x 4.5–5.5  $\mu\text{m}$ , on average 8.1–9.1 x 4.7–5.2  $\mu\text{m}$ , Q = 1.5–2.0,  $\bar{Q}$  = 1.6–1.9, smooth, regular, with obtuse apex. Pleurocystidia 46–65 x (13–)14–23  $\mu\text{m}$ , slenderly to broadly fusiform, sometimes subutriform, thick-walled, wall up to 2.0–2.5  $\mu\text{m}$ , pale to bright yellow, with crystalliferous apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia spheropedunculate to clavate, thin-walled, colourless, frequent. Basidia 26–35 x 7–9  $\mu\text{m}$ , 4-spored. Caulocystidia present in apical part, descending to maximally 1/3rd part, similar to cheilocystidia; cauloparacystidia also present; often only with true caulocystidia at extreme apex, and downwards with only undifferentiated to differentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Predominantly under coniferous, but exceptionally also under frondose trees on calcareous soil. Associated with *Picea*, *Pinus*, *Quercus*, and *Fagus*. Widespread in Central Europe, (very) rare in Northwestern Europe, also in North America. Known from two localities in the central and eastern part of the Netherlands. Aug.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Overijssel, Diepenveen, 13.VIII.1972, *Piepenbroek*; IJsselmeerpolders, Kuinderbos, 16.IX.1983, *Tjallingii-Beukers*. — AUSTRIA: Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2161*. — BELGIUM: prov. Namur: Ave-et-Auffe, Bois de Roptai, 6.X.1977, *van der Laan*; Vencimont, Pichelotte, 4.X.1982, *Kuyper 2262*; prov. Luxembourg, Halma, Bois Transsinne, 23.IX.1974, *Bas 6381*. — CZECHOSLOVAKIA: Slovakia, Nižke Tatry, Bystrá dolina, 7.IX.1960, *Bas 2111*. — FRANCE: dpt. Doubs, Lougres, 4.X.1955, *Huijsman*. — GERMANY: Eifel: Duppach, 3.X.1979, *Bas 7537*; Gerolstein, Büschkapelle, 22.IX.1980, *Kuyper 1465*. — SCOTLAND: Jedburgh, *Jerdon* (holotype of *A. geophyllus* var. *lateritius*, K); Glasgow, near Dunoon, 15.IX.1959, *Kits van Waveren*; co. Perthshire; near Kindrogan Field Centre, 22.IX.1983, *Kuyper 2413*; Rannoch, 1.X.1875, *White* (holotype of *A.*



Figs. 53–56. *Inocybe whitei*. — Spores, pleurocystidia (53, from Kuyper 2161; 54, from holotype of *I. whitei*; 55, from holotype of *I. geophylla* var. *lateritia*; 56, from holotype of *I. geophylla* f. *perplexa*).

*whitei*, K). — SWITZERLAND: Saignolis, 16.IX.1966, Huijsman; Le Coty, 29.IX.1959, Huijsman.  
— UNITED STATES: Oregon, Clackamas Co., Mount Hood, 29.IX.1922, Kauffman (holotype of *I. geophylla* f. *perplexa*, MICH).

Notes: 1. The protologue of *Agaricus whitei* B. & Br. is somewhat deviant as the colour of the pileus was described as fulvous. For that reason *I. whitei* has always been considered an autonomous, be it enigmatic species. However, its microscopical characters completely conform to those of collections referred to *I. pudica*, and for that reason I do not hesitate to synonymise these names. It seems likely that the specimens gathered by White were old and/or damaged.

2. The holotype of *I. geophylla* f. *perplexa* is prominently umbonate, but fits the circumscription of f. *whitei* better than that of f. *armeniaca*.

3. Both collections from the Netherlands deviate in some respects from the typical form. The collection from Diepenveen has a prominently umbonate pileus, but the specimens are rather robust and the pleurocystidia possess a bright yellow wall. The collection from Kuinderbos consists of small rather slender specimens without an umbo. As both the collections fit the circumscription of f. *whitei* in 2 characters, and only 1 character is more conforming to f. *armeniaca*, they are considered here as belonging to the type-form. These collections evidently suggest an occasional mixing of both taxa, and for that reason they can only accorded the rank of form.

4. *Inocybe whitei* f. *whitei* has in former times been confused with *I. godeyi* Gillet, but these taxa can nowadays easily be separated, not only on account of covering of the stipe and presence of a cortina, but also on account of spore-dimensions and spore-form.

#### 24.2. *I. whitei* f. *armeniaca* (Huijsman) Kuyper, *comb. & stat. nov.* — Fig. 57

*Inocybe armeniaca* Huijsman in Bull. mens. Soc. linn. Lyon 43 (No spéc.): 201. 1974 (basonym).  
MISAPPLIED NAMES. — *Inocybe geophylla* var. *lateritia* sensu J. Lange, Fl. agar. dan. 3: 76, pl. 112E. 1938.

*Inocybe geophylla* f. *perplexa* sensu Huijsman in Bull. mens. Soc. linn. Lyon 43 (No spéc.): 201. 1974.

SELECTED ICON. — J. Lange, Fl. agar. dan. 3: pl. 112E. 1938 (as *I. geophylla* var. *lateritia*).

Pileus 8–32 mm, when young campanulato-convex, conico-convex to convex, spreading, finally plano-convex to applanate, with a very prominent, obtuse to subacute papilla or umbo especially in older specimens, sometimes subdentate-subappendiculate at margin, white to very pale cream when young, discolouring on age, at first around papilla, to pinkish or orange-yellow, finally even to reddish orange, sericeous-smooth around centre, outwards sericeous-fibrillose, at margin not or hardly rimulose, subviscid when moist. Lamellae, L = 25–40, l = 1–3, moderately crowded, 3–5 mm broad, not ventricose to subventricose, narrowly adnate, greyish isabella to greyish brown or yellowish brown, sometimes with pinkish stains; edge fimbriate to subfloculose, whitish, on bruising with reddish tinges. Stipe 18–57 x 1.5–5 mm, (almost) equal to slightly bulbous, but not marginately bulbous, solid, whitish, slowly discolouring to ochraceous orange, similar to colour of pileus, pruinose to slightly hairy in apical part (1/6th), longitudinally subfibrillose below. Cortina present



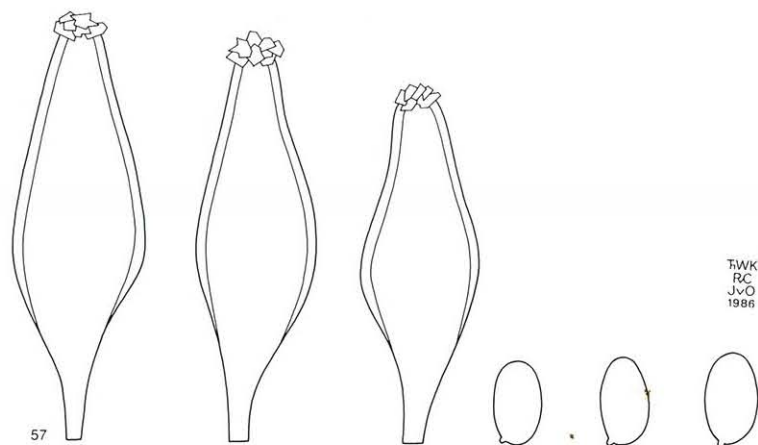


Fig. 57. *Inocybe whitei* f. *armeniaca*. — Spores, pleurocystidia (from holotype of *I. armeniaca*).

in young specimens, leaving no remnants on the stipe. Context whitish, not or only slowly discolouring to pale orange. Smell and taste spermatic.

Spores (7.0–)7.5–9.5(–10.0) x 4.5–6.0  $\mu\text{m}$ , on average 8.1–8.9 x 4.9–5.3  $\mu\text{m}$ , Q = 1.5–1.9,  $\bar{Q} = 1.6$ –1.7, smooth, regular to subamygdaliform, with obtuse apex. Pleurocystidia 43–65(–70) x (12–)14–22  $\mu\text{m}$ , fusiform to subutriform, thick-walled, wall to 1.5–2.0  $\mu\text{m}$ , colourless or (very) pale yellow, with crystalliferous apex, frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia (broadly) clavate, thin-walled, colourless, frequent. Basidia 23–32 x 7–9  $\mu\text{m}$ , 4-spored. Caulocystidia at stipe apex similar to cheilocystidia, cauloparacystidia also present; often with true caulocystidia only at extreme apex and with an extensive intermediate zone of undifferentiated to differentiated caulocystidioid hairs, descending to 1/6th of length of stipe.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on rather calcareous soil. Associated with *Pinus*, *Picea*, *Quercus*, and *Carpinus*. Known so far only from the Netherlands and Denmark, probably more widespread in West Europe. Rare in the Netherlands. Sept.–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Drenthe, Odoorn, 16.VIII.1985, *Weeda*; prov. Gelderland, Apeldoorn, 1.XI.1962, *Koopmans 453*; IJsselmeerpolder s: Kuinderbos, 4.X.1975, *Tjallingii-Beukers*; Voorsterbos, 12.X.1983, *Kuyper 2475*; Revebos, 19.X.1983, *Tjallingii-Beukers*; prov. Noord-Holland, Vogelenzang, 19.X.1958, *Bas 1616* (holotype of *I. armeniaca*, L); prov. Zuid-Holland, Wassenaar, 15.IX.1940, 20.X.1940 & 11.X.1942, *Huijsman*, 22.X.1938, *Zaneveld & 10.IX.1952, Leenhouts 866*; prov. Zeeland, Haamstede, 1.XI.1972, *Huijsman*, 23.X.1982, *Bas 8037 & 8038*. — DENMARK: Jylland, Frederikshavn, 13.X.1972, *Barkman 9568* (WBS).

Note: Huijsman (in Bull. mens. Soc. linn. Lyon 43 (No spéc.): 195. 1974) asserted that both forms (considered to be autonomous species by him) could also be separated

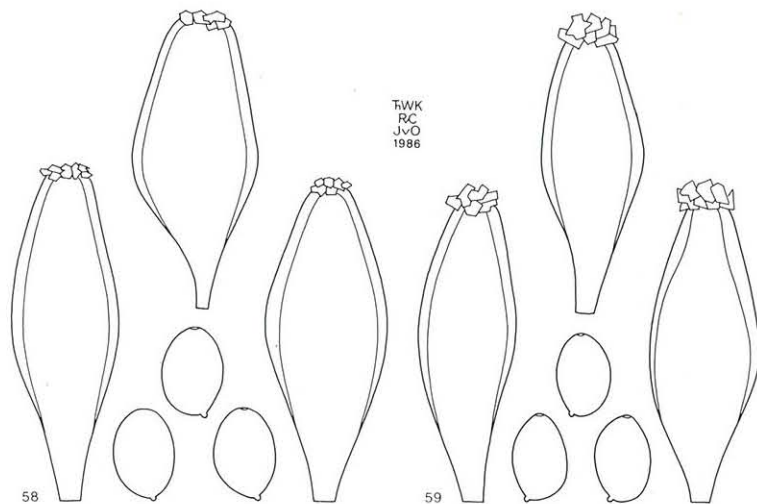
on account of the reddening of the basidiocarps on drying: completely and strongly reddening on drying in f. *whitei*, incompletely and only indistinctly so in f. *armeniaca*. Although there is a general tendency in f. *whitei* to show more pronounced reddening, my observations indicate that this character is too gradual to be reliable for identification.

## 25. *Inocybe subporospora* Kuyp., *spec. nov.* — Figs. 58–59

*Inocybe tarda* var. *sabulosa* Beller & M. Bon in M. Bon in Docs mycol. 5(17): 21. 1975

Pileus 9–36 mm, plano-convexus vel applanatus, rufobrunneus vel rufofuscus, fibrilloso-tomentosus, centro minute subsquamuloso, margine non rimuloso, velipelle tenui grisea obtectus. Lamellae anguste adnatae, (pallide) brunneae, margine fimbriato, albo. Stipes 14–42 x 2–5 mm, non bulbosus, albidofibrillosus, subtus brunneo-rufescens, apice pruinoso. Caro albida in pileo, rufo-brunnea in stipite. Odor spermaticus. Sporae 7.5–10.5 x 5.0–6.5  $\mu\text{m}$ , laeves, regulares, obtusae versus apicem, cum poro germinativo indistincto. Pleurocystidia (45–)46–57(–59) x (13–)14–20(–21)  $\mu\text{m}$ , late fusiformia vel subutriformia, crassiparietalia, cheilocystidia simillima. Basidia tetrasporigera. Caulocystidia presentia in apice, descendentia ad trientem, cheilocystidia simillima. Holotypus: *Th. W. Kuyper 2142*, 2.IX.1982, Meijndel, Wassenaar, prov. Zuid-Holland, the Netherlands, (L, isotypus BR).

Etymology: subporospora, spores with an indistinct germ-pore.



Figs. 58–59. *Inocybe subporospora*. — Spores, pleurocystidia (58. from authentic material of *I. griseobrunnea*; 59. from holotype of *I. subporospora*).

Pileus 9–36 mm, convex, plano-convex to applanate, with or without umbo, in young specimens sometimes prominently umbonate, margin slightly inflexed when young, dark red-brown to dark brown [7.5 YR 4/3–4/6], fibrillose-tomentose, around centre minutely subsquamulose, later somewhat breaking up and becoming recurvately squamulose, at margin not rimulose; velipellis thin, greyish, rather indistinct and soon disappearing. Lamellae, L = 30–45, l = 1–3, normally crowded, 2.5–5 mm broad, somewhat ventricose, narrowly adnate, pale brown to brown [10 YR 6/4, 5/4]; edge fimbriate, whitish to concolorous. Stipe 14–42 x 2–5 mm, equal to slightly swollen below, not truly bulbous, solid, whitish because of longitudinal ariferous fibrils, underneath soon red-brown, especially in upper part [5 YR 4/6–4/8], pruinose in upper 1/3rd, but rather inconspicuously so. Cortina present in young specimens. Context whitish in pileus, red-brown in stipe. Smell and taste spermatic.

Spores 7.5–10.5 x 5.0–6.5  $\mu\text{m}$ , on average 8.1–9.6 x 5.4–6.0  $\mu\text{m}$ , Q = (1.4)–1.5–1.7,  $\bar{Q}$  = 1.5–1.6, smooth, regular to subamygdaliform, with obtuse apex, with indistinct germ-pore. Pleurocystidia (45)–46–57(–59) x (13)–14–20(–21)  $\mu\text{m}$ , broadly fusiform to subutriform, thick-walled, wall up to 2.0  $\mu\text{m}$ , colourless, with apex crystalliferous, rather frequent. Cheilocystidia similar to pleurocystidia, rather scarce. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 26–31 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia present in apical 1/3rd part of stipe, more or less similar to cheilocystidia; cauloparacystidia also present.

HABITAT & DISTRIBUTION. — Under coniferous trees in dune-sand, once found under frondose trees on calcareous loam. Associated with *Pinus* and *Quercus*. Known from three localities in the Netherlands, also occurring in Belgium and France. May, Sept.–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Zuid-Holland: Noordwijk, 31.X.1957 & 15.XI.1957, *Huijsman*; Wassenaar, 9.V.1981, *Bas 7761* & 2.IX.1982, *Kuyper 2142* (holotype of *I. subporospora*, L); prov. Zeeland, Haamstede, 29.X.1972, *Huijsman* & 6.XI.1972, *Bas 5977*. — BELGIUM: prov. Namur, Ave-et-Auffe, Bois Le Roptai, 2.X.1984, *Kuyper 2617*. — FRANCE: dpt. Manche, Biville, 18.V.1983, *Kuyper 2346*; Vendée, Fromentine, XI.1965, *Bon* (holotype of *I. tarda* var. *sabulosa*, herb. Bon).

Notes: 1. The most distinctive character of this species and *I. luteipes* J. Favre is the presence of an indistinct germ-pore at the apex of the spores. A good microscopical equipment is needed, however, for the observation of this character. Other species sometimes show some thinning of the spore-wall near the apex, but not a true germ-pore.

2. *Inocybe griseobrunnea* Métrod in Bull. trimest. Soc. mycol Fr. 72: 124. 1956 (inval., Art. 36.1) comes very close to *I. subporospora*. I examined an authentic collection (France, Bois de Sapois, 15.IX.1941, herb. Métrod, PC), and noted spores with an obtuse apex and sometimes an indistinct germ-pore. The short macroscopical description, however, does not allow for a certain determination, although it is probably conspecific with *I. subporospora*.

## 26. *Inocybe luteipes* J. Favre — Figs. 60–61

*Inocybe luteipes* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 201. 1955.

SELECTED ICON. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: pl. 8, f. 13. 1955.

Pileus to 19 mm, conico-convex or convex, indistinctly umbonate, dark greyish brown, coarsely fibrillose, but at margin not radially rimulose, more smooth around disc because

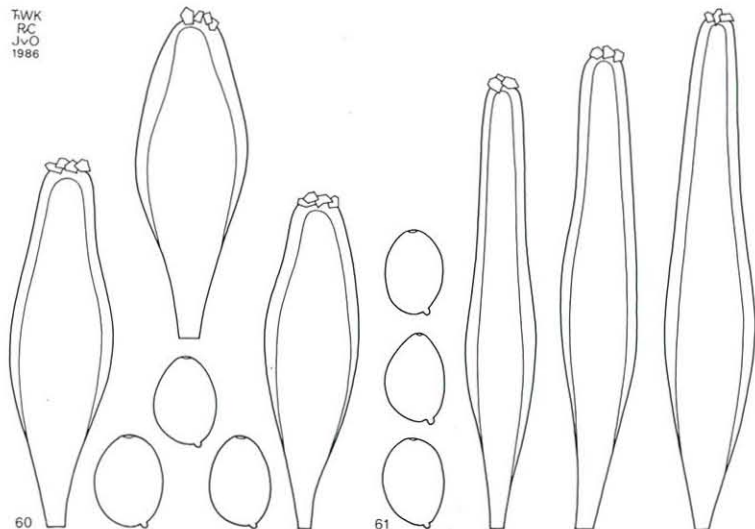
of velipellis. Lamellae, L = 15–30, l = 1–3, somewhat distant, to 4 mm broad, ventricose, narrowly adnate, whitish when young, finally dark ochraceous brown; edge fimbriate, white. Stipe to 22 x 3.5 mm, equal to somewhat swollen below, solid, bright ochraceous yellow, whitish near base, pruinose at apex, somewhat longitudinally white-fibrillose downwards. Context whitish in pileus, yellowish in stipe. Smell spermatic. Taste not recorded.

Spores (8.5)–9.0–10.5(–11.0) x 6.0–7.0(–7.5)  $\mu\text{m}$ , on average 9.5–9.8 x 6.6–6.9  $\mu\text{m}$ , Q = 1.3–1.5(–1.6),  $\bar{Q}$  = 1.4, smooth, mostly regular but sometimes subamygdaliform, with obtuse apex, often with indistinct germ-pore. Pleurocystidia 46–78 x 11–20(–21)  $\mu\text{m}$ , cylindrical, cylindrico-subfusiform, fusiform or broadly clavate, thick-walled, with up to 3.0  $\mu\text{m}$  thick, colourless to yellow wall, crystalliferous at apex. Cheilocystidia similar to pleurocystidia. Paracystidia clavate to pyriform, thin-walled, colourless. Basidia 25–36 x 8–11  $\mu\text{m}$ , 4-spored. Caulocystidia in apical part, descending to 1/6th of stipe, similar to cheilocystidia and mixed with cauloparacystidia.

HABITAT & DISTRIBUTION. — Associated with *Dryas octopetala* on calcareous soil. So far known only from the Swiss Alps. Aug.

COLLECTIONS EXAMINED. — SWITZERLAND: Kt. Graubünden, Fuorn, Val dal Botsch, alt. 2400 m, 20.VIII.1950, *Favre* (lectotype of *I. luteipes*, design. Monthoux & Kuyper, G); Kt. Bern; Schynige Platte, Daube-Oberberghorn, alt. 2040 m, 6.VIII.1981, *Irlet 81.162* (BERN); Schynige Platte, Usset Isetten, alt. 1940 m, 3.IX.1985, *Irlet 85.152* (BERN).

Note: Easily recognised because of spores with an indistinct germ-pore and yellowish tinges in stipe. Shape and dimensions of the pleurocystidia show much variation



Figs. 60–61. *Inocybe luteipes*. — Spores, pleurocystidia (60. from lectotype of *I. luteipes*; 61. from *Irlet 81.162*).

and it might be possible that two different infraspecific taxa are involved, viz. one with cylindrical pleurocystidia with a yellow wall, and one with (broadly) fusiform pleurocystidia with an almost colourless wall. The latter type is best conforming to *I. luteipes* s. str., whereas the former type shows some affinities with *I. lucifuga* var. *lutescens* (Velen.) J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: 95*. 1955 (inval., Art. 33.2). More material is necessary for a balanced judgement regarding the infraspecific variability of *I. luteipes*.

## 27. *Inocybe lacera* (Fr.: Fr.) Kumm.

*Agaricus lacerus* Fr.: Fr., *Syst. mycol.* 1: 257. 1821. — *Inocybe lacera* (Fr.: Fr.) Kumm., *Führ. Pilzk.*: 79. 1871.

*Agaricus deflectens* Britz., *Dermini Südbayern*: 5. 1882. — *Inocybe deflectens* (Britz.) Sacc., *Syll. Fung.* 5: 786. 1887.

*Inocybe deglubens* var. *trivialis* P. Karst. in *Meddn Soc. Fauna Flora fenn.* 9: 43. 1882. — *Inocybe trivialis* (P. Karst.) P. Karst. in *Acta Soc. Sci. fenn.* 16: 521. 1888.

*Agaricus observabilis* Britz. in *Ber. naturw. Ver. Augsburg* 30: 19. 1890. — *Inocybe observabilis* (Britz.) Sacc., *Syll. Fung.* 11: 54. 1895.

*Agaricus oblongisporus* Britz. in *Bot. Zbl.* 62: 278. 1895. — *Inocybe oblongispora* (Britz.) Sacc. & Syd. in *Sacc., Syll. Fung.* 14: 133. 1899.

*Inocybe carbonaria* Velen., *České Houby*: 379. 1920, non *Inocybe carbonaria* (Fr.: Fr.) Roze 1876.

*Inocybe demitrata* Velen., *České Houby*: 380. 1920.

*Inocybe mammosa* Velen., *České Houby*: 381. 1920.

*Inocybe mitracea* Velen., *České Houby*: 381. 1920.

*Inocybe pallescens* Velen., *České Houby*: 377. 1920.

*Inocybe minima* Killerm. in *Denkschr. bayer. bot. Ges.* 16: 105. 1925, non *Inocybe minima* Peck 1913.

*Inocybe moravica* Hruby in *Hedwigia* 70: 279. 1930.

*Inocybe rhacodes* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: 201*. 1955.

EXCLUDED. — *Inocybe trivialis* sensu P. Karst. in *Acta Soc. Sci. fenn.* 16: 521. 1888 (= *I. flocculosa*).

### KEY TO THE VARIETIES OF *I. LACERA*

1. Edge of lamellae at least partly consisting of protruding, catenate, brown-incrusting elements, with terminal element resembling cheilocystidia.....var. *rhacodes*, p. 102
1. Edge of lamellae without such protruding catenate elements.
  2. Spores remarkably broad,  $\bar{Q} = 1.8$ , (almost) regular.....var. *regularis*, p. 105
  2. Spores more narrow,  $\bar{Q} = 1.9-2.9$ , minimally angular or paramorphic.
    3. Spores on average  $11.0-14.2 \times 4.5-5.6 \mu\text{m}$ ,  $\bar{Q} = 2.1-2.9$ ; pleurocystidia slightly thick-walled, wall colourless; on dry places.....var. *lacera*, p. 99
    3. Spores on average  $11.4-13.8 \times 5.8-6.6 \mu\text{m}$ ,  $\bar{Q} 1.9-2.3$ ; pleurocystidia more thick-walled, wall pale to bright yellow; on marshy places.....var. *helobia*, p. 103

Note: On account of the spore-form, which is quite often minimally angular, especially in var. *helobia*, and acidophytic habitat preference, *I. lacera* would find its natural place near some goniosporous *Inocybes*. Darkening of the stipe and mucronate pleurocystidia can also be observed in *I. curvipes* P. Karst.

## 27.1. *I. lacera* var. *lacera* — Figs. 62–65

*Agaricus lacerus* Fr.: Fr. — *Agaricus deflectens* Britz. — *Agaricus observabilis* Britz. — *Agaricus oblongisporus* Britz. — *Inocybe carbonaria* Velen. non (Fr.: Fr.) Roze — *Inocybe demitrata* Velen. — *Inocybe mammosa* Velen. — *Inocybe mitracea* Velen. — *Inocybe pallescens* Velen. — *Inocybe moravica* Hruby — *Inocybe deglubens* var. *trivialis* P. Karst.

*Inocybe lacera* var. *heterocystis* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: 201*. 1955.

*Inocybe lacera* var. *heterosperma* Grund & Stuntz in *Mycologia* 69: 403. 1977.

*Inocybe lacera* var. *griseolilacinoides* M. Bon in *Beih. Sydowia* 8: 84. 1979.

*Inocybe lacera* var. *aberrans* Reumaux in *Docs mycol.* 12(48): 25. ('1982') 1983.

*Inocybe lacera* f. *gracilis* J. Lange in *Dansk bot. Ark.* 2(7): 32. 1917.

*Inocybe lacera* f. *subsquarrosa* F. Möller, *Fungi Farøes* 1: 226. 1945.

*Inocybe lacera* f. *luteophylla* M. Bon in *Beih. Sydowia* 8: 83. 1979.

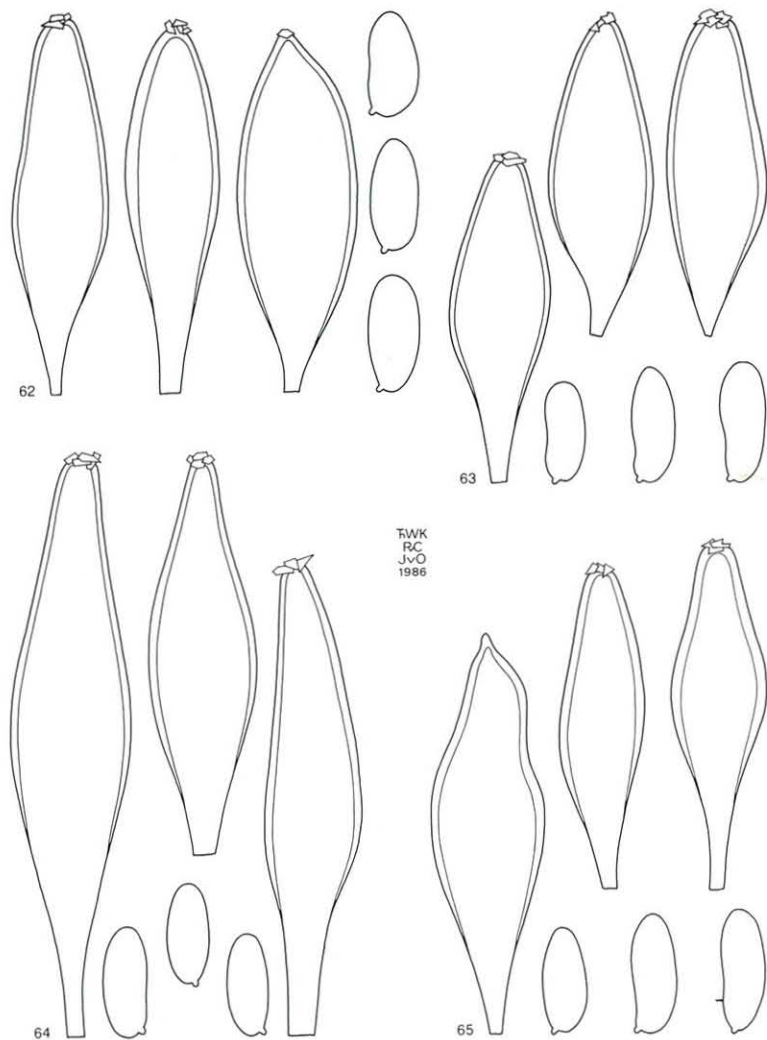
EXCLUDED. — *Inocybe lacera* f. *gracilis* sensu auct. (= *I. lacera* var. *helobia*).

SELECTED ICONES. — Bres., *Iconogr. mycol.* 15: pl. 731. 1930. — J. Lange, *Fl. agar. dan.* 3: pl. 111D, D'. 1938. — Alessio, *Iconogr. mycol.* 29: pl. 70. 1980. — R. Phillips, *Paddest. Schimm.*: 152. 1981. — Mos. & Jülich, *Farbatl. Basidiomyc.*: pl. 18, f.2. 1985.

Pileus 12–42 mm, campanulato-convex, conico-convex, convex, plano-convex to finally applanate, with margin inflexed when young and then subappendiculate to straight, often prominently umbonate but sometimes only indistinctly umbonate, dark brown around centre [7.5 YR 3/4], towards margin brown to ochraceous brown [10 YR 5/4–6/6], sometimes ochraceous brown all over, coarsely fibrillose to subsquamulose, at margin not rimulose, subtomentose-smooth around centre, but pileal covering later breaking up and then recurvately (sub)squamose, exceptionally very conspicuously so; velipellis absent or (very) indistinct. Lamellae, L = 35–50, l = 1–3, moderately crowded, 2–8 mm broad, (sub)ventricose, rather broadly to narrowly adnate, whitish when young, exceptionally yellowish, finally ochraceous, ochraceous brown to olivaceous brown [2.5 Y 5/4, 5 Y 5/4]; edge almost even to subfimbriate, whitish or concolorous. Stipe 25–110 x 1–6 mm, equal to somewhat enlarged at base, but without bulb, solid, finally fistulose, whitish to buff in upper half, sometimes with reddish sheen or lilac tinges, brown or reddish brown half-way, dark brown to almost blackish brown at base, progressively darkening on age, not pruinose, longitudinally white-fibrillose, often rather coarsely so. Cortina present in young specimens. Context whitish in pileus, reddish brown to dark brown in stipe, but near apex sometimes with a lilac tinge. Small faint, indistinct to subspermat. Taste indistinct.

Spores (9.0–)10.0–15.5(–16.0) x 4.0–6.0(–6.5)  $\mu\text{m}$ , on average 11.0–14.2 x 4.5–5.6  $\mu\text{m}$ ,  $\bar{Q} = (1.9-2.0-3.2(-3.3))$ ,  $\bar{Q} = 2.1-2.9$ , smooth to minimally angular, often with conspicuous suprahilar depression, reminding of *Boletus*-spores. Pleurocystidia (45–)46–74(–78) x (13–)14–21(–22)  $\mu\text{m}$ , (sub)fusiform to cylindrical-subfusiform, sometimes tending to subtrifurcate, at apex sometimes rounded but more often acute, sometimes mucronate, slightly thick-walled, with up to (1.5–)2.0  $\mu\text{m}$ , colourless wall (but yellow in one collection), apex not or rather indistinctly crystalliferous, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate to pyriform, thin-walled, colourless, abundant. Basidia 25–32 x 9–11  $\mu\text{m}$ , 4-spored, a few 2-spored. Caulocystidia (almost) completely absent, extreme apex of stipe with a narrow zone of undifferentiated to somewhat differentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on siliceous, nutrient-poor, dry sand, also occurring on old fireplaces. Associated with *Betula*, *Quercus*, *Castanea*, *Salix repens*, *Pinus*, and *Picea*. Widespread in Europe and North America, but locally extremely rare. Common in the Netherlands. April–Nov.



Figs. 62–65. *Inocybe lacera*. — Spores, pleurocystidia (62. from holotype of *I. moravica*; 63. from lectotype of *I. deglubens* var. *trivialis*; 64. from Fungi exsiccati suecici 2309; 65. from authentic material of *I. lacera* f. *gracilis*).

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland: Schiermonnikoog, 18.XI.1984, *Vellinga 734*; Terschelling, 27.X.1982, *Kuyper 2318 & 2319*; Wijnjeterp, 18.IX.1982, *Rubers 8914*; prov. Drenthe, Havelte, 3.VII.1983, *Sullock Enzlin*; prov. Gelderland: Apeldoorn, *Koopmans 451*; Elspeet, 27.V.1956, *van Brummelen*; Hemmen, 21.VIII.1971, *de Kleuver 71.019*; Nijmegen, 26.IX.1954, *Bas 663*; Wageningen, 18.V.1964, *Maas Geesteranus 14027*; prov. Noord-Holland: 's Graveland, 22.X.1957, *Daams*; Laren, 26.V.1972, *van Winden 49*; prov. Zuid-Holland, Noordwijk, 12.IX.1953, *Maas Geesteranus 9464*; prov. Noord-Brabant: Boxtel, 5.IX.1981, *Schreurs 618*; Breda, 1.IX.1959, *Bas 1752*; Dorst, 1.XI.1956, *Jansen*; Eindhoven, 7.VI.1981, *Rubers 7957*; Oisterwijk, 21.IV.1960, *Bas 1870*; Ossendrecht, 6.VI.1954, *Bas-Moes*; prov. Limburg: Annendaal, 30.VIII.1963, *Verschuere*; Maastricht, 15.X.1952, *Maas Geesteranus 9187*. — AUSTRIA: Ötztal, Windachtal, 18.VI.1954, *Maas Geesteranus 9957*; Ötztal, Timeljoch, 5.IX.1982, *Trimbach*. — CANADA: Nova Scotia, Annapolis Co., Kejimikujik National Park, 25.V.1969, *Bird* (isotype of *I. lacera* var. *heterosperma*, WTU). — CZECHOSLOVAKIA: Bohemia: Běchovice, VI.1919, *Velenovský* (holotype of *I. carbonaria*, PRC); Praha, Vidrholec, VIII.1919, *Velenovský* (holotype of *I. demitrata*, PRC); Mnichovice, VII.1919, *Velenovský* (holotype of *I. mammosa*, PRC); Rip, VI.1916, *Velenovský* (holotype of *I. mitracea*); Jevany, V.1920, *Velenovský* (holotype of *I. pallescens*, PRC); Moravia, Brno, Stadtwald, VII.1927, *Hruby* (holotype of *I. moravica*, BRNO); Ostrava, Halda, Lučina, 6.IX.1979, *Veselský & Klán* (herb. Klán). — DENMARK: Jylland, Munkebjerg, VIII.1940, *Lange* (authentic material of *I. lacera* f. *gracilis*, C). — ENGLAND: co. Surrey, Oxsholt, 5.VIII.1965, *Reid*. — FINLAND: Tavastia australis, Tammela, Mustiala, 11.VIII.1881, *Karsten* (lectotype of *I. deglubens* var. *trivialis*, design. mihi, H). — FRANCE: Pas de Calais, Libercourt, XI.1970, *Bon 75018* (holotype of *I. lacera* f. *luteophylla*, herb. Bon); Roost-Warendin, 3.XI.1971, *Bon 71110305* (holotype of *I. lacera* var. *griseolilacinoides*, herb. Bon); Marais des Hauts Butées (holotype of *I. lacera* var. *aberrans*, herb. Reumaux). — GERMANY: Eifel, Gerolstein, 9.IX.1970, *Bas 5344*. — ITALY: prov. Parma, Vighini, 13.IX.1984, *Kuyper 2531*. — SCOTLAND: co. Perthshire, near Kindrogan Field Centre, 21.IX.1983, *Kuyper 2409*. — SWEDEN: Småland, Slättagärdet, 24.IX.1943, *Lundell* (Fungi exsiccati suecici 2309, PC). — UNITED STATES: Michigan, Cheboygan Co., near Carp Lake, 26.VI.1963, *Bas 3161*.

Notes. 1. *Inocybe lacera* var. *lacera* is very variable, especially in some macroscopical characters. However, extreme variants are always connected through intermediates with the 'typical' variant, and for that reason no formal taxonomic status could be accorded to var. *griseolilacinoides* and f. *luteophylla*.

Microscopical characters also show much variation. Some of this variation does not show any definite pattern, but other characters, e.g. breadth of spores show a clinal pattern. Specimens from north-western Europe possess narrower spores than specimens from Central Europe, especially those that grow in the Alps. However, spore dimensions are probably also influenced by meteorological conditions, as specimens growing under adverse conditions (especially in arctic and alpine habitats) show more variability in this character than specimens growing under more favourable conditions. Therefore even extremes such as *I. lacera* var. *heterosperma* do not deserve a formal ranking.

2. The holotype of *I. pallescens* represents a (semi-)albinistic variant of *I. lacera* var. *lacera*, likewise without any formal taxonomic value.

3. The type collection of *Inocybe deglubens* var. *trivialis* P. Karst. is heterogeneous, consisting of two different species. Karsten's protologue clearly indicates that his taxon must be lectotyped with the specimens with slender spores and a darkening stipe (Art. 9.2).

27.2. *I. lacera* var. *rhacodes* (J. Favre) Kuyp., *comb. & stat. nov.* — Fig. 66

*Inocybe rhacodes* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 201. 1955 (basionym).  
SELECTED ICON. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: pl. 7, f. 5. 1955.

Pileus 11–21 mm, campanulato-convex, convex to plano-convex, umbonate, but not prominently so, margin somewhat extending over lamellae and subinvolute, dark brown to brown [7.5 YR 3/3, 5/4, tending to 6/6], but with a greyish hue, coarsely squamulose to even recurvately subsquarrose, especially with age, with indistinct to rather conspicuous white, subsquamulose patches of velipellis. Lamellae, L = 30–35, l = 1–3, rather crowded, to 3 mm broad, not ventricose to subventricose, broadly adnate, isabella-brown to dark brown, finally with an olivaceous tinge [10 YR 4/3–4/4]; edge minutely flocculose, white. Stipe 15–23 x 2–3 mm, equal, solid, brown, somewhat darker brown at base, even at apex not pruinose, when young longitudinally fibrillose, later on less distinctly so. Cortina present

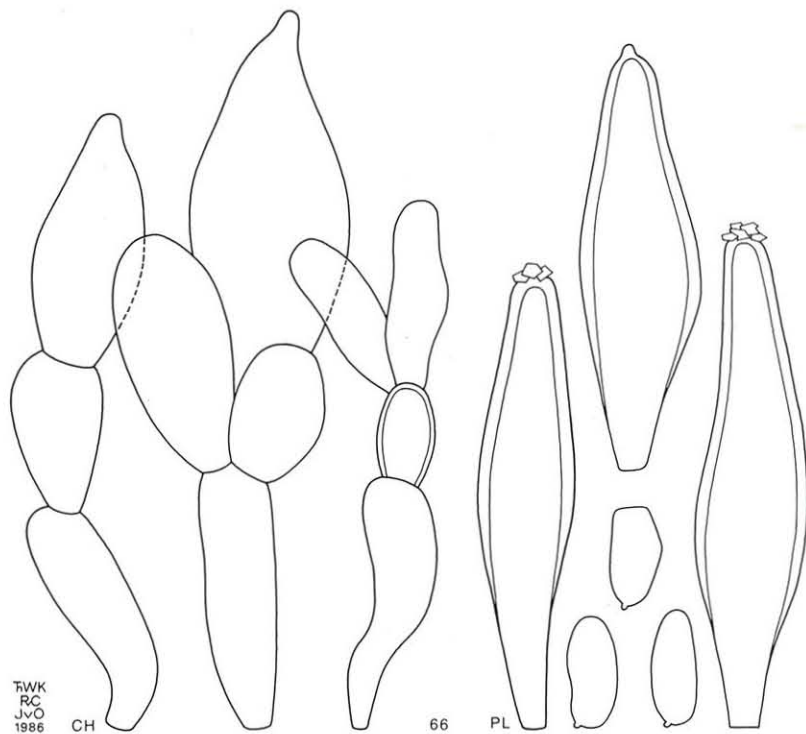


Fig. 66. *Inocybe lacera* var. *rhacodes*. — Spores, pleurocystidia, cheilocystidia (from holotype of *I. rhacodes*).

in young specimens. Context whitish in pileus and stipe, but brownish in cortex of stipe. Smell and taste indistinct.

Spores (9.5–)10.0–17.0 x 4.5–7.0  $\mu\text{m}$ , on average 10.9–14.5 x 5.0–6.5  $\mu\text{m}$ ,  $Q = (1.8\text{--})1.9\text{--}2.6$ ,  $\bar{Q} = 1.9\text{--}2.4$ , almost smooth to minimally angular, regular to paramaeciiform. Pleurocystidia (50–)54–78(–79) x (14–)15–21(–22)  $\mu\text{m}$ , cylindrical to fusiform, (sub)acute towards apex, a few even mucronate, thick-walled, with up to 2.0–3.0  $\mu\text{m}$ , almost colourless to bright yellow wall, crystalliferous at apex, abundant. Cheilocystidia at least partly catenate, consisting of chains of catenate cylindrical elements projecting beyond edge of lamellae, with terminal element as true cystidium, with thickened brownish walls, normal cheilocystidia also present, similar to pleurocystidia. Paracystidia clavate, with (slightly) thickened, brown wall. Basidia 28–38 x 10–13  $\mu\text{m}$ , 4-spored. Caulocystidia absent, at extreme apex of stipe only with a few rather undifferentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under dwarf shrubs in the (sub)alpine zone. Associated with *Betula*, *Salix herbacea*, and *Salix retusa*. Known from the Alps and Scotland, not occurring in the Netherlands. July–Sept.

COLLECTIONS EXAMINED. — FRANCE: Col de Restefond, 24.VII.1982, *Trimbach* 2298. — SCOTLAND: co. Perthshire, near Pitlochry, Moulin, 23.IX.1983, *Kuyper* 2420. — SWITZERLAND: Kt. Graubünden, Haut Val Sesvenna, alt. 2550 m, 20.VIII.1943, *Favre* (holotype of *I. rhacodes*, G); Kt. Bern, Steingletscher, 15.IX.1982, *Irllet* 82.339 & 21.IX.1984, *Kuyper* 2570, 2572, 2573 & 2576.

Note: Variation in spore dimensions seems to parallel that in var. *lacera* and a polyphyletic origin for var. *rhacodes* is assumed. A more detailed study might, however, reveal that the distinctive character of var. *rhacodes* is a phenotypical reaction to adverse climatological conditions (frost), which would ultimately result in the recognition that this taxon is nothing but an exotypic variant of var. *lacera*.

27.3. *I. lacera* var. *helobia* Kuyp., *var. nov.* — Figs. 67–68

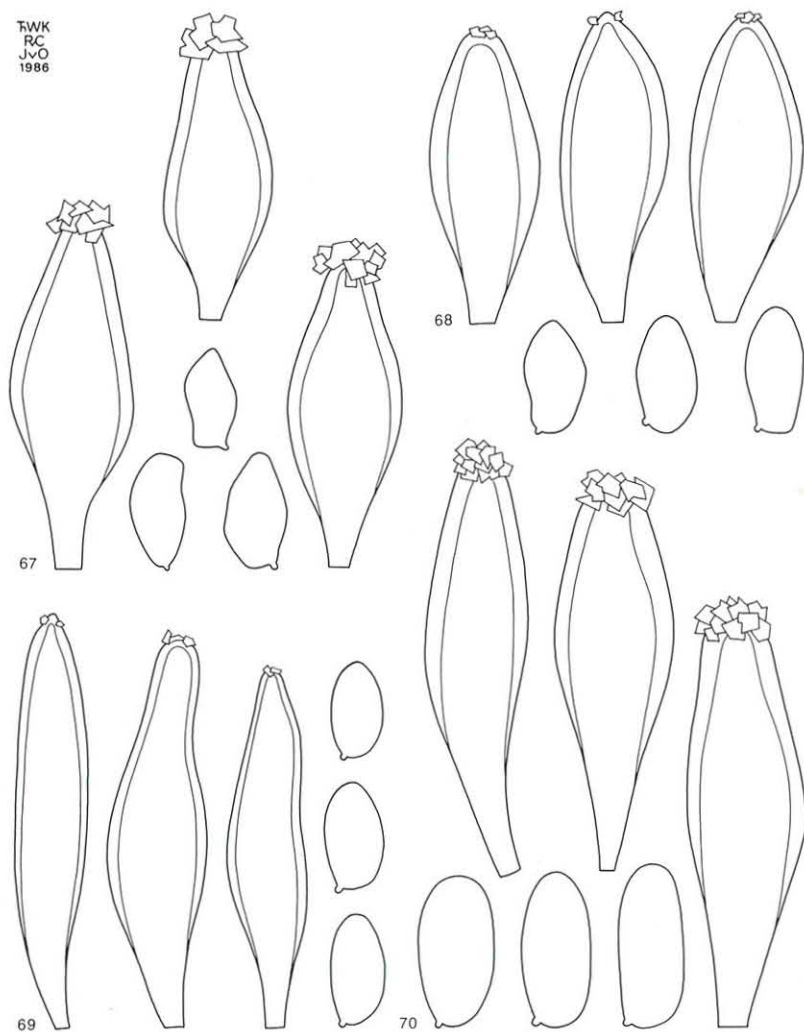
*Inocybe minima* Killerm. non Peck

A varietate typica differt sporis latoribus, subparamaeciiformibus, pleurocystidiis clavatis, cum pariete crassa, lutescente in  $\text{NH}_4\text{OH}$ , et habitatione in locis paludosis. Holotypus: *Th. W. Kuyper* 2124, 25.VIII.1982, Loampits, Buren, Gelderland, the Netherlands (L).

Etymology:  $\epsilon\lambda\omicron\beta\iota\sigma$ , living in marshy places.

MISAPPLIED NAME. — *Inocybe lacera* f. *gracilis* sensu auct.

Pileus 11–29 mm, convex to applanate, mostly prominently umbonate, but sometimes with a low, broad umbo, dark brown to blackish brown around centre [7.5 YR 3/2, 3/3], brown to ochraceous brown in outer half [10 YR 4/4–5/6], coarsely fibrillose to subsquamulose, but fibrils not or hardly diverging, at margin not rimulose, slightly breaking up on age and becoming somewhat more distinctly squamulose, around disc subtomentose; velipellis absent or very thin and indistinct. Lamellae, L = 20–40, l = 1–3, moderately crowded, 3–6 mm broad, ventricose, often conspicuously so, rather broadly to narrowly adnate, yellow-brown [10 YR–2.5 Y 5/4] to dark brown [7.5 YR 4/6]; edge almost even to fimbriate, concolorous to white. Stipe 20–56 x 1–4 mm, equal to somewhat enlarged at base, often (very) slender, but sometimes rather stout, solid, apex whitish to pale cream, half-way



Figs. 67–68. *Inocybe lacera* var. *helobia*. — Spores, pleurocystidia (67. from holotype of var. *helobia*; 68. from holotype of *I. minima*).

Fig. 69. *Inocybe lacera* var. *regularis*. — Spores, pleurocystidia (from holotype).

Fig. 70. *Inocybe impexa*. — Spores, pleurocystidia (from neotype of *I. maritima*).

ochraceous buff to brown, at base brown to almost black, progressively darkening on age, completely without pruina, somewhat longitudinally fibrillose, but rather indistinctly so. Cortina present in young specimens. Context whitish in pileus, ochraceous buff, brown or reddish brown in stipe. Smell faint, indistinct to subspermiatic. Taste indistinct.

Spores (10.0–)10.5–15.0(–16.0) x 5.5–7.0(–7.5)  $\mu$ m, on average 11.4–13.8 x 5.8–6.6  $\mu$ m, Q = 1.7–2.3(–2.5),  $\bar{Q}$  = 1.9–2.3, 'smooth' to minimally angular, mostly slightly irregular, (sub)parameciiform, towards apex somewhat applanate. Pleurocystidia (41–)42–67(–72) x 15–26  $\mu$ m, (broadly) clavate, cylindrico-clavate to (broadly) fusiform, towards apex obtuse to acute, and sometimes even (sub)mucronate, thick-walled, with up to 2.5(–3.0)  $\mu$ m, pale to bright yellow wall, at apex heavily crystalliferous, frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia pyriform to clavate, thin-walled and colourless, but a few minutely thick-walled and somewhat brownish-tinged, abundant. Basidia 27–35 x 10–12  $\mu$ m, 4-spored, a few 2-spored. Caulocystidia absent, at extreme apex of stipe with a few rather undifferentiated to somewhat thick-walled, crystalliferous caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under frondose trees on marshy soil. Associated with *Alnus*, *Betula*, *Salix* spec., and *Salix repens*. Probably widespread in West Europe, rare in Central Europe. Rather common in the Netherlands. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland, Terschelling, VII.1955, Jansen, 27.VII.1958, *Bas* 1499 & 19.X.1981, *Noordeloos* 1618; prov. Drenthe: Borger, 7.IX.1982, *Arnolds* 4794 (WBS); Diever, 29.IX.1982, *Arnolds* 4816 (WBS); Gieten, 16.VIII.1974, *Huijsman*; Rolde, 24.X.1983, *Arnolds* 5076 & 15.VII.1984, *Arnolds* 5162 (WBS); Wijster, 9.VIII.1973, *de Kleuver* 73.019; prov. Overijssel, Hengelo, 15.VII.1982, *Weeda*; prov. Gelderland: Buren, 11.VIII.1971, *de Kleuver* 71.006 & 25.VIII.1982, *Kuyper* 2124 (holotype of *I. lacera* var. *helobia*, L); Overasselt, 26.X.1960, *Maas Geesteranus* 13497; Staverden, 25.VII.1981, *Kuyper* 1632; prov. Utrecht, Veenendaal, 23.IX.1970, *Huijsman*; prov. Noord-Holland, Schoorl, 6.X.1969, *Arnolds* 393; prov. Zeeland, Haamstede, 23.X.1982, *Kuyper* 2308; prov. Noord-Brabant: Strijbeek, 15.VII.1959, *Jansen*; Zundert, 28.VI.1955, *Bas* 785; prov. Limburg, Mariapeel, 20.VI.1970, *Bas* 5252. — GERMANY: Niedersachsen, Langeoog, Flinthorndünen, 2.VII.1985, *Weeda*; Oberpfalz, Moosloh, VIII.1918, *Killermann* (holotype of *I. minima*, M); Bavaria, Gabsweiler near Michelau, 25.VIII.1982, *Hanff*. — NORWAY: Ranland, Nesland, 25.VII.1975, *Tjallingii-Beukers*.

Note: The habit of this taxon is very variable, ranging from slender forms with a prominent umbo, to rather stout forms that are only indistinctly umbonate. This latter variant seems to be restricted to *Salix repens* and is known only from the dunes. However, intermediates occur and for that reason a demarcation between both variants is impossible. It seems not unreasonable to suggest that var. *helobia* is not of monophyletic origin but consists of a polyphyletic assemblage of ecotypic variants.

#### 27.4. *I. lacera* var. *regularis* Kuyper, var. nov. — Fig. 69

A varietate typica differt sporibus brevioribus et regularibus, 9.0–11.5(–12.5) x 5.0–6.5(–7.0)  $\mu$ m, Q = 1.6–1.9. Holotypus: *Th. W. Kuyper* 2481, 14.X.1983, Havelterberg, Havelte, Drenthe, the Netherlands (L).

ETYMOLOGY: regularis, regular, referring to the regular spores.

Pileus 21–33 mm, convex, with prominent papilla, yellowish brown to dark brown [10 YR 3/3, 4/3, 5/4], coarsely fibrillose-subsquamosulose. Lamellae, L = 35, l = 1–3, moderately

crowded, 6 mm broad, ventricose, broadly adnate, ochraceous brown [10 YR 5/4] with a faint olivaceous tinge; edge minutely fimbriate, whitish. Stipe 32–63 x 3–4 mm, equal, solid, brownish buff to brown in upper half, dark brown to almost blackish brown in lower half, at base with white felt, even at apex not pruinose, downwards rather coarsely fibrillose. Context whitish in pileus, (pale) brown in stipe, darkest in cortex. Smell and taste indistinct or acidulous-spermatoc.

Spores 9.0–11.5(–12.5) x 5.0–6.5(–7.0)  $\mu\text{m}$ , on average 9.9–10.9 x 5.5–6.1  $\mu\text{m}$ , Q = 1.6–1.9,  $\bar{Q}$  = 1.8, smooth, almost regular. Pleurocystidia (46–)47–75 x (12–)13–19  $\mu\text{m}$ , cylindrical to fusiform, with acute, often (sub)mucronate apex, somewhat thick-walled, with up to 1.5–2.0  $\mu\text{m}$ , almost colourless to very pale yellowish wall; apex hardly crystalliferous. Cheilocystidia similar to pleurocystidia. Paracystidia clavate, thin-walled, colourless. Caulocystidia absent, at apex of stipe only a few almost undifferentiated caulocystidioid hairs present.

HABITAT & DISTRIBUTION. — Under coniferous and frondose trees on acid, nutrient-poor sand. Known only from the Netherlands. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Drenthe: Havelte, 14.X.1983, *Kuyper 2481* (holotype of *I. lacera* var. *regularis*, L); Gieten, 11.VI.1986, *Kuyper 2693* (WBS); prov. Gelderland, Otterlo, 24.VI.1972, *Huijsman*; prov. Noord-Brabant, Driessen, 10.X.1980, *Bas 7723*.

Note: This taxon differs from the type variety only in possessing rather broad, (almost) regular spores. Its spores are rather unlike those of typical *I. lacera*, but the colour of stipe and often mucronate cystidia testify to its close relationship with *I. lacera*. It might be possible that the distinctive character of var. *regularis* is only a phenotypic modification in which spore development has been arrested, but such conclusions exceed the limit of herbarium taxonomy.

## 28. *Inocybe impexa* (Lasch) Kuyper, *comb. nov.* — Fig. 70

*Agaricus impexus* Lasch in *Linnaea* 4: 545. 1829 (basionym).

*Agaricus maritimus* Fr., *Observ. mycol.* 2: 51. 1818, non *A. maritimus* With. 1796. — *Agaricus lacerus* var. *maritimus* (Fr.) Fr.: *Fr. Syst. mycol.* 1: 257. 1821. — *Inocybe maritima* (Fr.) P. Karst. in *Bidr. Finl. Nat. Folk* 32: 457. 1879. — *Inocybe lacera* var. *maritima* (Fr.: Fr.) M. Bon in *Docs mycol.* 14(53): 21. 1984.

*Inocybe lacera* var. *arenaria* Rudnicka-Jeziarska in *Acta mycol.* 3: 185. 1967.

EXCLUDED. — *Inocybe maritima* sensu R. Heim, *Genre Inocybe*: 343. 1931 (= *I. dunensis*).

Pileus 15–34 mm, semiglobose to convex, without umbo, hygrophanous, when moist dull grey-brown or somewhat ochraceous-tinged brown, when dry pale grey-brown, pale grey or almost greyish white, strongly fibrillose to scaly. Lamellae adnate to free, ventricose, at first pale ochraceous, then more snuff-brown or yellow-brown. Stipe 15–23 x 3–8 mm, equal, solid, somewhat rooting in the sand (and this agglutinating to the base as a lump), concolorous with pileus, coarsely white-fibrillose, even at apex not pruinose. Cortina present in young specimens. Context slightly ochraceous grey-brown, whitish on drying. Smell indistinct.

Spores (12.0–)13.0–17.5(–18.5) x 6.0–7.5(–8.0)  $\mu\text{m}$ , on average 14.8–16.0 x 6.5–7.1  $\mu\text{m}$ , Q = (1.8–)1.9–2.6(–2.7),  $\bar{Q}$  = 2.2–2.3, smooth, sometimes minimally angular, almost obtuse at apex. Pleurocystidia (46–)50–82(–87) x (14–)15–25(–26)  $\mu\text{m}$ , cylindrical, clavate or fusiform, thick-walled, with up to 4.0  $\mu\text{m}$ , (almost) colourless wall, at apex crystalliferous. Cheilocystidia similar to pleurocystidia, rather scarce. Paracystidia broadly clavate to pyriform, at least

partly with slightly thickened, brownish wall. Basidia 31–40(–44) x 10–14  $\mu\text{m}$ , 4-spored. Caulocystidia absent.

HABITAT & DISTRIBUTION. — On bare sand in xerophytic vegetation with *Salix repens*, but sometimes without any mycorrhizal trees nearby. Widespread along the northern Atlantic and Baltic Coast, but also occurring in inland dunes in continental eastern Europe. Known from one locality in the Netherlands. Aug.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Hierden, 20.X.1957, *Maas Geesteranus 12406*. — FINLAND: Oulun Pohjanmaa, Hailuota, Marjanemi, 16.VIII.1981, *Ulvinen & Ohenoja*. — GERMANY: Norderney, Vogelschutzgebiet, 19.VIII.1981, *Fischer*. — NORWAY: Vest-Agder, Farsund, Lista, Lomsesanden, 3.X.1971 & 27.IX.1972 (neotype of *I. maritima*, designated by Høiland, O). — SCOTLAND: Culbin Sands, 19.VIII.1939, *Pearson* (PC), 9.IX.1963, *Henderson* (E).

Notes: 1. The macroscopical description of this remarkable species is for the greater part copied from Høiland (in *Norw. J. Bot.* 24: 251. 1977).

2. The species has hitherto been known as *I. maritima* (Fr.) P. Karst., but there is in my opinion not much doubt that *Agaricus impexus* Lasch refers to the same species, as both the macroscopical description and the habitat agree completely with that of *I. maritima*. As Fries (*Syst. mycol.* 1: 257. 1821) sanctioned the epithet *maritimus* only on varietal rank, this taxon, when considered an autonomous species, must be called *I. impexa*, the epithet *impexus* being the earliest legitimate.

## 29. *Inocybe similis* Bres. — Figs. 71–72

*Inocybe similis* Bres. in *Annls mycol.* 3: 161. 1905.

*Inocybe rufobrunnea* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 201. 1955.

EXCLUDED. — *Inocybe similis* sensu Kühner in *Bull. Soc. Nat. Oyonnax* 9(Suppl.): 14. 1955 (= *I. brunneotomentosa*); sensu Stangl in *Z. Pilzk.* 37: 22. 1971 (= *I. brunneotomentosa*).

SELECTED ICONES. — Bres., *Iconogr. mycol.* 15: pl. 730, f. 2. 1930. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: pl. 7, f. 2. 1955 (as *I. rufobrunnea*).

Pileus 20–35 mm, conico-campanulate to campanulato-convex, with a broad umbo, with incurved or abruptly deflexed margin, unicolorous cinnamon-brown, coarsely radially fibrillose, with concentric rows of laterally confluent, quadrangular, fringed squamules around more or less smooth centre, and these outwards more and more separate, but often with little developed squamules, at margin not rimulose; velipellis persisting around margin as a circle of greyish patches, in young specimens with numerous greyish patches elsewhere. Lamellae, L = 35–45, l = 1–3, moderately crowded, subventricose, adnexed to emarginate-adnexed, ochraceous to cinnamon-brown; edge fimbriate, whitish. Stipe 20–50 x 2.5–5 mm, equal to subbulbous at base, sometimes even submarginately bulbous, solid, somewhat paler than pileus, brownish half-way, occasionally slightly darkening with age, but remaining whitish at base and apex, pruinose at apex and this pruina descending to about 1/3rd of length, indistinctly white-fibrillose below. Context whitish. Smell indistinct or spermatoc.

Spores 11.5–16.0(–17.0) x (6.5–)7.0–8.5(–9.0)  $\mu\text{m}$ , on average 12.2–14.8 x 7.2–7.8  $\mu\text{m}$ , Q = (1.4–)1.5–2.1(–2.2),  $\bar{Q}$  = 1.6–2.0, smooth, regular, with almost obtuse apex, not applanate at apex, conspicuously thick-walled. Pleurocystidia (43–)46–73(–74) x (14–)15–22  $\mu\text{m}$ , cylindrical, (slenderly) clavate or subtriform, thick-walled, with up to 2.0(–2.5)  $\mu\text{m}$  thick, almost colourless to very pale yellow wall, at apex crystalliferous, scarce. Cheilocystidia similar to pleurocystidia, scarce. Paracystidia (slenderly) clavate, thin-walled, colourless,

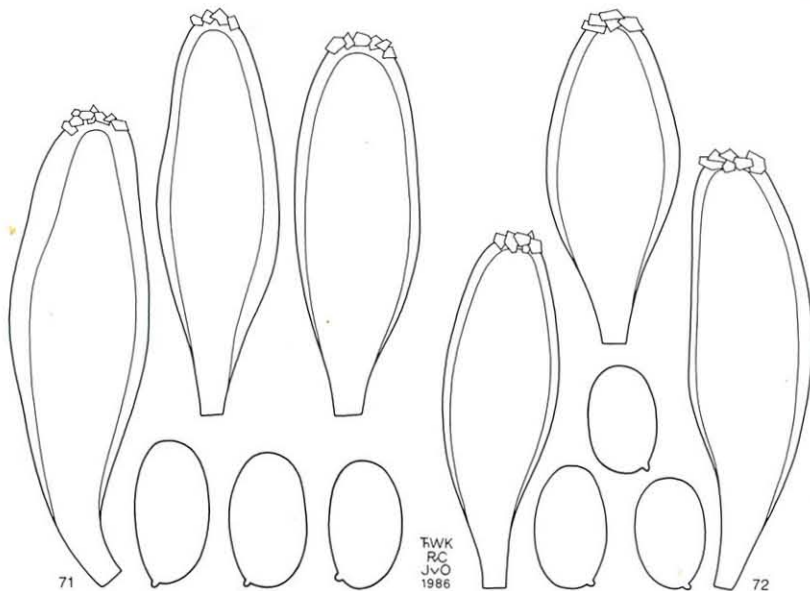
frequent. Basidia 34–41 x 10–13  $\mu\text{m}$ , predominantly 4-spored, but a few 2-spored. Caulocystidia only at apex of stipe, similar to cheilocystidia, soon turning into an intermediate zone of rather undifferentiated caulocystidioid hairs.

**HABITAT & DISTRIBUTION.** — In open vegetation on calcareous soil. Associated with *Salix repens*, *Populus*, and *Dryas octopetala* in the alpine zone. Very rare in Europe, known from 2 localities in the Netherlands. May–Sept.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Gelderland, Buren, 9.VIII.1971, de Kleuver 71.052; prov. Zuid-Holland, Oostvoorne, 11.VIII.1972, de Kleuver 72.079. — ITALY: prov. Alto Adige, Trento, Desert, V.1900, Bresadola (holotype of *I. similis*, S). — SWITZERLAND: Kt. Graubünden, Val Nügliä, alt. 2400 m, 15.VIII.1950, Favre (holotype of *I. rufobrunnea*, G); Kt. Bern, Gemmi-Spittelmatte, 14.IX.1980, Irlet 80.216 (BERN).

**Notes:** 1. The macroscopical description of this species has been copied from Huijsman (in Persoonia 9: 476. 1978).

2. *Inocybe similis* resembles *I. vulpinella* Bruylants very much, and both species seem to have comparable habitat preferences. *Inocybe similis* differs not only in covering of stipe but also because the pleurocystidia are somewhat larger and less thick-walled, and the spores have an almost obtuse apex. In *I. vulpinella* the apex of spore is partly subapplanate, suggesting an affinity with goniosporous species as *I. decipiens* Bres. and *I. dunensis* P. D. Orton.



Figs. 71–72. *Inocybe similis*. — Spores, pleurocystidia (71. from holotype of *I. similis*; 72. from holotype of *I. rufobrunnea*).

### 30. *Inocybe rufuloides* M. Bon

*Inocybe rufuloides* M. Bon in Docs mycol. 14(53): 28. 1984.

#### KEY TO THE VARIETIES OF *I. RUFULOIDES*

1. Pileus 11–34 mm, stipe 16–42 x 2.5–6 mm; spores on average 11.3–12.5 x 6.5–7.1  $\mu\text{m}$ ; under *Pinus*..... var. *rufuloides*, p. 109
1. Pileus 4–14 mm, stipe 14–44 x 0.6–3 mm; spores on average 13.7–14.0 x 7.4–8.0  $\mu\text{m}$ ; under frondose trees..... var. *xillis*, p. 110

#### 30.1. *I. rufuloides* var. *rufuloides* — Fig. 73

*Inocybe rufuloides* M. Bon

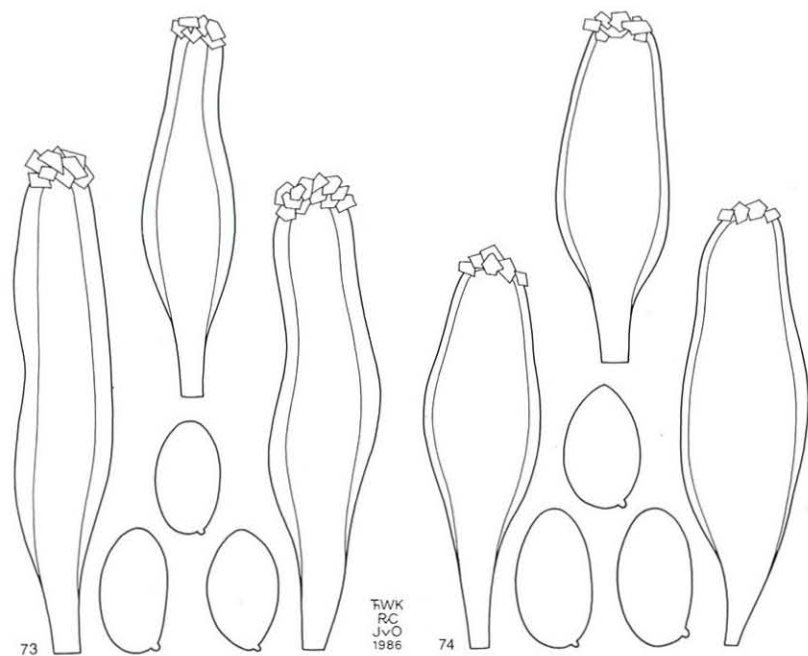
Pileus 11–34 mm, campanulate, conico-convex to convex when young, then plano-convex, finally almost applanate, often indistinctly umbonate but umbo sometimes prominent, with margin slightly inflexed when young but soon straight, not appendiculate, dark brown around centre [7.5 YR 3–4/3–4], somewhat brighter brown to orange-brown in outer half [7.5 YR 4–5/6, tending to 5/8], almost smooth to slightly tomentose around disc, outwards radially fibrillose, rather coarsely so, fibrils not or only slightly diverging, at margin sometimes rimulose, finally somewhat excoriate and becoming recurvately squamulose-subsquarrose, especially in outer half; velipellis mostly distinct, especially around disc, causing greyish tinge of pileus, but sometimes absent. Lamellae, L = 30–50, l = 1–3, moderately crowded, 4–8 mm broad, conspicuously ventricose, rather broadly to narrowly adnate, pale greyish buff when young, then brown [10 YR 5–6/4], finally dark brown [10 YR 3/3–4]; edge fimbriate to subfloculose, white to almost concolorous. Stipe 16–42 x 2.5–6 mm, equal to clavate, not distinctly bulbous, solid, brown to orange-brown [7.5 YR 5/8–4/6], most distinctly so half-way stipe, paler in lower half, near base almost whitish, extreme apex indistinctly pruinose or hairy-pruinose, downwards longitudinally white-fibrillose but fibrils disappearing on handling. Cortina present in young specimens, leaving no remnants on stipe. Context white in pileus, red-brown in upper part of stipe, especially in cortex. Smell and taste spermiatic.

Spores (10.0–)10.5–13.0(–13.5) x 6.0–7.5  $\mu\text{m}$ , on average 11.3–12.5 x 6.5–7.1  $\mu\text{m}$ , Q = 1.6–2.1(–2.2),  $\bar{Q}$  = 1.7–1.9, smooth, regular to subamygdaliform, with almost obtuse to indistinctly conical apex, somewhat thick-walled. Pleurocystidia (42–)48–66(–74) x 13–22(–25)  $\mu\text{m}$ , cylindrico-clavate, clavate, fusiform or utriform, a minority tending to sublageniform, thick-walled, with up to 1.5(–2.0)  $\mu\text{m}$  thick, pale to bright yellow wall, at apex crystalliferous, rather scarce. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia clavate, thin-walled, colourless, rather frequent. Basidia 30–38 x 9–12  $\mu\text{m}$ , predominantly 4-spored, but a few 2-spored. Caulocystidia absent or present at extreme apex of stipe (to 1/10th), similar to cheilocystidia and mixed with cauloparacystidia, downwards turning to a rather narrow zone of somewhat differentiated caulocystidioid hairs.

**HABITAT & DISTRIBUTION.** — Under *Pinus maritima* on dune-sand. Known from the Atlantic and Mediterranean Coast, not yet recorded from the Netherlands. April–May.

**COLLECTIONS EXAMINED.** — FRANCE: dept. Manche, Biville, 18.V.1983, Kuyper 2344, 2348, 2350, 2352 & 2354 & 22.V.1983, Kuyper 2361 & 2362; dept. Somme, Cayeux-sur-Mer, Bois de Brighton, 19.V.1983, Bon 83038 (holotype of *I. rufuloides*, herb. Bon). — ITALY: prov. Pisa, San Rossore, 6.IV.1984, Kuyper 2502.





Figs. 73–74. *Inocybe rufuloides*. — Spores, pleurocystidia (73. from holotype of *I. rufuloides*; 74. from holotype of var. *exilis*).

Note: Bon (in Docs mycol. 14(53): 28. 1984) reported the spores to be (8.0–)9.0–11.0(–13.0) x 5.0–6.5  $\mu\text{m}$ . Upon reexamination of the holotype I found much larger spores, viz. 10.5–13.0 x 6.0–7.5  $\mu\text{m}$ .

### 30.2. *I. rufuloides* var. *exilis* Kuyp., var. nov. — Fig. 74

A varietate typica differt habitu graciliore, sporis magnioribus et habitatione sub arboribus frondosis. Holotypus: *Th. W. Kuyp. 2657*, 24.X.1984, Marnewaard, Lauwersmeer, prov. Friesland, the Netherlands (L).

ETYMOLOGY: *exilis*, slender.

Pileus 4–14 mm, convex, not or only indistinctly umbonate, dark brown, somewhat reddish-tinged, rather coarsely radially fibrillose but fibrils not diverging, when young covered with white fibrillose-arachnoid velipellis, persisting around disc. Lamellae, L = 20, l = 1–3, subdistant, 1–3 mm broad, ventricose, narrowly adnate, dark reddish brown; edge flocculose,

white. Stipe 14–44 x 0.6–3 mm, equal, solid, in upper part yellow-brown to orange-brown, somewhat darker in lower part, at base dark reddish brown, at apex somewhat pruinose under lens, downwards longitudinally white-fibrillose. Context whitish in pileus, reddish brown-tinged in stipe, especially in cortex. Smell faint, subspermatic.

Spores 12.0–14.5(–16.0) x 6.5–8.5(–9.0)  $\mu\text{m}$ , on average 13.7–14.0 x 7.4–8.0  $\mu\text{m}$ , Q = 1.7–1.9(–2.0),  $\bar{Q}$  = 1.8–1.9, smooth, regular to subamygdaliform, with an indistinct submedian depression, with apex almost obtuse, not distinctly conical, with thick wall. Pleurocystidia (50–)56–66(–67) x (15–)17–21(–22)  $\mu\text{m}$ , fusiform, slenderly clavate to rather indistinctly utriform, thick-walled, with up to 2.0  $\mu\text{m}$  thick, yellowish-tinged wall, at apex somewhat crystalliferous, rather scarce. Cheilocystidia similar to pleurocystidia, scarce. Paracystidia (slenderly) clavate, thin-walled, sometimes slightly thick-walled, colourless, abundant. Basidia 4-spored. Caulocystidia present at extreme apex only, similar to cheilocystidia and mixed with cauloparacystidia, downwards soon passing into a narrow intermediate zone of somewhat differentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Associated with frondose trees and *Salix repens* in calcareous dune-sand. Known only from the Netherlands. Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland, Lauwersmeer, 24.X.1984, *Kuyp. 2657* (holotype of *I. rufuloides* var. *exilis*, L); prov. Zeeland, Haamstede, 22.X.1966, *Bas 4825*.

### 31. *Inocybe leptocystis* Atk. — Figs. 75–76

*Inocybe leptocystis* Atk. in Amer. J. Bot. 5: 212. 1918.

*Inocybe hygrophila* J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 6: 587. 1960 (inval., Art. 37.1).

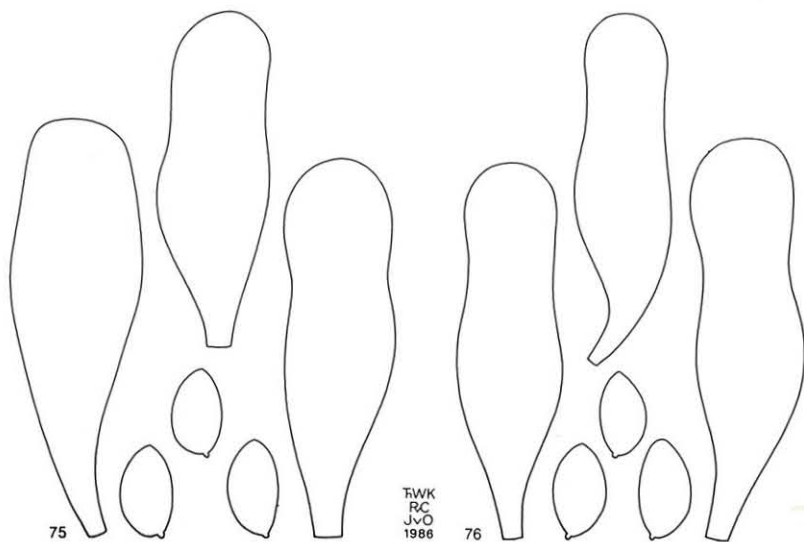
EXCLUDED. — *Inocybe leptocystis* sensu Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 73. 1955 (= *I. obscuroidia*).

SELECTED ICON: J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 6: pl. 2, f. 8. 1960 (as *I. hygrophila*).

Pileus 10–30 mm, convex to plano-convex, indistinctly umbonate, sometimes at margin slightly appendiculate, ochraceous buff to brownish [10 YR 7/6, 7/4, 6/4, 5/3], slightly pallescent on drying because of hygrophanous context, minutely tomentose to indistinctly fibrillose, with not diverging fibrils, at margin not rimulose, with age becoming minutely subsquamulose around centre; velipellis rather indistinct but in one collection more conspicuous. Lamellae, L = 30–35, l = 1–3, moderately crowded, 2–4 mm broad, not ventricose, moderately broadly adnate, yellowish-brownish [2.5 Y 6/4]; edge fimbriate, whitish. Stipe 20–45 x 2–4 mm, equal to slightly enlarged at base, not bulbous, solid, whitish to ochraceous [10 YR 6/6] especially in middle part, sometimes faintly pinkish-tinged near apex, even at apex not pruinose nor hairy, completely smooth to minutely white-fibrillose. Context becoming whitish on drying. Smell indistinct to faintly acidulous. Taste indistinct.

Spores 7.5–10.0 x 4.5–6.0  $\mu\text{m}$ , on average 8.2–9.3 x 4.9–5.6  $\mu\text{m}$ , Q = 1.5–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, regular to subamygdaliform, with indistinctly conical apex. Pleurocystidia (46–)49–69(–70) x 10–18(–19)  $\mu\text{m}$ , clavate to subutriform, sometimes indistinctly capitate, completely thin-walled, exceptionally with double wall less than 0.5  $\mu\text{m}$  thick, not or hardly crystalliferous at apex, sometimes with resinous exudate, rather frequent. Cheilocystidia similar to pleurocystidia, rather scarce. Paracystidia slenderly clavate to cylindrico-clavate, thin-walled, colourless, abundant. Basidia 24–30 x 7–9  $\mu\text{m}$ , 4-spored. Caulocystidia even at extreme apex absent, only a few undifferentiated hairs observed.

HABITAT & DISTRIBUTION. — Under coniferous trees on rather moist places. Associated



Figs. 75–76. *Inocybe leptocystis*. — Spores, pleurocystidia (75. from authentic material of *I. hygrophila*; 76. from holotype of *I. leptocystis*).

with *Picea*, in North America also with *Thuja*, sometimes even on very decayed wood of conifers. Not yet reported from the Netherlands, very rare in Central Europe and Scotland, more widespread in North America. July–Sept.

COLLECTIONS EXAMINED. — A U S T R I A: Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2180*. — S C O T L A N D: co. Invernesshire, Fort William, Nevis Forest, 18.IX.1983, *Kuyper 2402*. — S W I T Z E R L A N D: Kt. Graubünden, Fuorn, 9.VIII.1949, *Favre* (authentic material of *I. hygrophila*, G). — U N I T E D S T A T E S: New York, Ithaca, Campus Cornell University, 14.VII.1903, *Thom* (holotype of *I. leptocystis*, CUP); Michigan, Ogenaw Co., Rifle River Recreation Area, 5.VII.1963, *Bas 3249*; Cheboygan Co., Hermit Bog, 8.VII.1963, *Bas 3257*; Grass Bay, 9.VII.1963, *Bas 3259*.

### 32. *Inocybe obscurobadia* (J. Favre) Grund & Stuntz — Figs. 77–79

*Inocybe furfurea* var. *obscurobadia* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 200. 1955. — *Inocybe obscurobadia* (J. Favre) Grund & Stuntz in *Mycologia* 69: 407. 1977.

*Inocybe tenuicystidiata* Horak & Stangl in *Sydowia* 33: 149. ('1980') 1981.

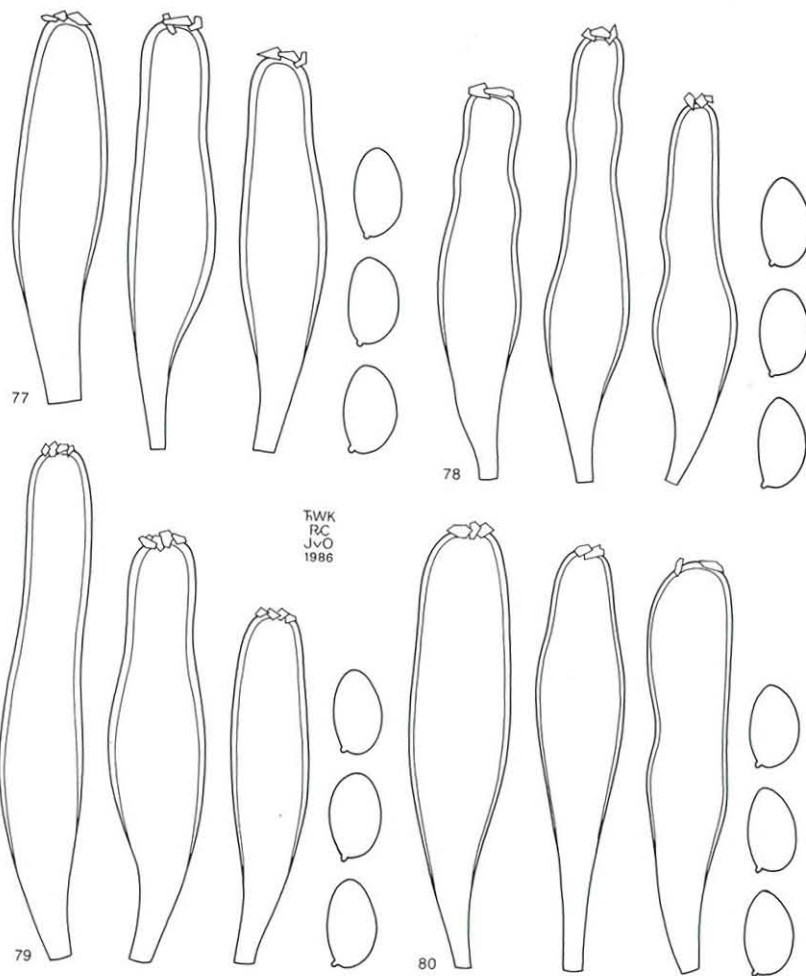
EXCLUDED. — *Inocybe obscurobadia* sensu Grund & Stuntz in *Mycologia* 69: 407. 1977 (= *Inocybe* spec.).

MISAPPLIED NAME. — *Inocybe leptocystis* sensu Kühner in *Bull. Soc. Nat. Oyonnax* 9(Suppl.): 73. 1955; sensu auct. eur.

SELECTED ICONES. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: pl. 7, f. 4. 1955

(as *I. furfurea* var. *obscurobadia*). — Stangl in *Z. Pilzk.* 37: pl. 6. 1971 (as *I. leptocystis*). — Alessio, *Iconogr. mycol.* 29: pl. 71, f. 2. 1980 (as *I. leptocystis*).

Pileus 8–37 mm, convex, plano-convex or applanate, umbonate, but often indistinctly so, dark brown, brown, isabella-brown or ochraceous brown, smooth around disc, outwards



Figs. 77–79. *Inocybe obscurobadia*. — Spores, pleurocystidia (77. from holotype of *I. leptocystis* var. *ambigua*; 78. from holotype of *I. tenuicystidiata*; 79. from holotype of *I. furfurea* var. *obscurobadia*). Fig. 80. *Inocybe maculipes*. — Spores, pleurocystidia (from lectotype of *I. maculipes*).

radially fibrillose-subsquamous, at margin not rimulose, sometimes with greyish sheen because of thin, non-persisting velipellis. Lamellae, L = 20–50, l = 1–3, moderately crowded, 2–7 mm broad, ventricose or not, narrowly to rather broadly adnate, yellowish-brownish or greyish-yellowish brown; edge fimbriate to subflocculose, white. Stipe 23–109 x 1.5–5 mm, equal, clavate or subulbous, solid, reddish ochraceous in apical part, downwards pallescent and less reddish-tinged, sometimes reddish tinges completely lacking, not pruinose at apex or only pruinose at extreme apex (less than 1/10th of stipe), downwards with longitudinally-fibrillose covering, disappearing on handling, white-tomentose at base. Cortina present in young specimens. Context whitish, but reddish in upper part of stipe. Smell when cut subspermatric, but on drying strongly *Pelargonium*-like. Taste indistinct to subspermatric.

Spores 7.0–11.0(–11.5) x 4.5–6.0(–6.5)  $\mu\text{m}$ , on average 7.8–10.3 x 4.9–5.8  $\mu\text{m}$ , Q = 1.5–2.0,  $\bar{Q}$  = 1.6–1.9, smooth, subamygdaliform with subconical apex. Pleurocystidia (48–)49–94(–97) x 10–17  $\mu\text{m}$ , cylindrical to slenderly fusiform, not lageniform, often somewhat flexuose in upper part, sometimes subcapitate, slightly thick-walled, with up to 1.0–1.5  $\mu\text{m}$  thick, pale to rather bright yellow wall, not or hardly crystalliferous at apex, frequent to abundant. Cheilocystidia similar to pleurocystidia, rather scarce. Paracystidia broadly clavate, thin-walled, colourless, abundant. Basidia 27–34 x 7–10  $\mu\text{m}$ , 4-spored. Caulocystidia absent or only at extreme apex, more or less similar to cheilocystidia, also cauloparacystidia present; soon only undifferentiated to rather differentiated caulocystidioid hairs present.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on somewhat calcareous soil. Associated with *Alnus*, *Salix*, *Populus*, *Quercus*, *Picea*, *Pinus*, and *Larix*, sometimes also growing on decayed wood. Widespread in Europe, rare in the Netherlands. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: I J S S E L m e e r p o l d e r s: Houtribbos, 15.VIII.1982, *Jansen*; Jagersveld, 7.VII.1981, *Kuyper 1606* & 23.X.1981, *Tjallingii-Beukers*; prov. U t r e c h t, Utrecht, 13.X.1981, *Kuyper 1938*; prov. Z e e l a n d, Hulst, 21.IX.1981, *de Meijer 513*. — A U S T R I A: Salzburg, Hinterglemm, 12.VII.1983, *Rücker*; Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2179*, 2182 & 2184; Pertisau, Falzthurntal, 6.IX.1982, *Kuyper 2203*. — B E L G I U M: prov. Luxembourg, Daverdisse, Barboillon, 4.X.1982, *Kuyper 2271*; prov. Namur, Dourbes, Tièneau-Pauquis, 1.X.1984, *Kuyper 2609* & 2613; Resteigne, Bois de Resteigne, 8.X.1982, *Kuyper 2292*. — C Z E C H O S L O V A K I A: Slovakia, Nižke Tatry, Stanišovská Dolina, 10.IX.1981, *Kuyper 1734* & 12.IX.1981, *Kuyper 1764*. — E N G L A N D: co. Bedfordshire, Chicksands Wood, 2.XI.1980 (K). — G E R M A N Y: Inzigkofen, Schlosspark, 23.IX.1974, *Stangl 1039* (holotype of *I. tenuicystidiata*, M); Bavaria, Bubesheimer Wald, 18.X.1980, *Enderle* (M). — S C O T L A N D: co. Perthshire, Inver, The Hermitage, 26.IX.1983, *Kuyper 2542*. — S W I T Z E R L A N D: Kt. Graubünden, Region of Fuorn, Val Nügli, alt. 2400 m, 31.VIII.1949, *Favre* (holotype of *I. furfurea* var. *obscurobadia*, G); Kt. Bern, Bremgartenwald, 23.IX.1984, *Kuyper 2583*.

Notes: 1. This species has in Europe for a long time been known under the misapplied name *I. leptocystis*. Horak & Stangl (in Sydowia 33: 145. ('1980') 1981) asserted that they were unable to find a name for this misapplied species and for that reason described it as new under the name *I. tenuicystidiata*. However, they overlooked the fact that Favre (in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 91. 1955) had already described that taxon which was subsequently elevated to specific rank by Grund & Stuntz (in *Mycologia* 69: 407. 1977). Unfortunately, both American authors misapplied the name *I. obscurobadia*.

2. *Inocybe leptocystis* var. *ambigua* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 201 (1955) was said to be only a minor variant of *I. obscurobadia*. Favre's icon (l.c., pl. 6, f. 1) looks macroscopically strikingly different, however, and the synonymy has in my opinion not yet unambiguously been demonstrated, despite identical microscopical characters.

### 33. *Inocybe maculipes* J. Favre — Fig. 80

*Inocybe maculipes* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 201. 1955.  
SELECTED ICON. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N. F. 5: pl. 7, f. 6. 1955.

Pileus to 20 mm, hemispherical then conical, indistinctly umbonate, at first (almost) completely white because of velipellis, gradually discolouring to ochraceous brown in outer part, remaining whitish around centre, smooth, outwards radially fibrillose, at margin often somewhat rimose. Lamellae, L = 34–42, l = 1–3, moderately crowded, to 3.5 mm broad, somewhat ventricose, narrowly adnate, whitish, then greyish-brownish to brown; edge white. Stipe to 30 x 4.5 mm, swollen towards base (to 7 mm), solid, whitish, soon with moderately dark brown spots, pruinose only near apex, longitudinally white-fibrillose downwards, sometimes even with a very indistinct and fugacious ring-like zone. Cortina conspicuously present in young specimens, somewhat persisting at margin of pileus. Context whitish, with age somewhat brownish. Smell spermatric. Taste indistinct.

Spores (8.5–)9.0–10.0(–10.5) x 5.0–6.0  $\mu\text{m}$ , on average 9.5 x 5.5  $\mu\text{m}$ , Q = 1.6–1.8(–1.9),  $\bar{Q}$  = 1.7, smooth, regular to subamygdaliform, with subconical apex. Pleurocystidia (54–)58–67(–75) x 12–15  $\mu\text{m}$ , cylindrical, sometimes tending to sublageniform, partly with flexuose apical part and/or constricted subapically, thick-walled, with up to 1.0(–1.5)  $\mu\text{m}$  thick, pale yellow wall, crystalliferous at apex, abundant. Cheilocystidia similar to pleurocystidia, rather scarce. Paracystidia slenderly clavate, thin-walled, colourless. Basidia 27–36 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia not observed, only with some rather undifferentiated caulocystidioid hairs at extreme apex.

HABITAT & DISTRIBUTION. — Associated with *Dryas octopetala* on calcareous soil. So far known only from the Swiss Alps. Aug.

COLLECTION EXAMINED. — S W I T Z E R L A N D, Kt. Graubünden, Ofenpass, Piz d'Aint, alt. 2350 m, 22.VIII.1949, *Favre* (lectotype of *I. maculipes*, design. Monthoux & Kuyper, G).

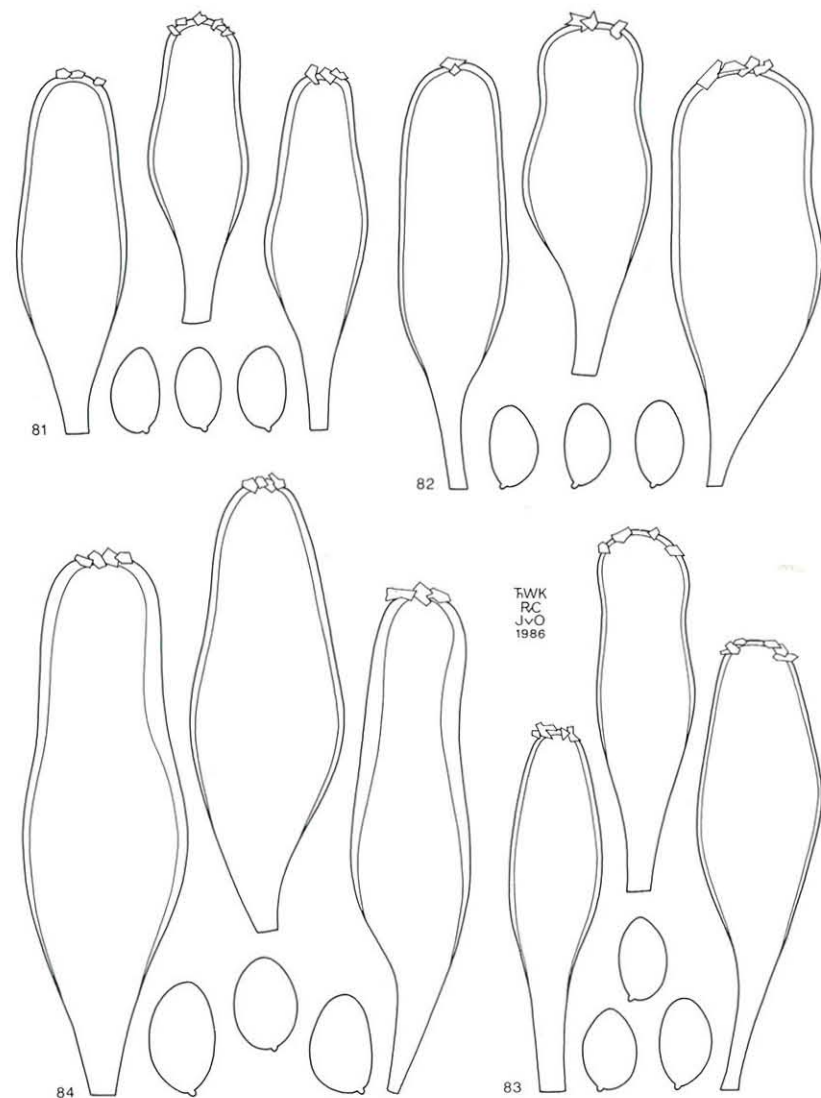
Notes: 1. The macroscopical description has been copied from Favre (l.c.).

2. *Inocybe maculipes* comes in microscopical characters close to *I. obscurobadia* (J. Favre) Grund & Stuntz but differs in having a much more developed velipellis and a brown-spotted stipe. Its smell seems to be different too.

### 34. *Inocybe melanopus* Stuntz — Figs. 81–83

*Inocybe melanopus* Stuntz in *Pap. Mich. Acad. Sci.* 39: 68. ('1953') 1954.  
*Inocybe calcaris* Métrod in *Schweiz. Z. Pilzk.* 31: 158. 1953. (inval., Art. 36.1).  
*Inocybe submaculipes* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 6: 587. 1960. (inval., Art. 37.1).  
*Inocybe submaculipes* f. *gigantea* Romagn. in *Beih. Sydowia* 8: 358. 1979. (inval., Art. 43.1).  
SELECTED ICON: J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 6: pl. 2, f. 7 (as *I. submaculipes*). 1960.

Pileus 31–54 mm, convex to subapplanate, with a low, broad umbo, with margin somewhat inflexed when young, pale brownish ochraceous to ochraceous [2.5 Y 7/6, 6/6], woolly-felted to somewhat squamulose, especially near margin, with squamules somewhat darker brown, around disc with thin velipellis giving centre greyish hue. Lamellae, L = 60–80,



Figs. 81–83. *Inocybe melanopus*. — Spores, pleurocystidia (81. from authentic material of *I. calcaris*; 82. from holotype of *I. melanopus*; 83. from authentic material of *I. submaculipes*).  
Fig. 84. *Inocybe olivaceobrunnea*. — Spores, pleurocystidia (from holotype of *I. olivaceobrunnea*).

l = 1–3, (very) crowded, 4–5 mm broad, not or hardly ventricose, emarginate, rather narrowly adnate, pale ochraceous brown with a faint olivaceous tinge [2.5 Y 5–6/4]; edge fimbriate to subflocculose, white. Stipe 30–63 x 4–10 mm, equal to somewhat broadening towards base, not bulbous, solid, pale brownish in upper part [10 YR 5/4], darker downwards, dark brown to fuliginous at base [10 YR 4/3, 3/2, 2/2], but at utmost base with pale ochraceous tomentum, minutely hairy at extreme apex, not truly pruinose, downwards soon longitudinally fibrillose. Context sordid whitish in pileus and stipe. Smell when cut none, on drying rather faint, somewhat reminding of cheap soap. Taste not distinct.

Spores 7.5–10.0 x 4.0–5.5  $\mu\text{m}$ , on average 8.1–9.0 x 4.7–5.3  $\mu\text{m}$ , Q = 1.6–2.0(–2.1),  $\bar{Q}$  = 1.7–1.9, smooth, regular to subamygdaliform, with almost rounded to subconical apex. Pleurocystidia (42–)45–64(–67) x (10–)11–22(–23)  $\mu\text{m}$ , cylindrical to slenderly utriform, a minority subcapitate, only slightly thick-walled, with up to 0.5(–1.0)  $\mu\text{m}$  thick, colourless wall, not or hardly crystalliferous at apex, rather frequent to scarce. Cheilocystidia similar to pleurocystidia or somewhat more slender, not frequent. Paracystidia slenderly clavate, thin-walled, colourless, abundant. Basidia 25–38 x 7–10  $\mu\text{m}$ , 4-spored. Caulocystidia absent, at extreme apex with some undifferentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under coniferous trees. Associated with *Pinus* and *Picea*. Widespread in Europe, but apparently (very) rare, also occurring in North America. Known from one collection in the Netherlands. June–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Noord-Holland, Bergen, 8.X.1967, *Bas* 4949. — AUSTRIA: Tirol, Jenbach, 9.IX.1982, *Kuyper* 2192. — FRANCE: Bois de Curtil, 27.VI.1946, *Métrod* 1962 (authentic material of *I. calcaris*, herb. Métrod, PC); dpt. Landes, Escource, 9.XI.1972 ('holotype' of *I. submaculipes* f. *gigantea*, herb. Romagnesi). — GERMANY: Baden, Wöschbach, *Schwöbel* (herb. Romagnesi). — SWITZERLAND: Kt. Graubünden, Val Mingèr, 22.VIII.1948, *Favre* (authentic material of *I. submaculipes*, G). — UNITED STATES: Washington, Friday Harbor, Biological Station, 15.VII.1948, *Stuntz* 3641 (holotype of *I. melanopus*, WTU).

Note: The holotype of *I. melanopus* differs from the European collections in having somewhat broader pleurocystidia; they are also much more scarce. I do not consider these differences as important. Likewise, a variant, which occurs along the Atlantic Coast of Europe and generally is somewhat more robust, does not seem to deserve an autonomous rank.

### 35. *Inocybe olivaceobrunnea* J. Favre ex Kuyp., *spec. nov.* — Fig. 84

*Inocybe olivaceobrunnea* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 6: 587. 1960 (inval., Art. 37.1; validated hoc loco, Art. 45.1).

SELECTED ICON. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 6: pl. 2, f. 4. 1960.

Pileus to 27 mm, at first conical, then plano-convex to applanate, not or only indistinctly umbonate, reddish-tinged ochraceous brown, somewhat darkening with age, distinctly squamulose around centre, less distinctly so outwards, at margin more tomentose; no velipellis observed. Lamellae, L = 33–37, l = 1–3, ventricose, to 4 mm broad, broadly adnate to even subdecurrent, at first pale olivaceous brown, finally dark olivaceous brown; edge fimbriate, concolorous. Stipe to 24 x 5 mm, slightly swollen below (to 6 mm), but not bulbous, solid, whitish, becoming pale brownish in lower half, even at apex not pruinose, longitudinally fibrillose throughout. Cortina not observed. Context whitish. Smell absent. Taste not recorded.

Spores 9.5–11.0 x 6.0–7.0  $\mu\text{m}$ , average 10.2 x 6.6  $\mu\text{m}$ , Q = 1.5–1.6, smooth, regular to subamygdaliform, with almost obtuse apex. Pleurocystidia (64–)66–85(–109) x (17–)18–23(–24)

$\mu\text{m}$ , cylindrical, partly tending to subfusiform or subutriform, thick-walled, with up to 2.0 (in apical part to 3.0)  $\mu\text{m}$  thick, colourless wall, somewhat crystalliferous at apex, not frequent. Cheilocystidia as pleurocystidia, scarce. Paracystidia broadly cylindrical to subclavate, thin-walled, colourless, frequent. Basidia 32–39 x 10–12  $\mu\text{m}$ , 4-spored. Caulocystidia completely absent, at extreme apex of stipe only with some undifferentiated thin-walled hairs.

**HABITAT & DISTRIBUTION.** — Between moss under coniferous trees. Known only from the type-locality in the Swiss Alps. Aut.

**COLLECTION EXAMINED.** — S W I T Z E R L A N D: Kt. Graubünden, God dal Fuorn, alt. 1850 m, 14.VIII.1949, Favre (holotype of *I. olivaceobrunnea*, G).

Notes: 1. The macroscopical description has been copied from Favre (1. c.). As the species was not validly published, lacking the designation of a nomenclatural type (Art. 37.1), it is formally validated here in accordance with Art. 45.1.

2. Easily recognised because of squamulose pileus and broadly adnate to subdecurrent olivaceous brown lamellae.

### 36. *Inocybe albovelutipes* Stangl — Fig. 85

*Inocybe albovelutipes* Stangl in Stangl, Winterhoff & Schwöbel in Z. Mykol. 46: 166. 1980.

SELECTED ICON. — Stangl & al. in Z. Mykol. 46: 167. 1980.

Pileus 30–50 mm, convex to plano-convex with low broad umbo, yellowish buff to ochraceous buff, rather pale, old specimens somewhat darker, ochraceous brown [10 YR 5/4], minutely to rather coarsely woolly-tomentose, at margin not rimulose, dull, sometimes covered with thin velipellis causing greyish hue. Lamellae, L = 50–70, l = 1–3, moderately crowded, 4–5 mm broad, (sub)ventricose, narrowly adnate, greyish brown, in old specimens with a faint olivaceous tinge; edge fimbriate, white. Stipe 40–45 x 6–9 mm, equal or somewhat attenuated below, sometimes with a slightly swollen base, but not bulbous, solid, whitish when young, then pale yellow-brown, sometime with pinkish tinge near apex, with white-fibrillose covering, at apex not pruinose. Cortina present in young specimens. Context whitish. Smell faint, subspermatic. Taste not recorded.

Spores 8.0–10.0 x 4.5–6.0  $\mu\text{m}$ , on average 8.8–9.3 x 5.0–5.4  $\mu\text{m}$ , Q = 1.6–1.9, Q = 1.7–1.8, smooth, regular to subamygdaliform, with subconical apex. Pleurocystidia (42–)46–69(–74) x 11–17(–19)  $\mu\text{m}$ , cylindric-clavate, slenderly clavate to slenderly subfusiform or subutriform, a minority subcapitate, slightly thick-walled, with usually less than 0.5  $\mu\text{m}$ , sometimes up to 1.0  $\mu\text{m}$  thick, colourless wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia clavate to cylindrical, thin-walled, colourless, abundant. Basidia 25–38 x 7–10  $\mu\text{m}$ , 4-spored. Caulocystidia absent, at extreme apex only rather undifferentiated caulocystidioid hairs present.

**HABITAT & DISTRIBUTION.** — Under frondose and coniferous trees on sandy soil. Associated with *Quercus*, *Fagus*, *Pinus*, and *Picea*. Rare in Europe, known from three localities in the Netherlands. Aug.-Oct.

**COLLECTIONS EXAMINED.** — N E T H E R L A N D S: prov O v e r i j s s e l, Eerde, 13.VIII.1963, *Kits van Waveren*; prov. G e l d e r l a n d, Warnsveld, 17.VIII.1962, *Kits van Waveren*; prov. N o o r d - H o l l a n d, Vogelenzang, 16.X.1955, *Swanenburg de Veye*. — F I N L A N D: Savonia borealis, Kuopio, 12.IX.1981, *Vauras 1156F* (M). — G E R M A N Y: Eifel, Totenmaar, Gillenfeld, 21.VIII.1980, *Runge* (M); Sandhausen near Heidelberg, Düne Pflege Schönau, 16.X.1974, *Schwöbel & Winterhoff* (holotype of *I. albovelutipes*, M).

Note: *Inocybe albovelutipes* comes very close to *I. monochroa* J. Favre (see p. 119). On account of differences in spore and cystidial characters both taxa are accepted as autonomous species, but more material might well indicate that they are merely infraspecific taxa of one species.

See also comments under *I. subnudipes* Kühner (p. 235).

### 37. *Inocybe monochroa* J. Favre — Fig. 86

*Inocybe monochroa* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N. F. 5: 201. 1955.

SELECTED ICON. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: pl. 7, f. 3. 1955.

Pileus to 24 mm, convex, indistinctly umbonate, margin slightly inflexed, somewhat extending over lamellae, at first whitish, then pale ochraceous brown [10 YR 7/6], centre remaining whitish because of tomentose velipellis, outwards rather coarsely woolly-fibrillose, with fibrils not diverging, not radially rimulose. Lamellae, L = 25–35, l = 1–3, moderately crowded, to 3 mm broad, not ventricose, rather broadly adnate, yellowish grey [2.5 Y 7/3–6/3]; edge fimbriate, white. Stipe 35 x 4 mm, subequal, solid, concolorous with pileus to somewhat darker brownish underneath a rather coarsely whitish longitudinal fibrillose

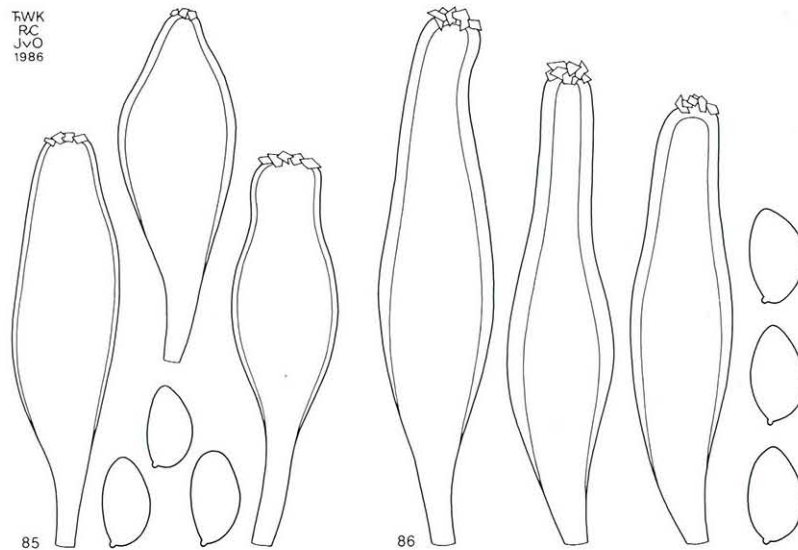


Fig. 85. *Inocybe albovelutipes*. — Spores, pleurocystidia (from holotype of *I. albovelutipes*).  
Fig. 86. *Inocybe monochroa*. — Spores, pleurocystidia (from holotype of *I. monochroa*).

covering, minutely hairy but not truly pruinose at extreme apex. Context whitish in pileus, pale brownish in cortex of stipe, especially near apex. Smell when cut somewhat acidulous-spermiatic. Taste as smell.

Spores  $9.5\text{--}11.0 \times 5.5\text{--}6.5 \mu\text{m}$ , on average  $10.1\text{--}10.4 \times 5.8 \mu\text{m}$ ,  $Q = 1.7\text{--}1.9$ ,  $\bar{Q} = 1.8$ , smooth, subamygdaliform, with rather indistinctly conical apex. Pleurocystidia  $61\text{--}87\text{--}(94) \times 11\text{--}16\text{--}(17) \mu\text{m}$ , (slenderly) cylindrical to slenderly subfusiform, exceptionally somewhat tending to sublageniform, thick-walled, with up to  $1.5\text{--}2.0 \mu\text{m}$  thick, almost colourless to pale yellow wall, with crystalliferous apex, moderately frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia (slenderly) clavate, thin-walled, colourless. Basidia  $33\text{--}41 \times 9\text{--}12 \mu\text{m}$ , 4-spored. Caulocystidia only present at extreme apex (less than 1/10th) of stipe, similar to cheilocystidia, soon forming an intermediate zone of rather undifferentiated caulocystidioid hairs.

**HABITAT & DISTRIBUTION.** — Associated with *Dryas octopetala*, *Salix retusa*, and *Pinus mugo* on calcareous soil. Hitherto only known from the Alps. Sept.

**COLLECTIONS EXAMINED.** — A U S T R I A: Tirol, Roskogel, alt. 1900 m, 7.IX.1982, *Kuyper 2164*. — S W I T Z E R L A N D: Kt. Graubünden, Alp Minger, alt. 2200 m, 2.IX.1948, *Favre* (holotype of *I. monochroa*, G).

Note: *Inocybe monochroa* comes very close to *I. albovelutipes* Stangl but differs in having larger spores and more slender cystidia with a thicker wall. More material is needed for a better evaluation of the relationships between both species.

### 38. *Inocybe abjecta* (P. Karst.) Sacc. — Figs. 87–90

*Agaricus abjectus* P. Karst. in Meddn Soc. Fauna Flora fenn. 5: 1721. 1878. — *Inocybe abjecta* (P. Karst.) Sacc., Syll. Fung. 5: 768. 1887.

*Inocybe caucasica* Sing. in Rev. Mycol. 2: 236. 1937.

*Inocybe cavipes* J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: 200. 1955, non *I. cavipes* (Britz.) Sacc. & Trott. 1912.

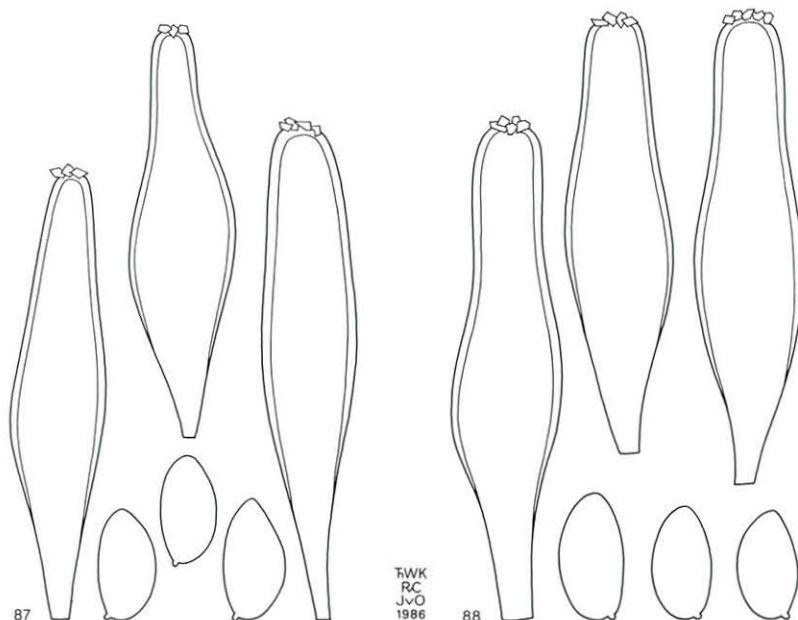
*Inocybe peronatella* J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 6: 587. 1960 (inval., Art. 37.1).

EXCLUDED. — *Inocybe abjecta* sensu J. Lange, Fl. agar. dan. 3: 73, pl. 111B. 1938 (= *I. flocculosa* var. *flocculosa*); sensu auct. eur.

SELECTED ICON. — J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 6: pl. 2, f. 5. 1960 (as *I. peronatella*).

Pileus 10–25 mm, subconical or subcampanulate when young, then convex to plano-convex, umbonate, brown, somewhat paler when dry, sometimes darkest around centre, squamulose-squarrose, at margin not rimulose, sometimes covered with a white-fibrillose velipellis, and this most conspicuous around centre, and disappearing with age or persistent. Lamellae moderately crowded, to 3 mm broad, subventricose, adnate, brown, finally olivaceous-tinged dark brown; edge fimbriate, whitish. Stipe 30–45 x 2–4 mm, equal, solid, pale brown, somewhat darker brown in middle part, somewhat pruinose near apex, almost smooth downwards. Cortina present in young specimens.

Spores  $(10.0\text{--})10.5\text{--}13.5\text{--}(14.0) \times 6.0\text{--}7.0\text{--}(7.5) \mu\text{m}$ , on average  $11.0\text{--}12.3 \times 6.3\text{--}6.7 \mu\text{m}$ ,  $Q = 1.6\text{--}1.9\text{--}(2.0)$ ,  $\bar{Q} = 1.8\text{--}1.9$ , smooth, (sub)amygdaliform, with subconical apex. Pleurocystidia  $(51\text{--})54\text{--}80\text{--}(86) \times (13\text{--})14\text{--}20\text{--}(21) \mu\text{m}$ , cylindrical, (slenderly) utriform, sometimes sublageniform, a few with subcapitate apex, slightly thick-walled, with up to  $1.0\text{--}(1.5) \mu\text{m}$  thick, colourless or pale yellowish wall, hardly crystalliferous at apex, moderately frequent. Cheilocystidia similar to pleurocystidia, moderately scarce. Paracystidia slenderly clavate, thin-walled, colourless, abundant. Basidia  $35\text{--}42 \times 10\text{--}12 \mu\text{m}$ , 4-spored. Stipe at apex with



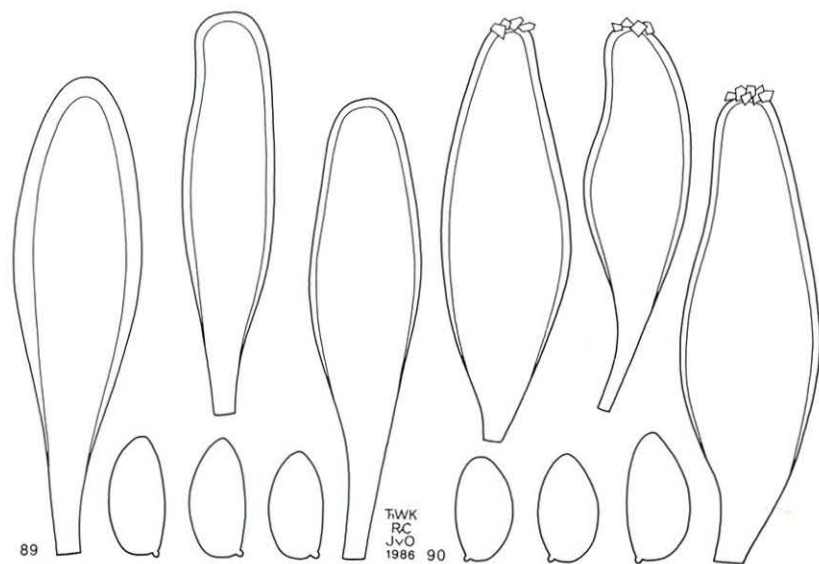
Figs. 87–88. *Inocybe abjecta*. — Spores, pleurocystidia (87. from holotype of *I. abjecta*; 88. from holotype of *I. caucasica*).

true caulocystidia, sometimes only at extreme apex, sometimes descending to 1/6th of stipe, similar to cheilocystidia, mixed with cauloparacystidia.

**HABITAT & DISTRIBUTION.** — Under coniferous trees on bare soil or between mosses. Very rare in Europe; known from Finland, Switzerland, and the Soviet Union. July–Sept.

**COLLECTIONS EXAMINED.** — F I N L A N D: Tavastia australis, Tammela, Syrjä, 21.IX.1877, *Karsten* (holotype of *A. abjectus*, H), 16.IX.1878, 5.IX.1890 & 11.VIII.1892 (H). — S O V I E T U N I O N: Caucasus, Yatyrgvarta Mt., 30.VII.1936, *Vasilieva* (holotype of *I. caucasica*, LE). — S W I T Z E R L A N D: Kt. Graubünden, between Plan Ot and Tablasot, 20.VIII.1944, *Favre* (authentic material of *I. peronatella*, G); Val Sesvanna near Scarl, 20.VIII.1944, *Favre* (holotype of *I. cavipes*, G); Planeyse, 16.IX.1968, *Huijsman*.

Note: The macroscopical description is a compilation of the original protologues. It should be remarked, however, that there is some variation in macroscopical characters, especially with regard to pileal colour. This variation is probably caused only by the development of the velipellis, and for that reason I assume that not much taxonomic value should be attached to that character. More material might show constant differences, justifying then a treatment of infraspecific taxa.



Figs. 89–90. *Inocybe abjecta*. — Spores, pleurocystidia (89. from holotype of *I. cavipes*; 90. from authentic material of *I. peronatella*).

### 39. *Inocybe phaeodisca* Kühner

*Inocybe phaeodisca* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 5. 1955.

#### KEY TO THE VARIETIES OF *I. PHAEODISCA*

1. Pileus 20–35 mm, with dark brown to isabella-brown centre, and contrasting pale buff outer part; stipe 25–55 x 2.5–5 mm. .... var. *phaeodisca*, p. 122
1. Pileus 12–21 mm, with brown to pale brown centre and almost whitish to very pale buff outer part; stipe 21–45 x 1.5–3 mm. .... var. *geophylloides*, p. 124

#### 39.1. *I. phaeodisca* var. *phaeodisca* — Fig. 91

*Inocybe phaeodisca* Kühner

*Inocybe phaeodisca* var. *diosma* Reumaux in Doec mycol. 14(54–55): 30. 1984.

MISAPPLIED NAME. — *Inocybe descissa* sensu Bres., Iconogr. mycol. 15: pl. 743, f. 1. 1930.

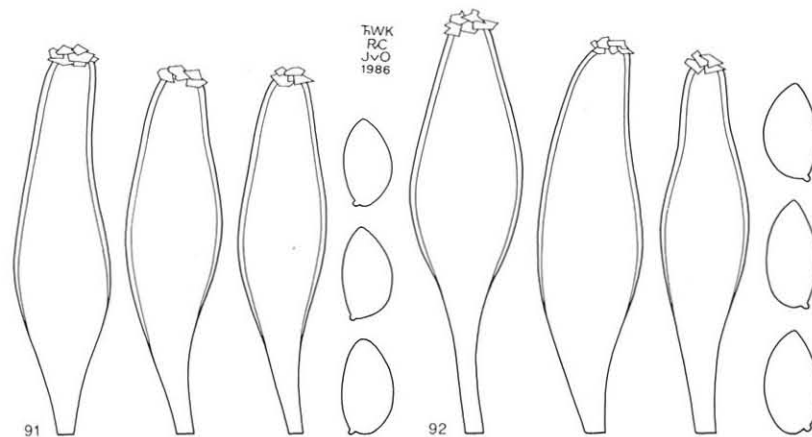
SELECTED ICONES. — Bres., Iconogr. mycol. 15: pl. 743, f. 1. 1930 (as *I. descissa*). — Alessio, Iconogr. mycol. 29: pl. 72, f. 1. 1980.

Pileus 20–35 mm, campanulate when young, then convex to plano-convex, umbonate but sometimes only indistinctly so, around centre dark brown to isabella-brown [7.5 YR 4/4 to 10 YR 6/4], rather strongly contrasting with outer half which is pale buff [10 YR 8/4], around centre sericeous-smooth to subtomentose, slightly cracking on age, outwards fibrillose, but with fibrils not or hardly diverging, not rimulose at margin; no velipellis observed. Lamellae, L = 30–45, l = 1–3, not crowded, not or hardly ventricose, moderately broadly adnate, yellowish-brownish [10 YR–2.5 Y 5/4]; edge fimbriate, whitish. Stipe 25–55 x 2.5–5 mm, equal to somewhat swollen at base, but not bulbous, solid, at apex pinkish buff, downwards whitish, not or only very indistinctly pruinose at apex, downwards rather conspicuously longitudinally shite-fibrillose. Cortina conspicuous in young specimens, sometimes leaving ring-like zone on stipe. Context whitish in pileus, distinctly red-brown in upper part of stipe. Smell faint, subspermatic. Taste not recorded.

Spores (8.5–9.0–10.5 x 4.5–5.5  $\mu$ m, on average 9.3–9.7 x 5.1–5.3  $\mu$ m, Q = 1.7–2.0,  $\bar{Q}$  = 1.8–1.9, smooth, subamygdaliform, partly with a suprahilar, depression, with conical apex. Pleurocystidia (46–)52–74 x 13–17  $\mu$ m, cylindrical, subfusiform to subutriform, sometimes tending to sublageniform, although not conspicuously so, thick-walled, with up to 1.59–2.0  $\mu$ m thick, colourless wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia. Paracystidia (broadly) clavate, thin-walled, colourless. Basidia 24–33 x 8–10  $\mu$ m, 4-spored. Stipe even at extreme apex without true caulocystidia, only some rather undifferentiated caulocystidioid hairs present.

HABITAT & DISTRIBUTION. — Under frondose trees. Associated with *Alnus*, *Betula*, *Fagus*, and *Quercus*. Probably widespread but rare in Europe, known from two localities in the western part of the Netherlands. June–Sept.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Zuid-Holland: Leiden, 25.VIII.1981, *Bas* 77834; Oostvoorne, 28.VI.1972, *Bas* 5830. — FRANCE: Ardennes, Bois de Vandy, Reumaux (holotype of *I. phaeodisca* var. *diosma*, herb. Reumaux). — GERMANY: Bavaria, Unterfahlheim, 4.IX.1982, *Enderle*.



Figs. 91–92. *Inocybe phaeodisca*. — Spores, pleurocystidia (91. from Enderle; 92. from Kuyper 2139).

Notes: 1. The macroscopical description is partly based on the description given by Kühner (in Bull. Soc. Nat. Oyonnax 9(Suppl.): 75. 1955).

2. *Inocybe phaeodisca* var. *diosma* Reumaux (in Docs mycol. 14(54–55): 30. 1984) differs in slender basidiocarps (pileus 20–30 mm; stipe 80–90 x 3–5 mm) and complex smell being a mixture of a goat-like smell and a *Pelargonium*-smell. This local variant could deserve autonomous taxonomic status, but more material is needed for a better evaluation.

### 39.2. *I. phaeodisca* var. *geophylloides* Kühner — Fig. 92

*Inocybe phaeodisca* var. *geophylloides* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 5. 1955.

SELECTED ICONES. — Alessio, Iconogr. mycol.: 29: pl. 72, f. 2. 1980. — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 19, f. 1. 1985.

Pileus 12–21 mm, convex, plano-convex to subapplanate, not or only indistinctly umbonate, with margin somewhat extending over lamellae in young specimens, but not distinctly appendiculate-dentate, around disc isabella-brown to brownish-pinkish [7.5 YR 6–7/4, or 5–6/6], outer half very pale buff to whitish [paler than 10 YR 8/2], at disc subtomentose, with age becoming subsquamulose, outer half radially fibrillose, with somewhat diverging fibrils and at margin rimulose, not greasy, dull. Lamellae, L = 25–35, l = 1–3, moderately crowded, 2–4 mm broad, not ventricose to subventricose, rather broadly to rather narrowly adnate, whitish, then pale greyish buff to ochraceous brown; edge fimbriate, whitish. Stipe 21–45 x 1.5–3 mm, equal to somewhat swollen near base, not bulbous, solid, whitish, discolouring with age to pale isabella-brown [10 YR 7–8/4], but more reddish brown near apex [5 YR 5/8], at extreme apex slightly hairy, downwards soon rather coarsely longitudinally fibrillose. Cortina present in young specimens. Context whitish in pileus, reddish-brownish in upper part of stipe, pale buff in lower part. Smell faint, spermatic. Taste as smell.

Spores (8.0–)9.0–11.0 x 5.0–6.0  $\mu$ m, on average 9.1–10.0 x 5.3–7  $\mu$ m, Q = 1.6–2.0,  $\bar{Q}$  = 1.7–1.9, smooth, subamygdaliform, with conical apex. Pleurocystidia (52–)53–67(–70) x (12–)13–20  $\mu$ m, slenderly fusiform to slenderly utriform, sometimes even somewhat lageniform, but not distinctly so, thick-walled, with up to 1.5  $\mu$ m thick, colourless wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate to pyriform, thin-walled, colourless, frequent. Basidia 28–34 x 9–11  $\mu$ m, 4-spored. Caulocystidia absent, at extreme apex of stipe only with somewhat differentiated, but sometimes rather undifferentiated, caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under frondose trees, also under conifers (unidentified). Associated with *Quercus*, *Carpinus*, and *Corylus*. Probably widespread but rare in Europe, known from one locality in the Netherlands. Sept.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Zuid-Holland, Wassenaar, 2.IX.1982, *Kuyper* 2139. — BELGIUM: prov. Namur, Ave-et-Auffe, Fond d'Auffe, 3.X.1982, *Kuyper* 2257; Nismes, 8.X.1982, *Kuyper* 2299 & 30.IX.1984, *Kuyper* 2597. — CZECHOSLOVAKIA: Slovakia, Raková near Čadca, 17.X.1974, *Kuthan* (PRM 828413, as *I. kuehneri*). — GERMANY: Westfalen, Heiligenkirchen, 16.IX.1972, *Huijsman*; Eifel, Gerolstein, Büschkapelle, 4.X.1971, *Tjallingii-Beukers*.

### 40. *Inocybe glabripes* Rick. — Fig. 93

*Inocybe glabripes* Rick., Blätterpilze: 107. 1915.

*Inocybe microspora* J. Lange in Dansk bot. Ark. 2(7): 38. 1917.

*Inocybe parvispora* Alessio, Iconogr. mycol. 29: 289. 1980, non *I. parvispora* Murrill 1945.

SELECTED ICONES. — R. Heim, Genre *Inocybe*: pl. 20, f. 2,3. 1931. — J. Lange, Fl. agar. dan. 3: pl. 113C. 1938. — Stangl & Veselský in Česká Mykol. 25: pl. 79, f. 4. 1971. — Alessio, Iconogr. mycol. 29: pl. 74, f. 1, 2. 1980. — Enderle & Stangl in Mitt. Ver. Naturw. Math. Ulm 31: 132. 1981 (all as *I. microspora*).

Pileus 9–31 mm, convex, soon spreading, finally applanate, only indistinctly umbonate, margin inflexed when young, soon straight, dark brown to brown at centre [7.5 YR 3/2, 3/3, 4/4], somewhat paler at outer half [7.5 YR 4/4, 4/6], radially fibrillose, sometimes minutely squamulose in centre, with diverging fibrils and at margin somewhat rimulose, in young specimens sometimes with an indistinct greyish velipellis. Lamellae, L = 30–40, l = 1–3, moderately crowded to subdistant, 2–5 mm broad, somewhat ventricose, narrowly to rather broadly adnate, ochraceous brown, sometimes with an olivaceous tinge [7.5 YR 4/6, 2.5 Y 5/4]; edge almost even to subfimbriate, slightly paler to whitish. Stipe 20–42 x 2–3 mm, equal to subbulbous (4 mm), solid, warm ochraceous or more honey-coloured [10 YR 6/6, 7/6, 7.5 YR 7/8], minutely hairy at extreme apex, not truly pruinose, downwards aeriferous-fibrillose, but soon smooth. Cortina present in young specimens. Context whitish in pileus, pale ochraceous in stipe. Smell when cut spermatic, sometimes somewhat acidulous on drying. Taste not distinct.

Spores (6.0–)6.5–8.0 x 4.0–5.0  $\mu$ m, on average 6.9–7.5 x 4.4–4.6  $\mu$ m, Q = (1.4–)1.5–1.7,  $\bar{Q}$  = 1.6, smooth, regular to subamygdaliform, with (sub)conical apex. Pleurocystidia (41–)42–66(–67) x (10–)11–17(–18)  $\mu$ m, cylindrical to subfusiform, sometimes even sublageniform, thick-walled, wall to 2.0(–2.5)  $\mu$ m, almost colourless to pale yellow, sparsely crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, infrequent. Paracystidia (slenderly) clavate, thin-walled, colourless, abundant. Basidia 22–28 x 7–9  $\mu$ m,

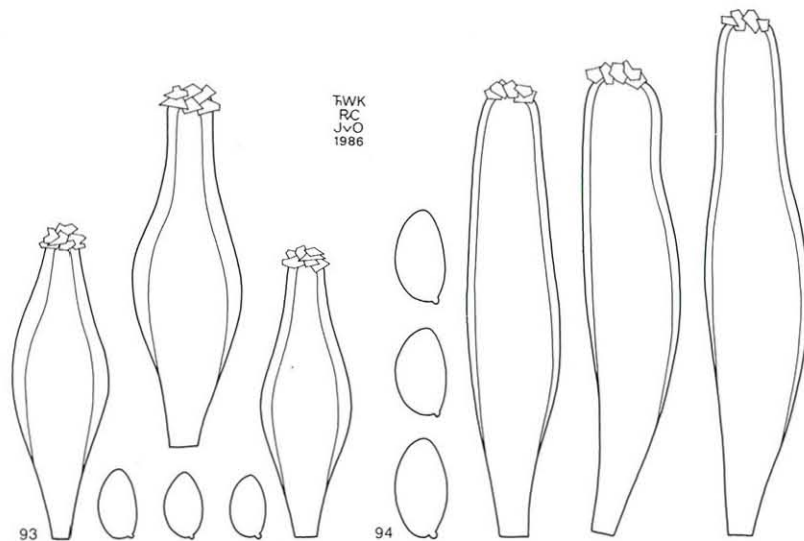


Fig. 93. *Inocybe glabripes*. — Spores, pleurocystidia (from authentic material of *I. microspora*).  
Fig. 94. *Inocybe griseovelata*. — Spores, pleurocystidia (from *Kuyper* 2078).



4-spored. Caulocystidia present in apical part, descending to less than 1/8th of length, more or less similar to cheilocystidia or somewhat more irregular, but sometimes completely lacking.

**HABITAT & DISTRIBUTION.** — Under frondose trees, preferably in parks but also in more natural vegetation. Associated with *Betula*, *Fagus*, and *Quercus*. Widespread in West and Central Europe. Not rare in the Netherlands. June-Sept.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Gelderland: Beek-Bergh, 5.VII.1952, *Huijsman*; Doetinchem, 26.VIII.1952 & 27.VI.1953, *Huijsman*; prov. Utrecht, Utrecht, 4.IX.1945, *Huijsman*; prov. Zuid-Holland: 's-Gravenhage, 24.VIII.1942, *Huijsman*; Oegstgeest, 3.VI.1981, *Bas 7772*; Wassenaar, 5.IX.1942, *Huijsman*. — DENMARK: locality unknown, *Lange* (authentic material of *I. microspora*, C). — FRANCE: dpt. Doubs, Lougres, 24.IX.1955 & 22.IX.1956, *Huijsman*; Montbéliard, Bois de Thür, 22.VII.1956, *Huijsman 4263*. — GERMANY: Bavaria, Augsburg, Wittelsbacher Park, 5.VIII.1982, *Kuyper 2110*. — SCOTLAND: co. Perthshire, Blair Atholl, Struan Birch Wood, 22.IX.1983, *Kuyper 2416*. — SWITZERLAND: Valangin, 2.IX.1960, *Huijsman*.

Notes: 1. Alessio (Iconogr. mycol. 29: 290. 1980) asserted that two taxa could be separated on specific level, viz. *I. microspora* and *I. parvispora*. The main difference between those taxa was said to lie in the dimensions of the pleurocystidia, although some smaller differences in habit were reported too. However, my observations are clearly contrary to those of Alessio, as I found an almost continuous series of cystidial length in different collections of this small-spored taxon. For that reason *I. parvispora* Alessio has to be placed in the synonymy of *I. glabripes*.

2. This species is easily recognisable by its very small spores that are on average less than 8.0  $\mu\text{m}$ . Two other small-spored species, viz. *I. albomarginata* Velen. and *I. langei* R. Heim differ in having the stipe pruinose throughout and in the lack of a cortina.

3. This species has up to now been called *I. microspora* J. Lange. However, there can be not much doubt that Ricken (Blätterpilze: 107. 1915) had described the same species two years earlier. Unfortunately his new species has been completely overlooked.

#### 41. *Inocybe griseovelata* Kühner — Fig. 94

*Inocybe griseovelata* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 4. 1955.  
SELECTED ICON. — Stangl & Veselký in Česká Mykol. 31: 202. 1977.

Pileus 24–42 mm, plano-convex to applanate, without umbo, with margin somewhat inflexed in young specimens but soon straight, (dark) brown, sometimes with an ochraceous tinge or more chestnut brown [7.5 YR 2/4, 3/4, 10 YR 4/6, 5/4], with scattered paler patches because of greyish velipellis, smooth around disc, with pellis later breaking up and slightly squamose to recurvately squarrose, outwards radially fibrillose, but with fibrils not or hardly diverging, not rimulose at margin, dull, not shiny. Lamellae, L = 30–70, l = 1–3, subdistant to crowded, to 5 mm broad, (sub)ventricose, narrowly to broadly adnate, greyish buff, yellowish buff to ochraceous brown, without distinct olivaceous tinges; edge fimbriate, whitish. Stipe 24–42 x 5–9 mm, equal, remarkably stout, solid, whitish to pale yellowish buff, at apex sometimes faintly pinkish-tinged, not pruinose or only indistinctly hairy-pruinose under lens at extreme apex (less than 1/10th of stipe), downwards longitudinally white-fibrillose, sometimes distinctly so. Context whitish in pileus, pale brownish in stipe especially in apical part, not distinctly pinkish-tinged. Smell faint, subspermat. Taste as smell.

Spores 9.0–11.0 x 5.5–6.5(–7.0)  $\mu\text{m}$ , on average 9.4–10.5 x 5.7–6.2  $\mu\text{m}$ , Q = 1.6–1.8,

$\bar{Q}$  = 1.7, smooth, (sub)amygdaliform, sometimes with suprahilary depression, with conical apex. Pleurocystidia (51–)54–70(–74) x (10–)11–24(–25)  $\mu\text{m}$ , cylindrical, slenderly fusiform, slenderly to broadly utriform, sometimes indistinctly lageniform, thick-walled, with up to 1.5(–2.0)  $\mu\text{m}$  thick, (almost) colourless wall, crystalliferous at apex, (very) frequent. Cheilocystidia similar to pleurocystidia, not frequent to very scarce. Paracystidia slenderly clavate, thin-walled, colourless, very frequent. Basidia 27–38 x 9–12  $\mu\text{m}$ , 4-spored. Caulocystidia absent or only at extreme apex, descending to less than 1/10th of stipe, mixed with some cauloparacystidia, but often with only a narrow intermediate zone of rather differentiated caulocystidioid hairs.

**HABITAT & DISTRIBUTION.** — Under frondose and coniferous trees. Associated with *Fagus*, *Tilia*, *Quercus*, *Pinus*, and *Pseudotsuga*. Widespread, but apparently (very) rare in West and Central Europe, also occurring in the Mediterranean Region. July-Aug., but in the Mediterranean in winter and spring (Dec., April). Known from only one locality in the Netherlands.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Zuid-Holland, 's-Gravenhage, 21.VII.1984, *Bas 8248*. — FRANCE: Nice, 9.XII.1982, *Trimbach 2467*. — GERMANY: Bavaria, Augsburg, Siebentisch Park, 2.VIII.1982, *Kuyper 2078*. — ITALY: Toscana, Arezzo, 5.IV.1984, *Gennari*.

Note: Cystidial form in this species is rather variable and ranges from broadly utriform to cylindrical. In this latter case the species might resemble *I. obscurobadia* (J. Favre) Grund & Stuntz somewhat, but it differs in being much more robust (especially the stipe), having somewhat wider spores and a cystidial wall that is (almost) colourless. The smell of both species is different, too.

#### 42. *Inocybe brunneotomentosa* Huijsman — Fig. 95

*Inocybe brunneotomentosa* Huijsman in Persoonia 9: 473. 1978.

MISAPPLIED NAME. — *Inocybe similis* sensu Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 14. 1955; sensu Stangl in Z. Pilzk. 37: 22. 1971.

SELECTED ICON. — Stangl in Z. Pilzk. 37: pl. 3. 1971 (as *I. similis*).

Pileus 15–40 mm, when still closed with incurved margin, soon expanding, campanulate to plano-convex, distinctly umbonate, at first pale alutaceous brown and tomentose, but with tomentum except at centre soon breaking up into patches and rags, tending to excoriate thus showing the ochraceous-alutaceous smooth underlying layer and this with age more and more contrasting with remaining patches of strongly darkening tomentum (velipellis?). Lamellae moderately crowded, slightly adnexed to sinuato-adnexed, to 3.5 mm broad, whitish, becoming ochraceous, then cinnamon-brown; edge minutely fimbriate, whitish. Stipe 25–35 x 2.5–5 mm, equal or slightly thickened downwards, solid, pruinose at whitish top, elsewhere dirty alutaceous, becoming dirty grey-brown from base upwards but remaining pale at top. Cortina present in young specimens. Context whitish in pileus, in stipe somewhat paler than cortex. Smell spermat. Taste not known.

Spores 7.5–9.5 x 4.5–5.5  $\mu\text{m}$ , on average 8.2–8.8 x 4.9–5.3  $\mu\text{m}$ , Q = 1.5–1.8,  $\bar{Q}$  = 1.6–1.7, smooth, (sub)amygdaliform, with (sub)conical apex. Pleurocystidia (34–)36–51(–52) x 14–20(–23)  $\mu\text{m}$ , clavate to even cylindrico-clavate, thick-walled, with up to 2.0–2.5  $\mu\text{m}$  thick, (almost) colourless wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia clavate, thin-walled, colourless, (very) frequent. Basidia 23–29 x 7–9  $\mu\text{m}$ , 4-spored. Caulocystidia present in apical part, at most descending to 1/3rd of stipe, similar to cheilocystidia and mixed with cauloparacystidia, but sometimes only in a very narrow zone of about 1/10th of stipe.

HABITAT & DISTRIBUTION. — Under frondose trees. Associated with *Quercus*, *Fagus*, and *Carpinus*. Very rare in Europe, known from two localities in the Netherlands. Aug.-Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Vorden, 22.VIII.1953, Huijsman (holotype of *I. brunneotomentosa*, L); prov. Zuid-Holland, Wasenaar, 5.X.1957, Bas 1265. — GERMANY: Bavaria, Augsburg, Siebentisch Park, 8-10.VIII.1966, Stangl 366; Siebentischstrasse, 22.IX.1966, Stangl 367.

Note: The macroscopical description has been copied from Huijsman (in Persoonia 9: 473. 1978). *Inocybe brunneotomentosa* can be confused with two other species with a darkening stipe, viz. *I. melanopus* Stuntz and *I. tenebrosa* Qué. The former species has a rather pale ochraceous pileus, and differently-shaped, rather thin-walled pleurocystidia, whereas the latter species lacks a cortina and has the stipe covered with caulocystidia throughout.

#### 43. *Inocybe rupestris* J. Favre — Fig. 96

*Inocybe rupestris* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 201. 1955.  
SELECTED ICON. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: fig. 94. 1955.

Pileus 12 mm, conical, umbonate, chestnut-brown, somewhat tomentose around centre, outwards minutely squamulose. Lamellae, L = 30, l = 1-3, not crowded, 3 mm wide, narrowly adnate, greyish-brownish with concolorous edge. Stipe 14 x 3 mm, equal, solid, brown, somewhat paler than pileus, pruinose at apex, fibrillose downwards. Cortina not observed. Context whitish. Smell spermiatic. Taste not recorded.

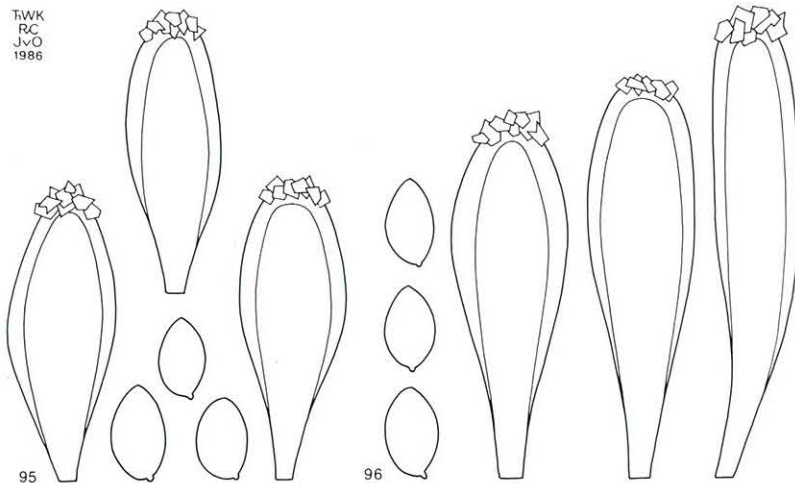


Fig. 95. *Inocybe brunneotomentosa*. — Spores, pleurocystidia (from holotype of *I. brunneotomentosa*).  
Fig. 96. *Inocybe rupestris*. — Spores, pleurocystidia (from lectotype of *I. rupestris*).

Spores (8.0-)8.5-10.5(-11.0) x 5.0-6.0  $\mu$ m, on average 9.1 x 5.4  $\mu$ m, Q = (1.5-)1.6-1.8(-1.9),  $\bar{Q}$  = 1.7, smooth, subamygdaliform, often with apical papilla, without germ-pore but with indistinct callus. Pleurocystidia (49-)52-62(-66) x 14-18  $\mu$ m, slenderly to broadly cylindrical, sometimes cylindrico-clavate, thick-walled, with up to 2.0(-3.0)  $\mu$ m thick, yellow wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 29-36 x 7-9  $\mu$ m, 4-spored. Covering of stipe difficult to study, a few caulocystidia observed in apical part and these similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Associated with *Salix retusa* and *S. reticulata* on calcareous soil. Known only from the Swiss Alps. Aug.

COLLECTION EXAMINED. — SWITZERLAND: Kt. Graubünden, Blaisch Bella, alt. 2400 m, 8.VIII.1943, Favre (lectotype of *I. rupestris*, design. Monthoux & Kuyper, G).

Note: The macroscopical description has been copied from Favre (1. c.).

Easily recognised because of its cylindrical pleurocystidia and spores with an apical papilla.

#### 44. *Inocybe aeruginascens* Babos — Figs. 97-98

*Inocybe aeruginascens* Babos in *Bohus in Bot. Közl.* 57: 21. 1970.

*Inocybe pseudohaemacta* M. Bon & Courtceuisse in *Docs mycol.* 14(56): 22. (1984) 1985.

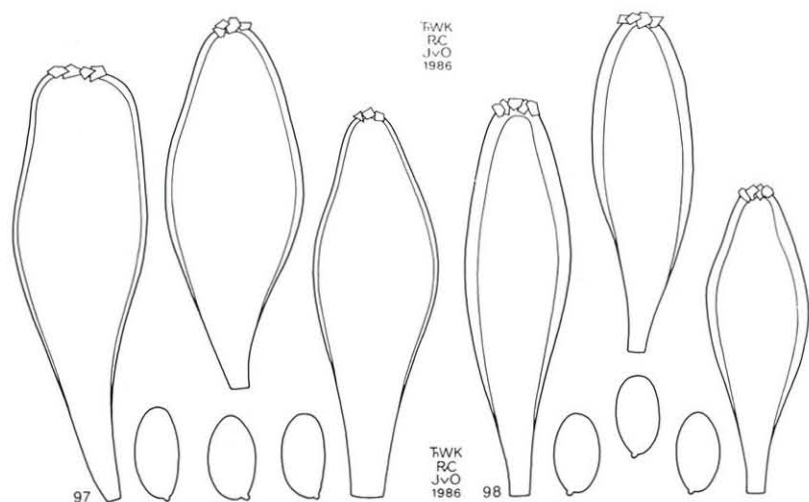
*Inocybe pintureaui* Duchemin in *Bull. Soc. linn. Normandie* 107: 39. 1979. (inval., Art. 37.1)

SELECTED ICONES. — Bohus & Babos in *Fung. rar. Ic. col.* 8: pl. 62. 1977. — Hohmeyer in *Z. Mykol.* 50: pl. s. n. 1984.

Pileus 10-44 mm, at first conical, soon plano-convex, with pronounced obtuse umbo, when young with inflexed margin, sordid buff to sordid ochraceous brown [2.5 Y 8/4, 10 YR 7/4, 6/4, 5/6], around umbo sordid grey, sometimes mixed with greenish tinges, radially fibrillose, but fibrils hardly diverging, at margin not rimulose, around umbo somewhat subtomentose because of velipellis. Lamellae normally crowded, to 7 mm broad, subventricose, narrowly adnate to almost free, pale grey-brown to clay-brown, with minutely fimbriate, whitish edge which sometimes discolours greenish on bruising. Stipe 22-50 x 3-7 mm, cylindrical to subbulbous, but without marginate bulb, solid, whitish at first, slowly discolouring to blue-green from base upwards, but sometimes even in old specimens rather inconspicuously so, finally even dark blue-green at base, pruinose at apex, downwards slightly longitudinally fibrillose. Cortina present in young specimens, soon disappearing. Context whitish in pileus, pale blue-green in stipe, especially in lower part. Smell sweetish with a disagreeable component, reminding of cheap soap. Taste as smell or indistinct.

Spores (7.5-)8.0-10.0 x 4.0-5.5(-6.0)  $\mu$ m, on average 8.3-9.6 x 4.6-5.5  $\mu$ m, Q = 1.5-2.0,  $\bar{Q}$  = 1.6-1.9, smooth, subamygdaliform, with subconical, but sometimes almost obtuse, apex. Pleurocystidia (37-)41-66(-71) x (12-)13-22(-24)  $\mu$ m, slenderly to broadly fusiform, subtriform or subclavate, thick-walled, with up to 1.5-2.0  $\mu$ m colourless to faintly yellowish-tinged wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather infrequent. Paracystidia (slenderly) clavate, thin-walled, colourless, numerous. Basidia 23-34 x 7-10  $\mu$ m, 4-spored. Caulocystidia only present in apical zone, descending to 1/6th of stipe, similar to cheilocystidia, mixed with cauloparacystidia, downwards with a narrow intermediate zone of cylindrical, rather undifferentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under frondose trees on sandy soil. Associated with *Populus* and *Salix*. Widespread in West and Central Europe, but probably overlooked. Known in the Netherlands from two localities in the dunes. June-Oct.



Figs. 97–98. *Inocybe aeruginascens*. — Spores, pleurocystidia (97. from isotype of *I. pseudohaemacta*; 98. from isotype of *I. aeruginascens*).

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Noord-Holland, Callantsoog, 25.VIII.1979, *Boekhout* & 21.X.1979, *Kuling-Coenraads*; prov. Zuid-Holland, Rockanje, 13.IX.1980, *Bas 7663*. — FRANCE: Pas-de-Calais, Le Touquet, 22.VII.1984, *Courteuisse* (isotype of *I. pseudohaemacta*, L.). — GERMANY: Potsdam, IX.1984, *Drewitz*. — HUNGARY: Com. Pest, Csevaraszt, 20.VI.1967, *Babos* (isotype of *I. aeruginascens*, BP); Budapest, Soroksár-Péterimajor, 20.VI.1974, *Babos* (BP); Insula Szentendrei, Horány, 13.IX.1975, *Babos* (BP); Budapest, Pestlőrinc, 31.V.1966, *Frankó* (BP); Budapest, Rákoshegy-Ferihegy, 10.IX.1968, *Ferencz* (BP); Com. Pest, Ocsa, 19.VI.1967, *Babos*.

Notes: 1. This species lacks muscarine, but contains psilocybin in rather great amounts (*Drewitz* in *Mykol. Mitt.* 26: 11. 1983; *Stijve & al.* in *Persoonia* 12: 472. 1985).

2. Specimens from the Atlantic coast differ from the Hungarian collections in having somewhat larger spores and less thick-walled cystidia. But as both characters show some overlap, the collections from West Europe do not deserve an autonomous rank.

#### 45. *Inocybe hystrix* (Fr.) P. Karst. — Fig. 99

*Agaricus hystrix* Fr., *Epicrisis*: 171. 1838. — *Inocybe hystrix* (Fr.) P. Karst. in *Bidr. Känned. Finl. Nat. Folk* 32: 453. 1879.

SELECTED ICONES. — Fr., *lc. sel. Hymenomyc.* 2: pl. 106, f. 1. 1877. — *J. Lange*, *Fl. agar. dan.* 3: pl. 111E. 1938. — *R. Phillips*, *Paddest. Schimm.*: 152. 1981.

Pileus 8–28 mm, convex to applanate, without umbo or indistinctly umbonate, with margin extending somewhat over lamellae and sometimes subappendiculate, with (dark) brown scales on pale brown or brownish buff background; scales around centre erect, pointed and converging to form bundles, towards margin appressed and more woolly. Lamellae, L = 30–70, l = 1–3, crowded, 2–3 mm broad, not ventricose, broadly adnate, whitish when young, then pale brownish or greyish-brownish; edge (sub)flocculose, white. Stipe 20–60 x 3–5 mm, equal to clavate, solid, ochraceous to brownish buff, especially in lower half covered with woolly, appressed (dark) brown scales, not pruinose at apex. Cortina present in young specimens. Context whitish. Smell nihil to subspermiatic. Taste nihil.

Spores (7.5–)8.0–12.5 x 5.0–6.5  $\mu\text{m}$ , on average 8.6–11.1 x 5.1–6.3  $\mu\text{m}$ , Q = 1.5–2.0,  $\bar{Q}$  = 1.6–1.9, smooth, subamygdaliform, with subconical apex. Pleurocystidia (54–)58–92 x 10–22(–23)  $\mu\text{m}$ , cylindrical, sublageniform to lageniform, thick-walled, with up to 1.5–2.0  $\mu\text{m}$  thick, almost colourless to yellowish wall, slightly crystalliferous at apex, moderately frequent. Cheilocystidia similar to pleurocystidia, moderately frequent. Paracystidia (slenderly) clavate, sometimes even subcylindrical, thin-walled, colourless, abundant. Basidia 24–35 x 7–10  $\mu\text{m}$ , 4-spored. Caulocystidia even at extreme apex absent, only a few cylindrical, undifferentiated caulocystidioid hairs present.

HABITAT & DISTRIBUTION. — Under frondose trees, sometimes also under coniferous trees. Associated with *Fagus*, *Quercus*, *Corylus*, *Carpinus*, and *Picea*. Widespread in northern Europe, less common in Central Europe, also occurring in North America. Rare in the Netherlands, and decreasing. Aug.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Renkum, 16.IX.1977, *Bijlsma*; prov. Noord-Brabant: Chaam, 29.IX.1959, *Maas Geesteranus 13012* & 11.IX.1959, *Douwes*; Ginneken, 28.VIII.1959, *Jansen*; Wouw, 11.X.1936, *Huijsman*. — BELGIUM: prov. Limburg, St. Pietersberg, Caestert, 17.X.1952, *Maas Geesteranus 9214*; Champlon, IX.1938, *Huijsman*. — CZECHOSLOVAKIA: Slovakia, Nižke Tatry, Bystrá Dolina, near hotel Srđiečko, 5.IX.1960,

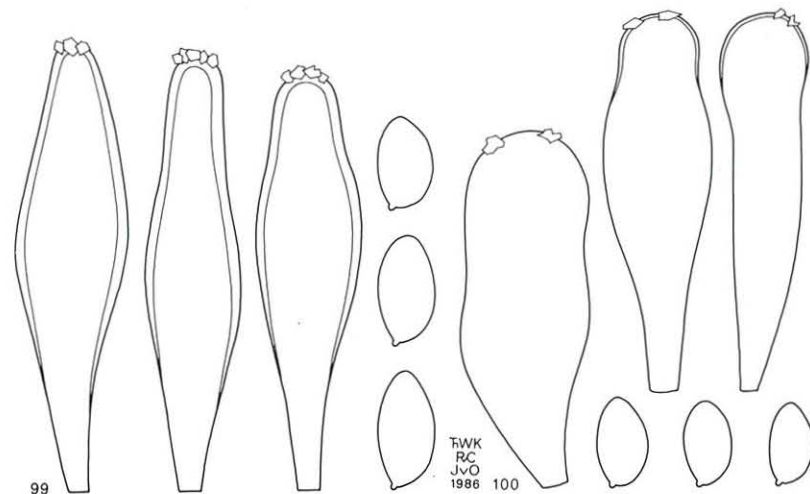


Fig. 99. *Inocybe hystrix*. — Spores, pleurocystidia (from *Fungi exsiccati suecici* 2308).

Fig. 100. *Inocybe squarrosa*. — Spores, pleurocystidia (from topotype of *I. squarrosa*).

*Bas 2075*. — GERMANY: Oldenburg, Zetel, Neuenburger Urwald, 24.X.1961, *Bas 2529*; Westfalen, Heiligenkirchen, 10.IX.1972, *Gams*; Eifel, Gerolstein, Reisrod near Gees, 25.IX.1980, *Kuyper 1487*. — SCOTLAND: co. Invernesshire, Fort William, along River Nevis, 16.IX.1983, *Kuyper 2381*; co. Perthshire: Dunkeld, 6.IX.1953, *Reid*; Pitlochry, near hotel Atholl, 26.IX.1983, *Kuyper 2434*. — SWEDEN: Bohuslän, Skredsövik parish, Gullmarsberg, 16.IX.1953, *Nathorst-Windahl* (Fungi exsiccati suecici 2308, PC). — WALES: co. Montgomeryshire, Lake Vyrnwy, IX.1960, *Kits van Waveren*.

Note: Both spore-length and cystidial length show much variation, but only a weak correlation. For that reason the recognition of infraspecific taxa seems not warranted.

#### 46. *Inocybe squarrosa* Rea — Fig. 100

*Inocybe squarrosa* Rea in Trans. Br. mycol. Soc. 5: 250. 1916.

SELECTED ICONES. — Rea in Trans. Br. mycol. Soc. 5: pl. 4. 1916. — Huijsman in Fungus 25: pl. 3. 1955.

Pileus 3–22 mm, convex, finally applanate, without umbo, yellowish brown, but covered with a whitish arachnoid velipellis, squarrose to squarrose. Lamellae, L = 20–25, l = 1–3, moderately crowded, 1–3 mm broad, subventricose, broadly adnate, brownish or olivaceous-tinged brown; edge fimbriate to subflocculose, white. Stipe 15–45 x 1–3 mm, equal or slightly broadened towards apex, solid, exceptionally becoming fistulose, pale yellowish brown, at apex with a faint lilac or pinkish often hardly distinct tinge, longitudinally white-fibrillose all over, even at apex not pruinose. Cortina present in very young specimens. Context pale yellowish brown, in stipe apex with a faint lilac or pinkish tinge. Smell subspermatric when cut, on drying faintly *Pelargonium*-like. Taste indistinct.

Spores (7.5–)8.0–11.5(–12.5) x 5.0–6.0  $\mu$ m, on average 8.8–10.3 x 5.2–5.7  $\mu$ m, Q = 1.6–2.1,  $\bar{Q}$  = 1.7–2.0, smooth, subamygdaliform, with subconical apex. Pleurocystidia (42–)43–66(–73) x (12–)14–22(–26)  $\mu$ m, utriform, often subcapitate, thin-walled to slightly thick-walled, with usually less than 0.5  $\mu$ m thick, colourless wall, not or hardly crystalliferous at apex, scarce. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 23–31 x 7–10  $\mu$ m, 4-spored. Caulocystidia absent, sometimes at extreme apex with some rather undifferentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under frondose trees on marshy places. Associated with *Salix* and *Alnus*. Widespread in Northwestern and Central Europe, but often overlooked because of specialized habitat. Rare in the Netherlands. April, June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland, Terschelling, 10.X.1954, *Reijnders*; prov. Overijssel, Denekamp, 13.X.1961, *Bas 2494*; prov. Gelderland: Ruurlo, 25.VII.1953, *Huijsman*; Staverden, 14.VIII.1971, *de Kleuver 71.014*; Vorden, 5.VII.1959, *Kits van Waveren*; prov. Noord-Holland: Callantsoog, 21.IV.1979, *Bas 7593*; Petten, 28.VIII.1969 & VIII.1971, *van de Bergh*; prov. Noord-Brabant: Best, 1.VIII.1962, *Verschuren*; Boxtel, 27.VIII.1957, *Bas 1252*; Zundert, 18.VI.1955, *Bas 783 & 784* & 10.VII.1956, *Bas 1046*; prov. Zeeland, Oostburg, 22.VII.1982, *de Meijer 549*. — ENGLAND: co. Worcester, Grimley brick pits, 25.VII.1915 (topotypical material of *I. squarrosa*, K). — SWEDEN: Uppland, Norra Varleda, 28.VIII.1973, *Huijsman*. — SWITZERLAND: Kerzen, Erlwald, 23.X.1959, *Huijsman*.

Note: Judging from the description *Inocybe griseoscabrosa* (Peck) Earle (in *Torreya* 3: 169. 1903) from North America comes close to *I. squarrosa* but differs in having a conspicuously white-fibrillose stipe and somewhat larger spores (10.0–13.0 x 5.5–6.5  $\mu$ m).

#### 47. *Inocybe griseoililacina* J. Lange — Fig. 101

*Inocybe griseoililacina* J. Lange in Dansk bot. Ark. 2(7): 33. 1917.

*Inocybe personata* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 5. 1955.

*Inocybe pusio* f. *elegans* Reumaux in Docs mycol. 12(48): 21. (1982) 1983.

SELECTED ICONES. — J. Lange, Fl. agar. dan. 3: pl. 111F. 1938. — Stangl in Z. Pilzk. 39: pl. 1. 1974. — Alessio, Iconogr. mycol. 29: pl. 33, f. 1. 1980. — R. Phillips, Paddest. Schimm.: 151. 1981.

Pileus 8–37 mm, convex to more or less applanate, with margin somewhat inflexed when young, later straight, sometimes subappendiculate, not or indistinctly umbonate, brown or greyish brown around centre, exceptionally dark brown, outwards paler, near margin greyish buff or isabella-brown, sometimes mixed with violaceous tinges because of underlying context, when young (coarsely) fibrillose-subsquamous, later breaking up around disc and becoming recurvately squamulose-squarrose, towards margin coarsely fibrillose; velipellis absent or inconspicuous. Lamellae, L = 25–45, l = 1–3, moderately crowded, 1.5–5 mm broad, ventricose or not, narrowly adnate, when young violaceous greyish to pale grey without violaceous tinges, then grey-brown; edge fimbriate, whitish. Stipe 14–67 x 1–6 mm, (sub)equal, not bulbous, wolid, greyish violaceous [19 B 2–3] for the greater part, but sometimes with violaceous tinges only in upper 1/3rd, near base greyish yellow to greyish-brownish, at extreme apex (less than 2 mm) somewhat hairy, not pruinose, downwards longitudinally fibrillose. Cortina present in young specimens. Context in upper part of stipe reddish to violaceous, more violaceous just above lamellae. Smell somewhat *Pelargonium*-like, especially on drying, but distinctly spermatric when cut. Taste subspermatric.

Spores (8.0–)8.5–10.5(–11.0) x 5.0–6.5  $\mu$ m, on average 9.1–10.0 x 5.4–6.2  $\mu$ m, Q = 1.5–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, regular to subamygdaliform, with subconical apex. Pleurocystidia (49–)50–74(–77) x (11–)12–18(–19)  $\mu$ m, utriform, fusiform to sublageniform, often indistinctly subcapitate, thick-walled, with up to 2.0  $\mu$ m thick, almost colourless to very pale yellow wall, slightly crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, infrequent. Paracystidia (slenderly) clavate, thin-walled, colourless, abundant. Basidia 26–33

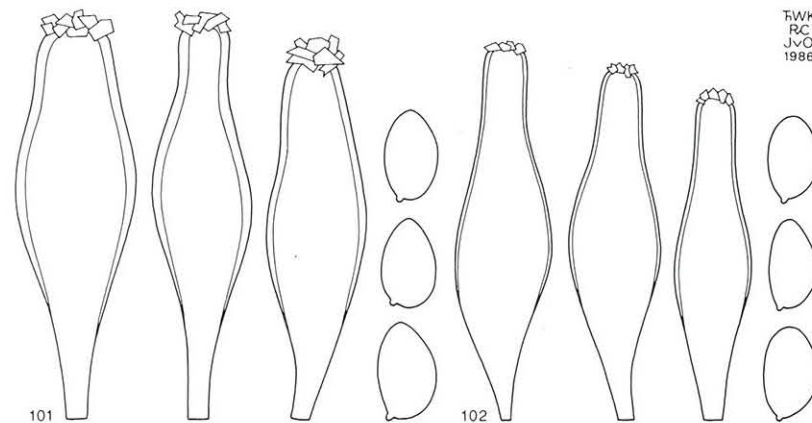


Fig. 101. *Inocybe griseoililacina*. — Spores, pleurocystidia (from *Kuyper 2464*).

Fig. 102. *Inocybe huijsmanii*. — Spores, pleurocystidia (from holotype of *I. huijsmanii*).

x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia absent, stipe at extreme apex (less than 2 mm) with some rather undifferentiated caulocystidioid hairs.

**HABITAT & DISTRIBUTION.** — Under frondose trees on somewhat calcareous soil. Associated with *Fagus*, *Quercus*, *Castanea*, and *Corylus*. Widespread in Europe, also occurring in North America, rare in the Netherlands. Aug.–Oct.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Gelderland: Beek-Bergh, 25.VIII.1971, *Huijsman*; Vorden, 22.VIII.1953, *Huijsman*; Winterswijk, 13.X.1945, *Huijsman*; I J s s e l m e e r p o l d e r s: Kuinderbos, 4.X.1975, *van der Laan*; Voorsterbos, 8.X.1981, *Kuyper 1900 & 1916* & 12.X.1983, *Kuyper 2464*; prov. Utrecht, Harmelen, 15.X.1981, *Kuyper 1951*; prov. Noord-Holland, Castricum, 21.X.1954, *Bas 688*; prov. Noord-Brabant, Heeze, 16.IX.1968, *Benjaminsen*; prov. Zeeland, Braakman, 26.VIII.1981, *Kuyper 1703 & 1706*. — BELGIUM: prov. Namur, Ave-et-Auffe, Fond d'Auffe, 3.X.1982, *Kuyper 2254*; Rosteigne, Bois de Rosteigne, 3.IX.1981, *Vellinga 390*; Nismes, 30.IX.1984, *Kuyper 2600*. — FRANCE: dpt. Doubs, Lougres, 14.VIII.1956, *Huijsman 4353*, 25.VIII.1956, *Huijsman 4399*, 7.IX.1956, *Huijsman 4470*, 27.IX.1956, *Bas 1132* & 30.IX.1956, *Huijsman 4550*; Ardennes, Les Alleux, 21.VIII.1979, *Reumaux* (holotype of *I. pusio f. elegans*, herb. Reumaux). — GERMANY: Westfalen, Heiligenkirchen, 11.IX.1972 & 15.IX.1972, *Huijsman*. — HUNGARY: Com. Salgótarján, Borosberény, 13.IX.1981, *Kuyper 1773*. — ITALY: prov. Alto Adige, Trento, Parco Gocciadoro, 26.IX.1981, *Kuyper 1854*; prov. Parma, Bedonia, 13.IX.1984, *Pöder*. — SWITZERLAND: Vaumarcus, 7.IX.1960, *Huijsman*; Planeyse, 11.IX.1965, *Huijsman*.

Note: *Inocybe personata* Kühner is regarded here a synonym of *I. griseolilacina*. I failed to see any important differences between the protologues of both species. It might be possible, however, that *I. griseolilacina* sensu Kühner refers to another species, e.g. *I. huijsmanii*, but this was not possible to check as I failed to obtain material from Kühner's herbarium. The violaceous pigment in the stipe is intracellular, and the amount of it can be very variable, although it generally diminishes on ageing of the basidiocarps.

#### 48. *Inocybe huijsmanii* Kuyp., *spec. nov.* — Fig. 102

Pileus conico-convexus vel plano-convexus, umbonatus, alutaceus vel gilvus, ad marginem subalbidus, subtiliter roseolo-lilacino tinctus, fibrillosus vel minute squamulosus in centro, haud squamuloso-squarrosus. Lamellae isabellino-brunneae cum margine albidia, fimbriata. Stipes versus apicem subtiliter roseolo-lilacinus, versus basim albidus, fibrillosus, non pruinosis in apice. Caro indistincte lilacina. Odor subpermativus. Sporae (8.0–)8.5–10.5 x 5.0–6.0  $\mu\text{m}$ , laeves, subamygdaliformes, apice conica. Pleurocystidia (42–)44–66(–70) x 12–18  $\mu\text{m}$ , (sub)fusiformia vel subutriformia, aliquot subcapitata, leviter crassiparietalia, cheilocystidia simillima. Caulocystidia absentia. Differt ab *I. griseolilacina* pileo pallidior atque glabrior, stipite minus lilacino atque parietibus cystidiorum minus crassis. — Holotypus: C. *Bas 1164*, 2.X.1956, Lougres, Doubs, France (L).

Etymology: named in honour of the late Mr H.S.C. Huijsman (1900–1986), whose extensive studies on the genus proved extremely valuable for this monograph.

Pileus 13–20 mm, conical when young, then conico-convex to plano-convex, prominently umbonate, pale alutaceous or pale café-au-lait, towards margin almost whitish, with scattered pinkish-lilac patches especially around centre because of velipellis, radially satiny-fibrillose, with age somewhat squamulose around centre, but remarkably smooth, at margin not rimulose. Lamellae, L = 25–35, l = 1–3, moderately crowded, 2–3 mm broad, subventricose, narrowly adnate, when young with a very faint lilac tinge, soon isabella-brown; edge fimbriate, whitish. Stipe 30–45 x 1.5–2.5 mm, somewhat swollen at base to indistinctly subbulbous, solid, whitish over the greater part, but pinkish-lilac near apex, longitudinally white-fibrillose, but at extreme

apex indistinctly hairy under lens. Context pinkish-lilac in apex of stipe. Smell faint, subpermativus.

Sporae (8.0–)8.5–10.5 x 5.0–6.0  $\mu\text{m}$ , on average 9.1–10.1 x 5.2–5.8  $\mu\text{m}$ , Q = 1.6–1.9,  $\bar{Q}$  = 1.7–1.8, smooth, subamygdaliform, with subconical apex, a minority with an indistinct apical papilla. Pleurocystidia (42–)44–66(–70) x 12–18  $\mu\text{m}$ , (sub)fusiform to utriform, few indistinctly sublageniform, slightly thick-walled, but with generally less than 1.0  $\mu\text{m}$ , colourless wall, crystalliferous at apex, abundant. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 22–30 x 7–9  $\mu\text{m}$ , 4-spored. Caulocystidia not observed, at extreme apex of stipe with some slightly differentiated caulocystidioid hairs, descending to less than 1/10th.

**HABITAT & DISTRIBUTION.** — Under *Corylus avellana* on rather acid loam. Known from France and Germany, up to now not known from the Netherlands. Probably more widespread but confused with *I. griseolilacina*. Aug.–Oct.

**COLLECTIONS EXAMINED.** — FRANCE: dpt. Doubs, Lougres, 2.X.1956, *Bas 1164* (holotype of *I. huijsmanii*, L); same locality, 17.IX.1955, 19.IX.1955, 4.X.1955, 13.X.1955, 12.VIII.1956, 21.VIII.1956 & 25.VIII.1956, *Huijsman*. — GERMANY: Westfalen, Höxter, Neuenheerse, 12.IX.1972, *Bas 5913*.

Notes: *Inocybe huijsmanii* differs from *I. griseolilacina* J. Lange in having a much smoother and paler pileus, less distinct lilac tinges in the stipe, and cystidia with a somewhat thinner wall. Its smell seems to be somewhat different too, but this character may not be very reliable. More material is needed to assess its relationship with *I. griseolilacina*; considering the morphological differences between both taxa, I regard *I. huijsmanii* as an independent species for the time being. As noted on p. 134, *I. griseolilacina* sensu Kühner might well refer to this species, as Kühner (in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 92. 1955) mentioned a smooth and rather pale pileus for *I. griseolilacina*. However, the stipe showed more distinct violaceous tinges.

#### 49. *Inocybe amethystina* Kuyp., *spec. nov.* — Fig. 103

*Inocybe obscura* var. *purpurea* R. Heim, Genre *Inocybe*: 259. 1931.

*Inocybe obscuroides* f. *heterospora* M. Bon in Docs mycol. 14(53): 19. 1984.

MISAPPLIED NAMES. — *Inocybe obscura* sensu Konr. & M., Ic. sel. Fung. 1: pl. 97, f. 2. 1929; sensu Bres., Iconogr. mycol. 15: pl. 736. 1930.

*Inocybe obscuroides* sensu Alessio, Iconogr. mycol. 29: 151. 1980.

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 97, f. 2. 1929 (as *I. obscura*). — Bres., Iconogr. mycol. 15: pl. 736. 1930 (as *I. obscura*). — R. Heim, Genre *Inocybe*: pl. 21, f. 3. 1931 (as *I. obscura* var. *purpurea*). — Alessio, Iconogr. mycol. 29: pl. 31. 1980 (as *I. obscuroides*).

Pileus convexus usque applanatus, obscure rufo-brunneus, versus marginem rufo-violaceotinctus, glaber, tum lanato-squamulosus vel minute appresso-squamulosus in centro, versus marginem radialiter fibrillosus, margine non rimuloso. Lamellae ab initio pallide isabellinae, interdum pallide violaceotinctae, margine fimbriata, albidia. Stipes aequalis, in apice pallide lilacinus vel amethystinus, in parte inferiore isabellino-ochraceus, glaber, sine fibrillis brunneis, apice vix pruinoso. Sporae 8.0–11.0(–11.5) x 5.0–6.0(–6.5)  $\mu\text{m}$ , laeves, subamygdaliformes, apice conica. Pleurocystidia (58–)59–86(–88) x 14–19(–21)  $\mu\text{m}$ , (sub)lageniformia, crassiparietalia, flavae. Paracystidia clavata, tenuiparietalia, incolorata. Caulocystidia presentia in apice, pleurocystidia simillima. — Holotypus: *F. Tjallingii* & *G. Tjallingii-Beukers*, 5.VII.1984, Roggebotzand, Oost-Flevoland, IJsselmeerpolders, Netherlands (L).

Etymology: amethystinus, amethyst-coloured, referring to the colour of the stipe.

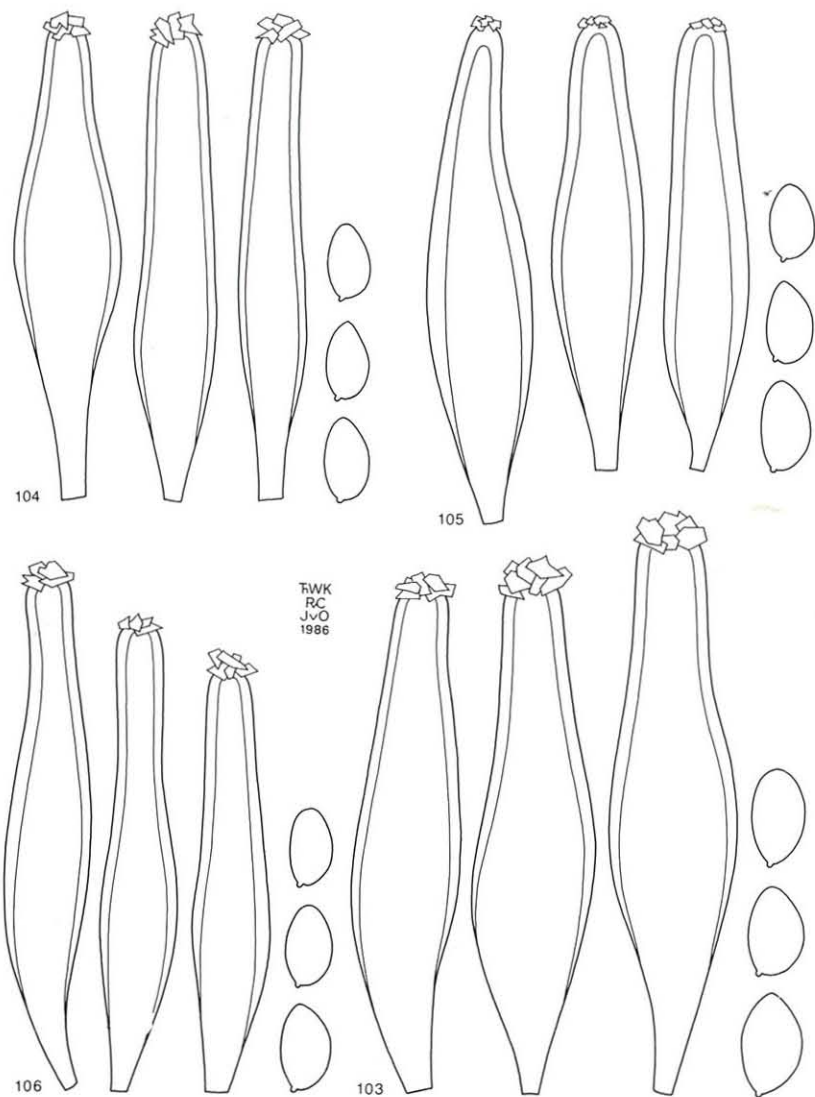


Fig. 103. *Inocybe amethystina*. — Spores, pleurocystidia (from holotype of *I. amethystina*).  
Figs. 104–106. *Inocybe phaeocomis*. — Spores, pleurocystidia (104. from holotype of *I. squarrosame-thystina*; 105. from neotype of *I. phaeocomis*; 106. from holotype of *I. conformata*).

Pileus 12–40 mm, convex, plano-convex to almost applanate, when young with slightly inflexed margin, soon straight, without or with low broad umbo, dark reddish brown [5 YR 3/3–4], towards margin sometimes mixed with reddish-violaceous tinges, when young almost smooth, then becoming woolly-squamulose to minutely appressedly scaly around disc, never recurvately scaly, outwards fibrillose, but fibrils not or hardly diverging, at margin not rimulose; velipellis absent or indistinct. Lamellae, L = 30–35, l = 1–3, moderately crowded, 2–4 mm broad, not or indistinctly ventricose, moderately broadly to narrowly adnate, when young pale isabella, sometimes mixed with a pale violaceous tinge, then greyish isabella to greyish brown [2.5 Y 6/3–10 YR 5/3]; edge fimbriate, whitish, exceptionally pale brownish. Stipe 18–46 x 2.5–5 mm, equal, solid, near apex pale lilac or amethyst-coloured, sometimes with lilac tinges over the greater part of length, downwards isabella-ochraceous, without lilac tinges, at apex pruinose over a narrow zone (less than 1/10th), downwards almost smooth to longitudinally white-fibrillose, not brown-squamulose. Cortina present in young specimens. Context whitish in pileus, reddish violaceous in apex of stipe, downwards whitish. Smell spermiatic when cut, on drying somewhat acidulous, faintly reminding of *Pelargonium*. Taste subspermiatic.

Spores 8.0–11.0(–11.5) x 5.0–6.0(–6.5)  $\mu\text{m}$ , on average 8.6–10.8 x 5.0–6.0  $\mu\text{m}$ , Q = 1.5–2.0,  $\bar{Q}$  = 1.6–1.9, smooth, subamygdaliform, with conical apex, exceptionally with indistinctly papillate apex. Pleurocystidia (58–)59–86(–88) x 14–19(–21)  $\mu\text{m}$ , (sub)lageniform, a minority cylindrical, thick-walled, with up to 2.0  $\mu\text{m}$  thick, yellow wall, but somewhat less bright than in *I. phaeocomis*, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia pyriform to (slenderly) clavate, thin-walled, colourless, exceptionally with slightly brownish wall, frequent. Basidia 25–32 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia present in apical part, descending to 1/10th of stipe, similar to cheilocystidia, mixed with cauloparacystidia, but true caulocystidia sometimes lacking and then only a narrow zone of somewhat differentiated caulocystidioid hairs present.

HABITAT & DISTRIBUTION. — Under coniferous and frondose trees on somewhat calcareous soil, preferably sand. Associated with *Picea*, *Pinus*, *Betula*, *Quercus*, and *Tilia*. Widespread but rather rare in Europa, probably also in North America, known in the Netherlands from several localities in the IJsselmeerpolders and the dune area. May–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: IJsselmeerpolders: Jagersveld, 9.VII.1982, *Kuyper 2034*; Roggebotzand, 5.VII.1984, *Tjallingii-Beukers* (holotype of *I. amethystina*, L), 15.V.1983, 11.VI.1983 & 3.VIII.1985 *Tjallingii-Beukers*; prov. Noord-Holland: Velzen, 2.X.1938, *Huijsman 489*; Heemstede, 7.VII.1951, *van der Laan*; prov. Zeeland, Haamstede, 1.XI.1972, *Huijsman*, 23.X.1982, *Kuyper 2310*. — FRANCE: Ile de Porquerolles, XI.1980, *Trimbach 2103*; dpt. Doubs, Lougres, 22.IX.1955 & 4.X.1955, *Huijsman*; dpt. Somme, Quend-les-Pins, XI.1975, *Bon* (holotype of *I. obscuroides* f. *heterospora*, herb. Bon). — NORWAY: Østfold, Onsey, 21.X.1984, *Weholt*. — SWITZERLAND: Schüpheim, Heilig Kreuz, 24.VIII.1955, *Huijsman*; Ducommun, 30.VIII.1966, *Huijsman*; Bôle-Boudry, 1.X.1968, *Huijsman*; vicinity of Willisau, 17.IX.1984, *Kriegelsteiner*.

Notes: 1. *Inocybe amethystina* Kuyp. differs from *I. phaeocomis* (Pers.) Kuyp. in having a smoother pileus with reddish brown tinges, a smoother stipe without brown squamules, and pleurocystidia that are more distinctly (sub)lageniform. *Inocybe pusio* P. Karst. differs in having a distinctly pruinose stipe apex, a rimulose pileal margin and colourless pleurocystidia.

2. This species has been called *I. obscuroides* P.D. Orton, but a study of the type-collection of the latter species (in K) revealed that *I. obscuroides* is only a variant of *I. phaeocomis*. However, Orton (in Trans. Br. mycol. Soc. 43: 276. 1960) was correct when he asserted that *I. obscura* sensu Konr. & M. was a misapplication, and that a second species besides *I. phaeocomis* exists with a more smooth pileus and stipe.

3. *Inocybe obscura* as described by Stuntz (in Mycologia 39: 40. 1947) probably refers to *I. amethystina*. Stuntz too referred to the similarity with *I. obscura* var. *purpurea* R. Heim.

### 50. *Inocybe phaeocomis* (Pers.) Kuyp., *comb. nov.*

*Agaricus phaeocomis* Pers., Mycol. eur. 3: 192. 1828 (basionym).

*Agaricus alienellus* Britz., Dermis Südbayern: 4. 1882. — *Inocybe alienella* (Britz.) Sacc., Syll. Fung. 5: 764. 1887.

*Inocybe conformata* P. Karst. in Bidr. Känned. Finl. Nat. Folk 48: 465. 1889.

*Inocybe picetorum* Velen., České Houby: 382. 1920.

*Inocybe squarrosamethystina* Sing. in Notul. syst. Sect. cryptog. Inst. bot. Acad. Sci. URSS 4(10-12): 17. 1938.

*Inocybe cincinnatula* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 4. 1955 (erroneously as *I. furfurea*).

*Inocybe obscuroides* P.D. Orton in Trans. Br. mycol. Soc. 43: 276. 1960.

EXCLUDED. — *Inocybe obscuroides* sensu Alessio, Iconogr. mycol. 29: 151. 1980 (= *I. amethystina*).

#### KEY TO THE VARIETIES OF *I. PHAEOCOMIS*

1. Habit slender, IS = (15-)20-40, pileus 10-20 mm, stipe 19-49 x 1-3 mm. Spores without apical papilla. .... var. *phaeocomis*, p. 138
1. Habit robust, IS = 5-20(-25), pileus 15-50 mm, stipe 25-69 x 2.5-9 mm. Spores at least partly with apical papilla. .... var. *major*, p. 140

Note: In my opinion these two taxa could best be regarded as varieties of one species; up to now no true intermediates seem to have been found. Should these taxa, however, be valued as formae, the correct name for var. *major* becomes *f. obscuroides* under the present rules (Art. 26.2 & 57.3).

These two varieties seem to differ slightly in their ecological requirements, var. *major* usually coming in earlier successional stages of the vegetation than var. *phaeocomis*. This ecological difference might help to maintain their relative autonomy.

#### 50.1. *I. phaeocomis* var. *phaeocomis* — Figs. 104-106

*Agaricus phaeocomis* Pers. — *Inocybe conformata* P. Karst. — *Inocybe picetorum* Velen. — *Inocybe squarrosamethystina* Sing. — *Inocybe cincinnatula* Kühner.

MISAPPLIED NAME. — *Inocybe cincinnata* sensu auct.

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 97, f. 1. 1929 (as *I. cincinnata*). — Bres., Iconogr. mycol. 15: pl. 732, f. 2. 1930 (as *I. cincinnata*). — J. Lange, Fl. agar. dan. 3: pl. 111H. 1938 (as *I. cincinnata*). — Alessio, Iconogr. mycol. 29: pl. 32, f. 1. 1980 (as *I. cincinnata*).

Pileus 10-20 mm, conico-convex, convex to plano-convex, sometimes applanate, with margin inflexed when young, then straight, sometimes appendiculate, not or only indistinctly umbonate, (dark) brown around centre, somewhat paler in outer half, near margin mixed with violaceous tinges of underlying context, squamulose to recurvately squarrose, especially around disc, towards margin more fibrillose-squamulose; no velipellis observed. Lamellae, L = 20-35, l = 1-3, moderately crowded, 1.5-4 mm broad, ventricose or not, rather broadly

to narrowly adnate, sometimes almost free, greyish yellow to greyish brown or isabella-brown, when young with vague violaceous tinges; edge fimbriate to subflocculose, often brown, but sometimes (almost) whitish. Stipe 19-49 x 1-3 mm, equal to somewhat clavate, not bulbous, solid, violaceous to pale greyish violaceous, especially in upper part, sometimes violaceous tinges extending to base, mostly greyish buff in lower part, at apex almost smooth to subhairy, downwards soon smooth but in lower 1/3rd with irregular, rather dark brown squamules, often distinctly so. Cortina present in young specimens. Context violaceous to greyish violaceous in (upper part of) stipe and just above lamellae, becoming whitish. Smell indistinct, faintly earth-like or somewhat acidulous. Taste indistinct.

Spores (7.0-)7.5-10.0 x 4.5-6.0  $\mu$ m, on average 8.0-9.6 x 5.1-5.6  $\mu$ m, Q = 1.4-1.8(-1.9),  $\bar{Q}$  = 1.5-1.8, smooth, regular to subamygdaliform, with subconical, apex, without apical papilla. Pleurocystidia (52-)55-82(-86) x 10-20  $\mu$ m, (slenderly) cylindrical to (sub)fusiform, not or hardly tending to lageniform, thick-walled, with up to 2.0(-3.0)  $\mu$ m thick, pale to bright yellow or even greenish yellow wall, crystalliferous at apex, frequent. Cheilocystidia finally similar to pleurocystidia, rather frequent. Paracystidia pyriform, often somewhat thick-walled and brown-incrusted but in some collections thin-walled and colourless, abundant. Basidia 25-31 x 7-10  $\mu$ m, 4-spored. Caulocystidia absent or present at extreme apex only (less than 2 mm) and then similar to cheilocystidia, soon forming a narrow intermediate zone of rather undifferentiated caulocystidioid hairs, sometimes with slightly thickened, brown wall.

HABITAT & DISTRIBUTION. — Predominantly under frondose trees (*Fagus*, *Quercus*, *Carpinus*, *Corylus*), but also under conifers (*Pinus*, *Picea*) and in the alpine zone with *Pinus mugo* and *Salix retusa* on somewhat calcareous soil. Widespread in Europe, not common in the Netherlands. June-Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. O v e r i j s s e l, Denekamp, 27.VIII.1941, *Huijsman*; prov. G e l d e r l a n d: Apeldoorn, 28.IX.1962, *Koopmans 469*; Beek-Bergh, 14.VI.1952, 29.VII.1952 & 2.VIII.1952, *Huijsman*; Doetinchem, 6.X.1943, *Huijsman*; Neerijnen, 14.X.1980, *Kuyper 1533*; prov. N o o r d - H o l l a n d, Schoorl, 7.XI.1981, *Kuyper 2023*; prov. N o o r d - B r a b a n t, Ginneken, 19.VII.1960, *Bas 1967*; prov. L i m b u r g, Bunde, 14.IX.1980, *Kuyper 1451*. — A U S T R I A: Tirol, Pertisau, Dristenautal, 6.IX.1982, *Kuyper 2186*; Roskogel, alt. 1900 m, 7.IX.1982, *Kuyper 2171*. — B E L G I U M: prov. Limburg, Kanne, Overstbos, 28.VII.1981, *Kuyper 1647*; prov. Namur, Han, Grande Tinémont, 5.X.1982, *Kuyper 2267*. — F I N L A N D: Tavastia australis, Tammela, Mustiala, 8.VIII.1889, *Karsten 2500* (holotype of *I. conformata*, H). — F R A N C E: dpt. Doubs, Lougres, 17.IX.1955, 4.IX.1956 & 25.VIII.1957, *Huijsman*. — G E R M A N Y: Oldenburg, Zetel, Neuenburger Urwald, 24.X.1961, *Bas 2528*. — I T A L Y: prov. Alto Adige, Trento, Sopramonte, 24.IX.1981, *Kuyper 1824*. — N O R W A Y: Oppland, Stenberg, Totenmuseum, 13.IX.1984, *Vellinga 634*. — S C O T L A N D: co. Perthshire: Straloch, 23.IX.1983, *Kuyper 2418*; Inver, The Hermitage, 26.IX.1983, *Kuyper 2443*. — S O V I E T U N I O N: Leningrad, Hortus Botanicus, X.1935, *Singer* (holotype of *I. squarrosamethystina*, LE). — S W E D E N: Småland, Femsjö, Löjenäs, 18.IX.1980, *Moser & Pöder* (IB). — S W I T Z E R L A N D: Schüpfheim, 22.IX.1953, 28.VIII.1955 & 30.VIII.1955, *Huijsman*; Tramelan, 23.VIII.1959, *Huijsman*. — W A L E S: co. Montgomeryshire, Lake Vyrnwy, IX.1960, *Kits van Waveren*. — P R O V E N A N C E U N K N O W N; authentic material of *Agaricus phaeocomis*, neotype, design. mihi (herb. Persoon, L 910.261-130)

Notes: 1. The nomenclatural aspects of the name *Agaricus cincinnatus* Fr.: Fr. are discussed on p. 223.

2. Most collections of this taxon possess paracystidia with somewhat thickened, brown-incrusted walls, but occasionally collections with thin-walled, colourless paracystidia are met. Intermediates do also occur. I regard this character as of minor importance that does not justify the recognition of these variants as a formal taxon. Parallel variation in this character can be observed in var. *major*.

50.2. *I. phaeocomis* var. *major* (S. Petersen) Kuyp., *comb. nov.* — Figs. 107–108

*Inocybe obscura* var. *major* S. Petersen, Danske Agaricaceer: 329. 1911 (basionym).

*Agaricus alienellus* Britz. — *Inocybe obscuroides* P.D. Orton.

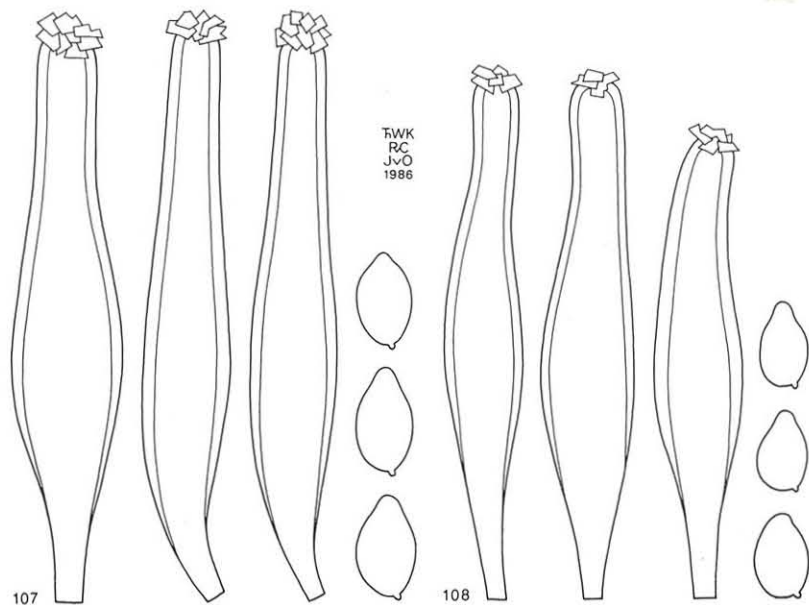
*Inocybe obscura* var. *transiens* Reumaux in Docs mycol. 14(54–55): 28. 1984.

*Inocybe obscuroides* var. *marginata* M. Bon in Beih. Sydowia 8: 84. 1979.

MISAPPLIED NAME. — *Inocybe obscura* sensu auct.

SELECTED ICONES. — J. Lange, Fl. agar. dan. 3: pl. 111A, Al. 1938 (as *I. obscura*). — Stangl in Z. Pilz. 39: pl. 1. 1974 (as *I. obscura*). — Alessio, Iconogr. mycol. 29: pl. 30. 1980 (as *I. obscura*).

Pileus 15–50 mm, convex, plano-convex to applanate, margin somewhat inflexed when young, then straight, sometimes subappendiculate, not or indistinctly umbonate, isabella-brown to (dark) brown, sometimes with violaceous tinge because of underlying context, generally somewhat paler than var. *phaeocomis*, when young coarsely tomentose-squamulose, soon breaking up and then with erect to recurvate, somewhat darkening scales around centre, in outer half subsquamulose to appressedly subsclaly; no velipellis observed. Lamellae, L = 25–40, l = 1–3, sometimes slightly thickish, moderately crowded, 2–7 mm broad, not ventricose to subventricose, rather broadly to rather narrowly adnate, at first pale violaceous, but violaceous tinges soon disappearing, and then via greyish isabella to greyish-brownish finally moderately dark brown, without olivaceous tinges; edge subflocculose, dark brown,



Figs. 107–108. *Inocybe phaeocomis* var. *major*. — Spores, pleurocystidia (107. from Kuyp. 1890; 108. from holotype of *I. obscuroides*).

but sometimes pale brown to (almost) whitish. Stipe 25–69 x 2.5–9 mm, equal to subclavate, not bulbous, solid, violaceous to violaceous grey in upper part, sometimes violaceous tinges descending almost to base of stipe, exceptionally without violaceous tinges even at apex, in lower half often brownish buff, at base often creamy buff, slightly hairy in a narrow apical zone (less than 2 mm), not truly pruinose, in lower half with indistinct to rather conspicuous brown fibrils or squamules, sometimes disappearing on age. Cortina present in young specimens. Context conspicuously violaceous in (upper part of) stipe and just above lamellae, but violaceous tinges disappearing on age, pallescent to whitish. Smell subspermatic to somewhat earth-like or acidulous. Taste slightly bitterish.

Spores 8.0–10.5(–11.0) x 5.0–6.0  $\mu\text{m}$ , on average 8.6–10.1 x 5.2–5.8  $\mu\text{m}$ , Q = 1.5–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, subamygdaliform, often with apical papilla. Pleurocystidia (59–)60–89(–101) x 10–17(–18)  $\mu\text{m}$ , (slenderly) cylindrical, sometimes slenderly fusiform, not or hardly tending to lageniform, thick-walled, with up to 3.0  $\mu\text{m}$  thick, bright yellow, often even greenish yellow wall, crystalliferous at apex, frequent. Cheilocystidia finally similar to pleurocystidia, moderately frequent. Paracystidia broadly clavate to pyriform, with somewhat thickened, brown-incrusted wall, but exceptionally almost colourless and thin-walled. Basidia 25–34 x 7–10  $\mu\text{m}$ , 4-spored. Caulocystidia absent or at extreme apex of stipe only (less than 2 mm), similar to cheilocystidia, soon forming a narrow intermediate zone of somewhat differentiated caulocystidioid hairs with brown-incrusted walls.

HABITAT & DISTRIBUTION: Under frondose and coniferous trees on somewhat calcareous and nutrient-rich soil. Appearing in earlier phases of vegetation succession than var. *phaeocomis*. Associated with *Populus*, *Tilia*, *Picea*, and *Pseudotsuga*. Widespread in Europe, also occurring in North America, in the Netherlands common in the IJsselmeerpolders, rare elsewhere. July–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. O v e r i j s s e l: Oldenzaal, 30.X.1948, Huijsman; Rijssen, 11.IX.1955, Maas Geesteranus 10672; I J s s e l m e e r p o l d e r s: Kuinderbos, 6.X.1981, Kuyp. 1890; Schokkerbos, 13.X.1983, Kuyp. 2471; Bremerberg, 11.IX.1980, Kuyp. 1435 & 1436 & 1.VIII.1981, Kuyp. 1659; Jagersveld, 9.VII.1982, Kuyp. 2038; Roggebotzand, 9.X.1981, Kuyp. 1928; prov. Z u i d - H o l l a n d: 's-Gravenhage, 21.IX.1942, Huijsman; Leiden, 21.XI.1981, Bas 7872; prov. Z e e l a n d, Veere, 31.X.1976, van der Laan; prov. N o o r d - B r a b a n t, Dorst, 23.VIII.1954, Jansen-Van der Plaats, 4.IX.1956, Bas 1080, 15.XI.1959, Jansen, 23.XI.1960, Jansen & 10.IX.1963, Maas Geesteranus 13953; prov. L i m b u r g, Noordervaart, 20.IX.1963, Verschuren. — B E L G I U M: prov. Luxembour, Daverdisse, Barbouillon, 4.X.1982, Kuyp. 2265; prov. Namur, Resteigne, Bois de Resteigne, 11.IX.1975, Van der Laan. — E N G L A N D: co. Yorkshire, Malham Tarnhouse Plantation, 31.VIII.1958, Orton (holotype of *I. obscuroides*, K). — F R A N C E: Fontainebleau, 13.X.1937, Huijsman; dpt. Doubs, Lougres, 17.IX.1955, Huijsman; Martignat, 2.IX.1957, Huijsman; Ardennes, Bois de la Sabotterie, X.1982, Reumaux (holotype of *I. obscura* var. *transiens*, herb. Reumaux); dpt. Somme, Bouillancourt en Sery, XI.1961, Bon (holotype of *I. obscuroides* var. *marginata*, herb. Bon). — G E R M A N Y: Westfalen, Heiligenkirchen, 13.IX.1972 & 15.IX.1972, Huijsman; Eifel, Gerolstein, Felsenhof, 26.IX.1980, Kuyp. 1495. — S W E D E N: Småland, Femsjö, Löjenäs, 18.IX.1980, Moser 80.323 (IB). — S W I T Z E R L A N D: Forêt Dames d'Oth, 1.IX.1966, Huijsman.

Notes: 1. This taxon has so far been known as *I. obscura* (Pers.  $\rightarrow$ ) Gillet. However, there is nothing in Persoon's protologue (Syn. meth. Fung.: 347. 1801) that is suggestive of the presence of violaceous tinges in the stipe. No authentic material of *A. obscurus* seems to be left in Persoon's herbarium, so that the name must be regarded a nomen dubium.

The holotype of *I. obscuroides* (at K) possesses a rather scaly pileus, (slenderly) cylindrical pleurocystidia without lageniform tendency, and spores that have an apical papilla. It is slightly aberrant because of its (almost) colourless paracystidia. However, the above characters all suggest that *I. obscuroides* is identical with *I. phaeocomis* var. *major*, and not with *I. amethystina*.



2. Exceptionally variants without violaceous tinges in the stipe can be encountered, e.g. *Bas 7872*. This collection consisted of several aged specimens, and the violaceous tinges might have been weathered away. No taxonomic importance could be given to this character.

### 51. *Inocybe hygrophana* Glowinski & Stangl — Fig. 109

*Inocybe hygrophana* Glowinski & Stangl in Stangl & Glowinski in Karstenia 21: 27. 1981.  
SELECTED ICON. — Stangl & Glowinski in Karstenia 21: 28. 1981.

Pileus 15–30 mm, conical, than conico-convex, more or less distinctly umbonate, margin somewhat inflexed when young, then straight, when moist dark sepiceous brown, in marginal part with violaceous tinges, hygrophanous, pallescent on drying to dirty ochraceous, often mixed with ferruginous tinges, tomentose, outwards only indistinctly fibrillose, at margin not rimulose, with indistinct greyish patches of velipellis around centre, not translucently striate at margin. Lamellae moderately crowded, to 4 mm broad, not ventricose, rather narrowly adnate to almost free, when young pale bluish-violaceous, then greyish buff to pale brown; edge fimbriate, whitish. Stipe 20–30 x 2–5 mm, equal or slightly attenuated towards base, or somewhat broadened-subbulbous at base, when young pale bluish-violaceous, then becoming brown, pruinose in apical part (descending to about 1/8th), below almost smooth to indistinctly radially fibrillose. Cortina present in young specimens, soon disappearing. Context whitish in pileus, violaceous blue in stipe, especially in upper 1/3rd part. Smell spermiatic. Taste not known.

Spores 8.0–10.5(–11.0) x 5.0–6.0  $\mu\text{m}$ , on average 8.6–9.7 x 5.1–5.6  $\mu\text{m}$ , Q = 1.6–2.0(–2.1),  $\bar{Q} = 1.7$ –1.8, smooth, subamygdaliform, with (sub)conical apex. Pleurocystidia (53–)55–74(–86) x 14–20(–22)  $\mu\text{m}$ , slenderly fusiform, slenderly utriform to sublageniform-cylindrical, thick-walled, with up to 2.0  $\mu\text{m}$  thick, almost colourless to pale yellow wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, infrequent. Paracystidia pyriform to clavate, thin-walled, colourless, abundant. Basidia 29–35 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia present in apical 1/6th part of stipe, but sometimes (almost) absent, similar to cheilocystidia or slightly irregular, mixed with scattered cauloparacystidia.

HABITAT & DISTRIBUTION. — Under frondose trees on marshy soil. Associated with *Betula*, *Alnus*, and *Salix*. So far known only from the type-locality in Germany. June–Aug.

COLLECTIONS EXAMINED. — G E R M A N Y : Lübeck, Müggenbusch, 16.VIII.1980 (holotype of *I. hygrophana*, M), 30.VI.1981 & 23.VIII.1981, *Glowinski*.

Notes: 1. The macroscopical description of this species has been copied from Stangl & Glowinski (in Karstenia 21: 27. 1981).

2. *Inocybe ionochlora* Romagn. (see p. 173) seems to come very close, but differs from *I. hygrophana* in being far less hygrophanous and in lamellae without violaceous tinges. For the time being both taxa are accepted as different species, but more material might well indicate that they merely are infraspecific taxa of one species.

### 52. *Inocybe ionochlora* Romagn. — Fig. 110

*Inocybe ionochlora* Romagn. in Beih. Sydowia 8: 352. 1979.

Pileus 9–12 mm, plano-convex, with a low, broad, obtuse umbo, seemingly hygrophanous because of very thin context, when moist olivaceous red-brown around centre and olivaceous-ochraceous in outer part (resembling *Entoloma pleopodium*), somewhat pallescent on drying, almost smooth to sericeous-fibrillose, around disc minutely squamulose. Lamellae somewhat distant, rather narrowly adnate, pale buff, then brown, with concolorous edge. Stipe 12–30 x 1.5–2 mm, somewhat broadened towards base, solid, somewhat greyish violaceous at apex, elsewhere more reddish-brownish, only at apex pruinose, downwards indistinctly longitudinally fibrillose. Cortina not observed. Context somewhat violaceous in stipe apex, hygrophanous, pallescent to whitish on drying. Smell iodine-like.

Spores (8.5–)9.0–10.0(–11.0) x (4.5–)5.0–5.5(–6.0)  $\mu\text{m}$ , on average 9.3 x 5.3  $\mu\text{m}$ , Q = (1.6–)1.7–1.9(–2.0),  $\bar{Q} = 1.8$ , smooth, (sub)amygdaliform, with conical apex. Pleurocystidia (58–)61–70(–74) x (12–)14–16(–17)  $\mu\text{m}$ , slenderly fusiform to slenderly utriform, a few tending to sublageniform, thick-walled, with up to 2.5(–3.0)  $\mu\text{m}$  thick, yellow wall, crystalliferous at apex, abundant. Cheilocystidia and paracystidia not studied. Basidia 25–32 x 8–10  $\mu\text{m}$ , 4-spored. Stipe covering not studied.

HABITAT & DISTRIBUTION. — On marshy soil, associated with *Corylus* and *Alnus*. Known so far only from the type locality in France. Aug.

COLLECTION EXAMINED. — F R A N C E: Oise, Grand Etang de La Neiville-en-Hez, 22.VIII.1957, *Romagnesi 57.86* (holotype of *I. ionochlora*, herb. Romagnesi).

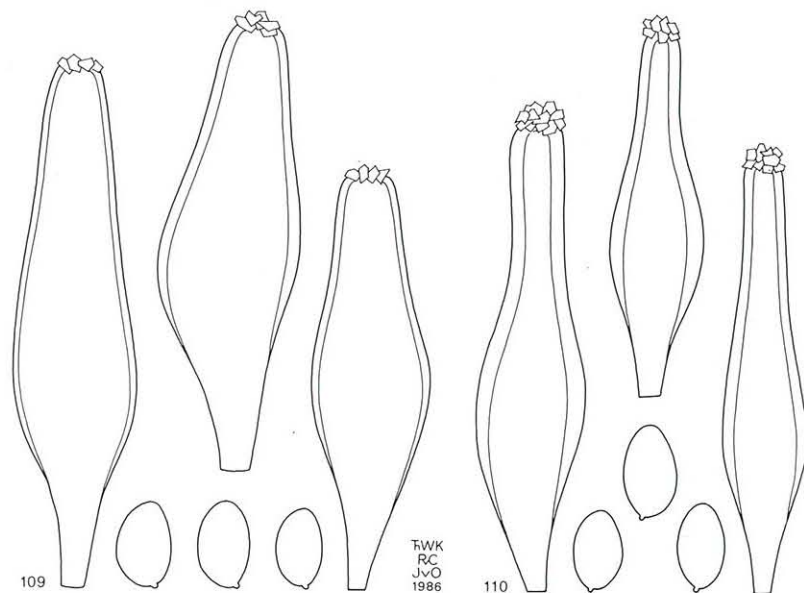


Fig. 109. *Inocybe hygrophana*. — Spores, pleurocystidia (from holotype of *I. hygrophana*).

Fig. 110. *Inocybe ionochlora*. — Spores, pleurocystidia (from holotype of *I. ionochlora*).

Note: The macroscopical description has been copied from Romagnesi (in *Beih. Sydowia* 8: 352. 1979).

### 53. *Inocybe cryptocystis* Stuntz — Figs. 111–112

*Inocybe cryptocystis* Stuntz in *Pap. Mich. Acad. Sci.* 39: 58. ('1953') 1954.

*Inocybe mystica* Stangl & Glowinski in *Z. Mykol.* 46: 170. 1980.

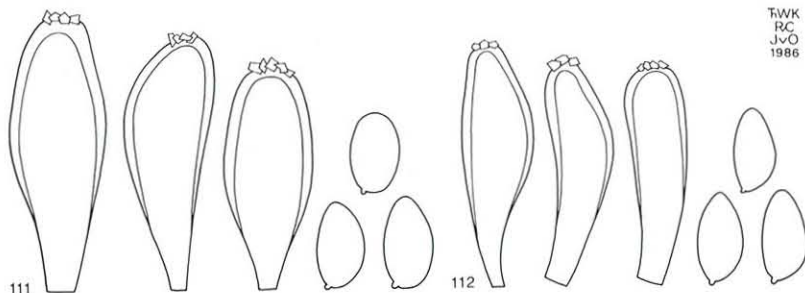
MISAPPLIED NAME. — *Inocybe confusa* sensu R. Heim, *Genre Inocybe*: 333. 1931; sensu Alessio, *Iconogr. mycol.* 29: 233. 1980.

SELECTED ICONES. — R. Heim, *Genre Inocybe*: pl. 18, f. 1–2. 1931 (as *I. confusa*). — Alessio, *Iconogr. mycol.* 29: pl. 56. 1980 (as *I. confusa*).

Pileus to 25(–40) mm, when young conical, then convex to plano-convex, umbonate, margin inflexed when young, then straight, ochraceous around centre, outwards distinctly paler, almost smooth around disc, outwards radially fibrillose, but fibrils not or hardly diverging and at margin not rimulose, sometimes minutely excoriate on age in outer half; velipellis present around disc, and then there subshiny. Lamellae moderately crowded, 4–5 mm broad, narrowly adnate, with a faint greyish tinge when young, soon ochraceous to brownish ochraceous; edge minutely fimbriate, white. Stipe to 20–40 x 3–5 mm, equal to swollen at base or with a small submarginate bulb as in *I. cookei*, solid, whitish when young, discolouring to pale yellowish on age, pruinose at apical part, descending to about 1/4th, downwards longitudinally white-fibrillose. Cortina present in young specimens, soon evanescent. Context whitish in pileus and stipe. Smell not distinctly spermatric.

Spores 7.5–9.5 x 4.5–6.0  $\mu\text{m}$ , on average 7.7–8.6 x 4.7–5.6  $\mu\text{m}$ ,  $Q = (1.4\text{--})1.5\text{--}1.8$ ,  $\bar{Q} = 1.5\text{--}1.7$ , smooth, subamygdaliform, with subconical apex. Pleurocystidia (25–)26–42 x 8–14(–15)  $\mu\text{m}$ , cylindrical to cylindrico-clavate, sometimes subclavate, thick-walled, with up to 1.0–1.5  $\mu\text{m}$  thick, almost colourless to faintly yellowish wall, crystalliferous at apex, rather infrequent to scarce. Cheilocystidia similar to pleurocystidia, rather scarce. Paracystidia (broadly) clavate, thin-walled, colourless, frequent. Basidia 22–26 x 7–8  $\mu\text{m}$ , 4-spored. Stipe in apical part (to 1/6th) with true caulocystidia, more or less similar to cheilocystidia, a few cauloparacystidia also present.

HABITAT & DISTRIBUTION. — Under frondose trees. Associated with *Quercus* and *Fagus*.



Figs. 111–112. *Inocybe cryptocystis*. — Spores, pleurocystidia (111. from holotype of *I. cryptocystis*; 112. from holotype of *I. mystica*).

Widespread in Europe and North America, but (very) rare throughout. Once recorded from the Netherlands. July–Aug.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. U t r e c h t, Doorn, 21.IX.1958, *Bas 1559*. — G E R M A N Y : Lübeck, Ehrenfriedhof, 25.VII.1978 (holotype of *I. mystica*, M) & 23.VIII.1981, *Glowinski*. — U N I T E D S T A T E S : Michigan, Mackinaw City, Old Lighthouse, 29.VII.1949, *Stuntz 5400* (holotype of *I. cryptocystis*, WTU).

Note: The macroscopical description of this species has been copied from Stangl & Glowinski (in *Z. Mykol.* 46: 170. 1980). These authors asserted that their species was different from *I. cryptocystis* but they did not state any specific differences. After a comparison of the macroscopical descriptions and my own type-studies I regard these species as synonyms as I was unable to detect any relevant differences.

### 54. *Inocybe auricoma* (Batsch) J. Lange — Fig. 113

*Agaricus auricomus* Batsch, *Elench. Fung.*: 75. 1783. — *Inocybe auricoma* (Batsch) J. Lange in *Dansk bot. Ark.* 2(7): 37. 1917.

SELECTED ICONES. — R. Heim, *Genre Inocybe*: pl. 20, f. 4. 1931. — J. Lange, *Fl. agar. dan.* 3: pl. 113B. 1938.

Pileus 10–24 mm, conico-convex to convex when young, with slightly inflexed margin, soon expanding to plano-convex or subapplanate with straight margin, not or rather indistinctly umbonate, pale cream to ochraceous yellow [2.5 Y 8/6, 7/6, 7/4, 6/6], somewhat paler around centre, subtomentose-smooth around centre, not or slightly radially fibrillose, at margin not or hardly rimulose, on age sometimes becoming recurvately subsquamulose; velipellis mostly abradent, sometimes present and then with a whitish patch around centre. Lamellae,  $L = 25\text{--}40$ ,  $l = 1\text{--}3$ , moderately crowded to subdistant, 2–4 mm broad, subventricose, moderately broadly adnate, rarely almost free; pale greyish-yellowish when young [2.5 Y 7/2–7/3], then ochraceous [2.5 Y 6/4, tending to 6/6]; edge fimbriate to subflocculose, white. Stipe 16–38 x 2–3 mm, equal to somewhat swollen below, not bulbous, solid, at first almost pure (milky-)white, conspicuously contrasting with colour of pileus, with age discolouring to pale ochraceous yellow [2.5 Y 8/4–8/6], with hairy-pruinose covering of apical part descending to about 1/4th, smooth or indistinctly white-fibrillose downwards. Cortina present in young specimens. Context whitish. Smell and taste spermatric.

Spores 8.0–9.5 x 4.5–5.5  $\mu\text{m}$ , on average 8.3–9.0 x 4.9–5.2  $\mu\text{m}$ ,  $Q = (1.5\text{--})1.6\text{--}2.0$ ,  $\bar{Q} = 1.6\text{--}1.8$ , smooth, (sub)amygdaliform, with (sub)conical apex. Pleurocystidia (40–)42–60(–63) x 12–20(–22)  $\mu\text{m}$ , fusiform, (sub)utriform to somewhat clavate, never (sub)lageniform, thick-walled, with up to 3.0(–4.0)  $\mu\text{m}$  thick, pale to bright yellow wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia spheropedunculate to pyriform, thin-walled, colourless, frequent. Basidia 23–33 x 7–10  $\mu\text{m}$ , 4-spored. Caulocystidia present in upper part of stipe, descending to 1/4th, similar to cheilocystidia or somewhat more slender, mixed with cauloparacystidia, below with a narrow intermediate zone of somewhat differentiated caulocystidioid hairs, but this zone sometimes descending slightly over half-way.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on rather moist soil. Associated with *Quercus*, *Alnus*, and *Picea*. Very rare in the Netherlands, known from only two localities. Probably rare and widespread in Europe. July–Nov.

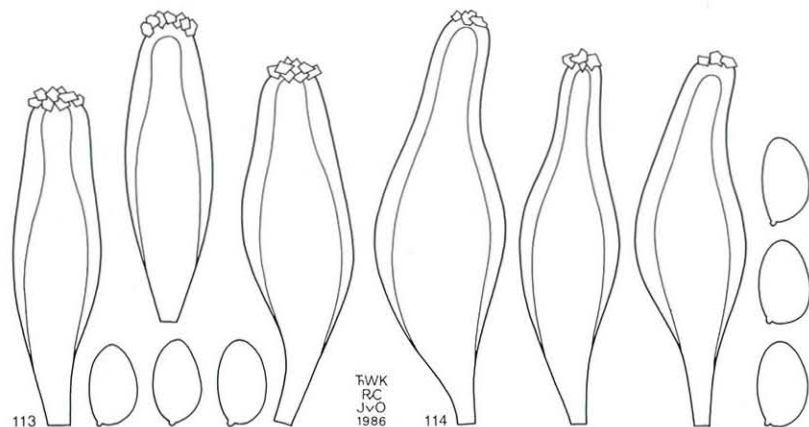


Fig. 113. *Inocybe auricoma*. — Spores, pleurocystidia (from *Kuyper 2129*).

Fig. 114. *Inocybe posterula*. — Spores, pleurocystidia (from *Kuyper 2258*).

COLLECTIONS EXAMINED. — NETHERLANDS: I J s s e l m e e r p o l d e r s, Visvijverbos, 7.VII.1981, *Kuyper 1603* & 28.VIII.1982, *Kuyper 2129*; prov. Z e e l a n d, Goes, 3.XI.1984, *Kuyper 2663*. — F R A N C E: Ain, Villereversure, 22.VIII.1957, *Huijsman*.

Notes: 1. Judging from the description and a study of the isotype (United States, New Jersey, Newfield, IX.1888, L), *Inocybe pallidipes* Ell. & Ev. (in *J. Mycol.* 5: 24 (1889)) comes extremely close to (or may be even identical with) *I. auricoma*. The main difference between both taxa is the colour of the pileus, being pale brown in *I. pallidipes* and ochraceous yellow in *I. auricoma*. Well-annotated collections of *I. pallidipes* are needed for a more definite conclusion regarding its autonomy.

2. *Inocybe auricoma* differs from *I. posterula* (Britz.) Sacc. in small habit, somewhat brighter and smoother pileus and slightly more yellow-coloured pleurocystidia. There is also some resemblance of *I. auricoma* with yellow-coloured variants of *I. flocculosa* (Berk. →) Sacc., but the latter taxon can be recognised by its lageniform cystidia, more squamulose pileus and somewhat less contrasting white stipe.

#### 55. *Inocybe posterula* (Britz.) Sacc. — Fig. 114

*Agaricus posterulus* Britz., *Dermini Südbayern*: 5. 1882. — *Inocybe posterula* (Britz.) Sacc., *Syll. Fung.* 5: 778. 1887.

*Inocybe xanthodisca* Kühner in *Bull. Soc. Nat. Oyonnax* 9 (Suppl.): 7. 1955.

*Inocybe geophylla* var. *lutescens* Gillet, *Hyménomycètes*: 520. 1876.

EXCLUDED. — *Inocybe posterula* sensu R. Heim, *Genre Inocybe*: 223. 1931 (= *Inocybe spec.*). — *Inocybe posterula* sensu Alessio, *Iconogr. mycol.* 29: 208. 1980 (= *Inocybe spec.*).

SELECTED ICONES. — Bres., *Iconogr. mycol.* 16: pl. 753. 1930 (as *I. geophylla* var. *lutescens*). — J. Lange, *Fl. agar. dan.* 3: pl. 113E. 1938. — Stangl & Veselský in *Česka Mykol.* 27: pl. 83, f. 1. 1973. — Stangl in *Z. Mykol.* 51: pl. 1. 1985.

Pileus 25–60 mm, conico-campanulate when young, then convex to subapplanate, distinctly to indistinctly umbonate, with straight margin, yellow around disc [2.5 Y 6/6–7/8], outwards somewhat paler, pale isabella-cream [2.5 Y 7/4–8/4], submentose-smooth around disc, outwards radially fibrillose-felty, but fibrils not diverging, at margin not rimulose, not becoming squamulose on age, at outer half covered by pallid velipellis, but rather indistinctly so. Lamellae, L = 40–50, l = 1–3, crowded, 3–5 mm broad, not ventricose, moderately narrowly adnate, (pale) yellowish grey [2.5 Y 7/2–6/3]; edge subfimbriate, concolorous. Stipe 20–75 x 5–10 mm, equal to somewhat swollen below, not bulbous, solid, silvery whitish with a faint greyish tinge, with age slightly yellowish-tinged, but only indistinctly so, somewhat pruinose at apex, downwards longitudinally white-fibrillose. Cortina present in young specimens, soon disappearing, leaving no remnants on stipe. Context whitish in pileus and stipe. Smell when cut almost nihil to indistinctly spermatic. Taste almost nihil.

Spores 7.5–9.0(–9.5) x 4.5–5.5(–6.0)  $\mu$ m, on average 8.1–8.6 x 4.9–5.3  $\mu$ m, Q = 1.5–1.7(–1.8),  $\bar{Q}$  = 1.6–1.7, smooth, subamygdaliform, with indistinctly conical to almost rounded apex. Pleurocystidia (47–)48–64(–66) x (12–)13–21  $\mu$ m, (broadly) fusiform to (broadly) utriform, never (sub)lageniform, thick-walled, with up to 2.0(–2.5)  $\mu$ m thick, almost colourless to pale yellow wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia, clavate, thin-walled, colourless, rather frequent. Basidia 23–30 x 7–9  $\mu$ m, 4-spored. Caulocystidia present at apex, descending to 1/6th of stipe, similar to cheilocystidia and mixed with slenderly clavate cauloparacystidia, downwards with a very narrow intermediate zone.

HABITAT & DISTRIBUTION. — Under coniferous trees. Associated with *Picea*, *Pinus*, and *Larix*. Widespread but rare in Europe, not found in the Netherlands. Sept.–Nov.

COLLECTIONS EXAMINED. — A U S T R I A: Tirol, Igls, 22.IX.1967, *Huijsman 67.319*. — B E L G I U M: prov. Namur, Vencimont, Pichelotte, 4.X.1982, *Kuyper 2258*. — G E R M A N Y: Bavaria, Landkr. Augsburg, Diedorf, 21.X.1983, *Sedlmeier* (neotype of *I. posterula*, M) & 12.X.1984. — I T A L Y: prov. Alto Adige, Trentino, Selva di Levico, 6.X.1984, *Stangl*. — S W I T Z E R L A N D: Bôle, 20.XI.1961, *Huijsman*; St. Baume, 5.X.1960, *Huijsman*.

Notes: 1. *Inocybe xanthodisca* Kühner is considered a synonym of *I. posterula* on account of their more or less identical macroscopical characters. I have been unable, however, to obtain authentic material of *I. xanthodisca*. According to Huijsman (pers. comm.) who studied material from Bresadola's herbarium at S, *I. geophylla* var. *lutescens* is identical with *I. posterula*.

2. *Inocybe posterula* often resembles *I. geophylla* (Fr.: Fr.) Kumm., but can be recognised by the less sericeous-smooth and more yellow pileus, the more robust habit, and the spores with a more conical apex. The latter character, however, is rather difficult to observe, as the apex of the spore of *I. posterula* is only slightly conical. *Inocybe phaeodisca* var. *geophylloides* Kühner differs in slender habit, stipe with reddish tinges at apex, and somewhat longer spores. Its ecology is somewhat different too.

#### 56. *Inocybe pusio* P. Karst. — Fig. 115

*Inocybe pusio* P. Karst. in *Bidr. Känned. Finl. Nat. Folk* 48: 465. 1889.

*Inocybe fechtneri* Velen., *České Houby*: 372. 1920.

*Inocybe obscura* var. *obscurissima* R. Heim, *Genre Inocybe*: 257. 1931.

*Inocybe pusio* f. *velata* Reumaux in *Docs mycol.* 12(48): 20. (1982) 1983.

SELECTED ICONES. — J. Lange, Fl. agar. dan. 3: pl. 112A. 1938. — Stangl in Z. Pilzk. 39: pl. 1. 1974. — Alessio, Iconogr. mycol. 29: pl. 32, f. 2. 1980.

Pileus 11–35 mm, convex, plano-convex to applanate, with margin inflexed when young, often umbonate, but umbo sometimes indistinct or even absent, not hygrophanous, dark brown, brown or ochraceous-tinged brown [10 YR 3/3, 4/4, 4/6, 5/4], smooth around disc, radially fibrillose outwards, at margin rimulose to subrimose, with fibrils later on somewhat breaking up and then recurvately (sub)squamulose; velipellis present around disc, giving the umbo a greyish hue, but sometimes lacking. Lamellae, L = 30–40, l = 1–3, moderately crowded, 2–5 mm broad, ventricose or not, moderately broadly to narrowly adnate, sometimes almost free, initially violaceous-tinged, but violaceous tinges soon disappearing, and then isabella to greyish-brownish [10 YR 6/2–3]; edge fimbriate, sometimes flocculose, whitish or concolorous. Stipe 18–48 x 3–6 mm, equal to subbulbous, but without marginate bulb, solid, at apex conspicuously violaceous to greyish violaceous, in lower 2/3rd part violaceous tinges absent, pale brownish-greyish to almost whitish, with pruina of apical part descending to 1/3rd, downwards almost smooth to longitudinally fibrillose. Cortina present in young specimens, soon disappearing. Context whitish in pileus, greyish to violaceous grey in stipe apex, but violaceous tinges rather indistinct. Smell and taste spermatic.

Spores 7.5–11.0  $\mu$ m, on average 7.9–10.5 x 4.7–5.7  $\mu$ m, Q = 1.5–1.9(–2.0),  $\bar{Q}$  = 1.6–1.8, smooth, (sub)amygdaliform, with (sub)conical apex. Pleurocystidia (41–)44–70(–74) x (12–)13–22(–25)  $\mu$ m, fusiform, slenderly subfusiform to subutriform, thick-walled, with up to 1.5–2.0  $\mu$ m thick, colourless, exceptionally faintly yellowish-tinged wall, crystalliferous at apex, rare to frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia pyriform to clavate, thin-walled, colourless, abundant. Basidia 27–32 x 8–11  $\mu$ m, 4-spored. Caulocystidia present in upper 1/3rd part of stipe, similar to cheilocystidia or somewhat more slender and more irregular, mixed with cauloparacystidia.

HABITAT & DISTRIBUTION. — Under frondose trees but exceptionally also under conifers. Associated with *Quercus*, *Tilia*, *Fagus*, *Populus*, and (once) *Pinus*. Widespread in Europe, not rare in the Netherlands on alluvial clay and on dune-sand. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland: Beek-Bergh, 29.VII.1952, 30.VIII.1952, *Huijsman*; Doetinchem, X.1953, *Huijsman*; Neerijnen, 13.VIII.1977, *van der Laan*; Valburg, 26.IX.1954, *Huijsman*; Vorden, 23.VIII.1953, *Huijsman*; prov. Utrecht, Breukelen, 10.VII.1981, *Kuyper 1615*; prov. Noord-Holland, Amsterdam, 13.VII.1958, *Kits van Waveren*; prov. Zuid-Holland: 's-Gravenhage, 31.VIII.1942, *Huijsman*; Leiden, 28.VIII.1959, *Bas 1738*; Oegsteeg, 16.VIII.1960, *Bas 2016*; Ridderkerk, 27.VIII.1977, *Kuyper 846*; Rotterdam, 17.IX.1960, *Bas 2198*; Wassenaar, 2.IX.1982, *Kuyper 2143*, 18.VIII.1966, *Visscher & 22.VIII.1982*, *Bas 7889*; prov. Zeeland, Oostkapelle 25.VIII.1981, *Kuyper 1697*. — BELGIUM: prov. Limburg, Kanne, Castle Caster, 17.X.1984, *Kuyper 2652*; prov. Namur, Treignes, 2.X.1984, *Kuyper 2627*. — CZECHOSLOVAKIA: Bohemia, Karlštejn, VII.1916, *Velenovský* (holotype of *I. fechtneri*, PRC). — FINLAND: Tavastia australis, Tammela, Syrjä, 8.VIII.1889, *Karsten 1608* (holotype of *I. pusio*, H); ibidem, 11.VIII.1892, *Karsten 1606* (H). — FRANCE: Ardennes, Semuy, 30.VII.1980, *Reumaux* (holotype of *I. pusio* f. *velata*, herb. Reumaux). — GERMANY: Westfalen, Heiligenkirchen, 15.IX.1972, *Huijsman*; Bavaria, Augsburg, Siebentisch Park, 2.VIII.1982, *Kuyper 2081*; Augsburg, Wittelsbacher Park, 5.VIII.1982, *Kuyper 2117*. — HUNGARY: Com. Salgótarján, Borosberény, 13.IX.1981, *Kuyper 1770*. — SWEDEN: Uppland, Uppsala, Hortus Botanicus, 3.IX.1948, *Holm & Melderis* (Fungi exsiccati suecici 2306, as *I. griseoilacina*, PC); Blekinge, Karlskrona, Vallgatan, 24.IX.1946, *Lundell & Wikland* (Fungi exsiccati suecici 2313, as *I. obscura*, PC). — SWITZERLAND: Planeyse, 21.VI.1965, *Huijsman*; Emmendingen, Bannwald, 5.IX.1978, *Huijsman*.

Notes: 1. The synonymy of *I. obscura* var. *obscurissima* with *I. pusio* is accepted on account of Kühner's assertions (in Bull. trimest. Soc. mycol. Fr. 71: 274. ('1955') 1956).

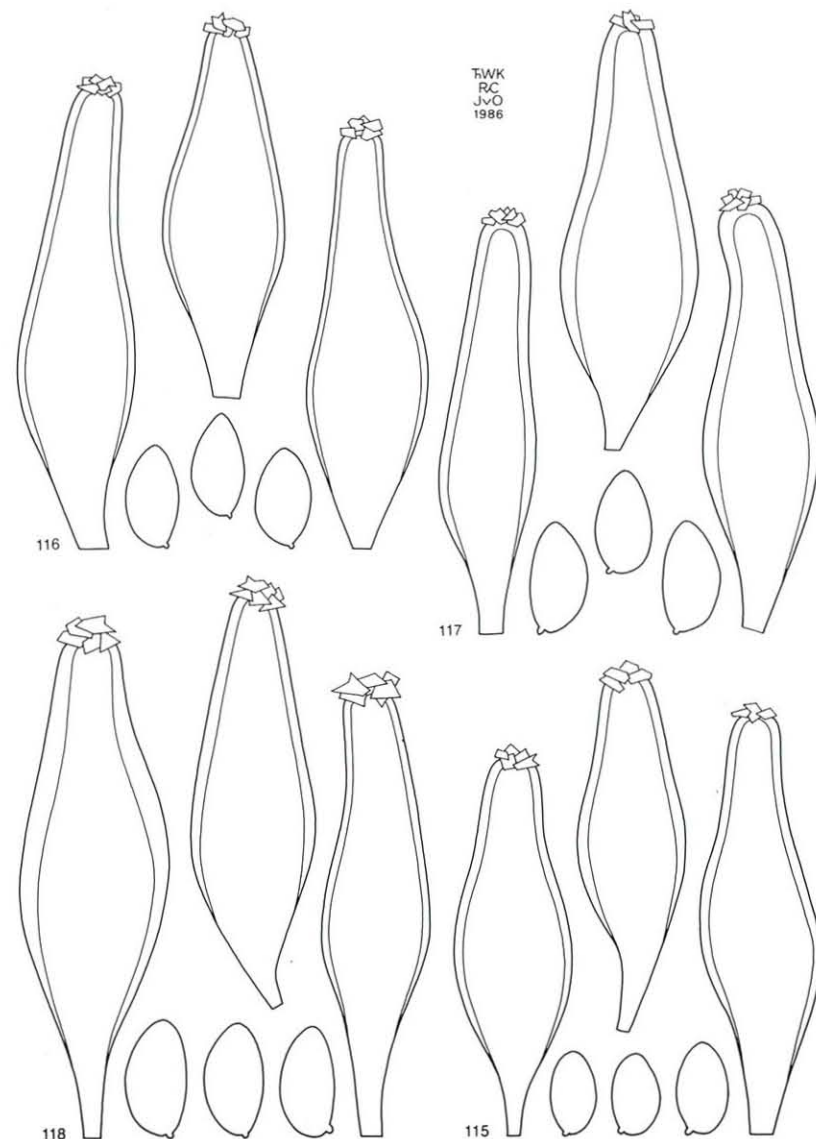


Fig. 115. *Inocybe pusio*. — Spores, pleurocystidia (from holotype of *I. pusio*).  
Figs. 116–118. *Inocybe nitidiuscula*. — Spores, pleurocystidia (116. from isoneotype of *I. nitidiuscula*;  
117. from holotype of *I. valida*; 118. from *Kuyper 2024*).

2. *Inocybe pusio* is rather variable in its macroscopical habit depending on the degree of development of the velipellis. When the velipellis is comparatively thick and rigid, the underlying pileipellis is more or less fibrillose-subtomentose and at margin not or hardly radially rimulose. Specimens with an early disappearing velipellis are generally somewhat darker and possess a distinctly rimulose to subrimulose margin. No taxonomic significance could, however, be accorded to this difference, contrary to the assertion by Reumaux (in Docs mycol. 12(48): 17. ('1982') 1983).

57. *Inocybe nitidiuscula* (Britz.) Sacc. — Figs. 116–118

*Agaricus nitidiusculus* Britz., Hymenomyc. Südbayern: 7. 1891. — *Inocybe nitidiuscula* (Britz.) Sacc., Syll. Fung. 11: 53. 1895.

*Inocybe friesii* R. Heim, Genre Inocybe: 319. 1931.

*Inocybe tarda* Kühner in Bull. Soc. Nat. Oyonnax 9 (suppl.): 6. 1955.

*Inocybe valida* M. Bon in Beih. Sydowia 8: 90. 1979.

*Inocybe friesii* f. *memorosa* R. Heim, Genre Inocybe: 332. 1931. — *Inocybe memorosa* (R. Heim) Grund & Stuntz in Mycologia 60: 420. 1968.

*Inocybe friesii* f. *epixantha* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 4. 1955. — *Inocybe nitidiuscula* f. *epixantha* (Kühner) Stangl in Int. J. Mycol. Lichenol. 1: 166. 1983.

MISAPPLIED NAME. — *Inocybe scabella* sensu Bres., Iconogr. mycol. 15: pl. 721, f. 1. 1930.

SELECTED ICONES. — Bres., Iconogr. mycol. 15: pl. 721, fig. 1. 1930 (as *I. scabella*). — Stangl in Z. Pilzk. 37: pl. 4, 5. 1971 (as *I. friesii* and *I. tarda* respectively). — Alessio, Iconogr. mycol. 29: pl. 46, f. 1. 1980 (as *I. friesii*).

Pileus 11–47 mm, conico-convex, convex, plano-convex to almost applanate, mostly umbonate, often prominently so, sometimes with a rather low, broad umbo or even without umbo, with straight margin, brown [5 YR–7.5 YR 3/3–4/4], sometimes more yellow-brown [10 YR 5–6/4, 10 YR 5/6, 2.5 Y 5/4], subtomentose-smooth around disc, but finally minutely excoriate and somewhat squamulose, outwards radially fibrillose, but fibrils not or hardly diverging, at margin not rimulose to subrimulose, dull to shiny; velipellis absent or present, but rather indistinct. Lamellae, L = 25–55, l = 1–3, normally crowded to subdistant, 2.5–6 mm broad, (sub)ventricose, rather narrowly adnate, white when young, then yellowish grey to yellowish brown [2.5 Y 5/4, 6/4]; edge fimbriate, whitish. Stipe 18–77 x 2–8 mm, equal to somewhat enlarged at base but not bulbous, solid, orange-ochraceous or reddish ochraceous in upper part [5 YR 5/6, 5/8, 6/6], sometimes ochraceous without reddish tinges [2.5 Y 6/6], pallescent and less reddish downwards, whitish at base, pruinose in upper part, descending to 1/3rd (exceptionally to halfway), below longitudinally white-fibrillose to almost smooth, but often with scattered minute whitish hairs. Cortina present in young specimens, leaving no remnants on stipe. Context whitish in pileus, reddish ochraceous to orange-ochraceous in cortex of upper part of stipe. Smell (sub)spermatric, sometimes with an acidulous component. Taste as smell.

Spores (8.5–)9.0–12.5(–13.0) x 5.0–7.0  $\mu$ m, on average 9.3–11.3 x 5.5–6.6  $\mu$ m, Q = 1.5–1.9(–2.0),  $\bar{Q}$  = 1.6–1.8, smooth, subamygdaliform, with conical apex. Pleurocystidia (50–)52–88(–90) x (11–)13–22  $\mu$ m, slenderly fusiform to almost cylindrical or slenderly (sub)lageniform, sometimes slenderly subtriform, thick-walled, with up to 2.0–2.5  $\mu$ m thick, colourless to pale yellow wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate to pyriform, thin-walled, colourless, frequent. Basidia 25–38 x 9–12  $\mu$ m, 4-spored. Caulocystidia present in upper part, descending to 1/3rd (sometimes even to half-way), similar to cheilocystidia and mixed with cauloparacystidia, in lower half sometimes with scattered caulocystidioid hairs, descending sometimes even to base of stipe.

HABITAT & DISTRIBUTION. — Under coniferous and frondose trees on calcareous soil. Associated with *Picea*, *Pinus*, *Larix*, *Quercus*, *Corylus*, and *Carpinus*. Widespread in Europe, especially in the montane zone under conifers, also in the alpine zone, also occurring in North America. Rare in the Netherlands in the dunes and in the IJsselmeerpolders. April–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland: Appelscha, 25.X.1984, *Kuyper* 2658; Franeker, 19.X.1982, *Wisman*; IJsselmeerpolders: Kuinderbos, 10.X.1983, *Kuyper* 2463; Voorsterbos, 12.X.1983, *Kuyper* 2477; Jagersveld, 16.VI.1981, *Kuyper* 1588, 7.VII.1981, *Kuyper* 1609, 4.VII.1982, *Jansen* & 9.VI.1983, *Jansen*; Roggebotzand, 2.VII.1982, *Jansen*, 25.V.1983, *Noordeloos* 83.10 & 11.VI.1983, *Tjallingii-Beukers*; Visvijverbos, 2.VII.1982, *Jansen* & 28.VIII.1982, *Kuyper* 2131; prov. Noord-Holland: Bergen, 7.XI.1981, *Kuyper* 2024 & 13.XI.1982, *Kuyper* 2334; prov. Zuid-Holland: Leiden, 30.XI.1982, *Bas* 8085; Oostvoorne, 11.VIII.1977, *de Kleuver* 72.077 & 17.X.1981, *Kuyper* 1960; Voorschoten, 15.X.1981, *Bas* 7822. — BELGIUM: prov. Luxembourg, Bevercé, 17.IX.1981, *Schreurs* 630; prov. Namur, Rochefort, Fond des Vaux, 5.X.1982, *Kuyper* 2270. — CZECHOSLOVAKIA: Slovakia, Male Fatra, Parmila, 9.IX.1981, *Kuyper* 1728 & 1730; Nižke Tatry, Stanišovská Dolina, 12.IX.1981, *Kuyper* 1767 & 1768. — FRANCE: Martignat, Lac Génin, 27.VIII.1957, *Huijsman*; dpt. Somme, Amiens, X.1975, *Bon* (holotype of *I. valida*, herb. Bon). — GERMANY: Bavaria, Augsburg, Gögginger Wäldchen, 29.VII.1982, *Kuyper* 2057; Augsburg, Haunstetter Wald, 3.VIII.1982, *Kuyper* 2091; Augsburg, Siebenbrunn, Siebentischwald, 25.X.1982, *Stangl* 1404 (isoneotype of *I. nitidiuscula*, L.); Haspelmoor, 4.VIII.1982, *Kuyper* 2105; Leipzig, Bubesheimerwald, 31.VII.1982, *Kuyper* 2068; Muna, Strass, 31.VII.1982, *Kuyper* 2066; Wellenbrunn, 4.VIII.1982, *Kuyper* 2097 & 2099; Werthering, 2.X.1962, *Bas* 2769. — ITALY: prov. Alto Adige, Trento, Alberghi di Margheri, 25.IX.1981, *Kuyper* 1842; prov. Pisa, S. Rossore, 6.IV.1984, *Kuyper* 2501 & 7.IV.1984, *Kuyper* 2508. — NORWAY: Oppland, Austsinni, 12.IX.1984, *Vellinga* 625; Randsfjorden, Nymoene, 14.IX.1984, *Vellinga* 639. — SWITZERLAND: Kt. Luzern: Oberdorf, 20.IX.1984, *Kuyper* 2560; Willisau, 17.IX.1984, *Kuyper* 2552 & 2553; Kt. Vaud, Pont-de-Nant sur Bex, 5.IX.1984, *Kuyper* 2514.

Notes: 1. *Inocybe nitidiuscula* has been neotypified by Stangl (in Int. J. Mycol. Lichenol. 1: 164. 1983), who was also the first to synonymise *I. friesii* with *I. nitidiuscula*. His conclusion is accepted here.

2. The difference between the yellow-brown variant formerly recognised as f. *epixantha* and the chestnut-brown typical variant is too small and shows too much intergradation to warrant a formal recognition of the former variant as autonomous form.

3. The synonymy of *I. tarda* with *I. nitidiuscula* may seem somewhat more surprising. However, a careful comparison between the protologues of both species described by Kühner (in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 63–68. 1955) makes clear that both taxa are extremely similar in both macroscopical and microscopical respects. *Inocybe tarda* mainly differs in being somewhat more robust and showing somewhat less pronounced reddish tinges at the apex of the stipe. The material studied by me did not allow for an unambiguous separation of both taxa, as several intermediates were encountered. For that reason these species are considered identical.

4. *Inocybe nitidiuscula* resembles *I. leiocephala* Stuntz rather much and can easily be confused with that species, especially when there are scattered somewhat differentiated caulocystidioid hairs in the lower part of the stipe. *Inocybe nitidiuscula* differs, however, in being somewhat more slender, not possessing a distinctly bulbous stipe, having a cortina in young stages, and having spores with a subconical apex (almost obtuse in *I. leiocephala*).

5. *Inocybe nitidiuscula* can also be confused with *I. fuscidula* Velen., but differs in having a stipe with distinct reddish tinges, larger spores, and pleurocystidia with

a somewhat thicker wall. Single specimens, especially in older stages, might not always be separable from *I. fuscidula*, however.

### 58. *Inocybe pseudodestructa* Stangl & Veselský — Figs. 119–120

*Inocybe pseudodestructa* Stangl & Veselský in Česká Mykol. 27: 19. 1973.

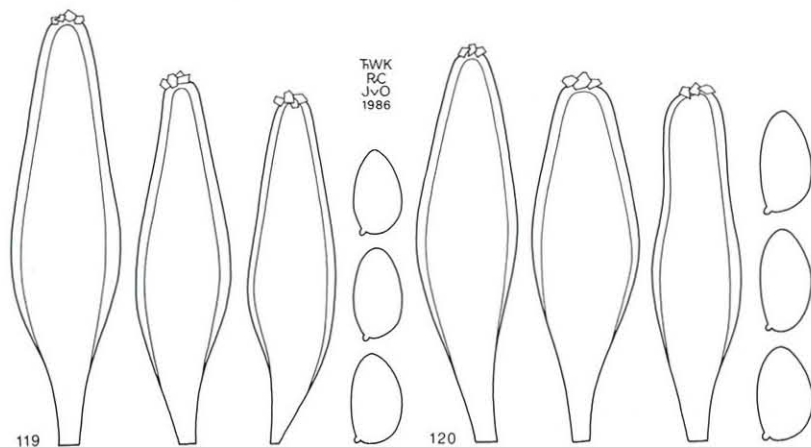
*Inocybe derbschii* Schwöbel & Stangl in Carolinea 40: 11. 1982.

MISAPPLIED NAME. — *Inocybe destructa* sensu Bres., Iconogr. mycol. 15: pl. 740. 1930; sensu Alessio, Iconogr. mycol. 29: 212. 1980.

SELECTED ICONES. — Bres., Iconogr. mycol. 15: pl. 740. 1930 (as *I. destructa*). — Stangl & Veselský in Česká Mykol. 27: pl. 83, f. 3. 1973. — Alessio, Iconogr. mycol. 29: pl. 49. 1980 (as *I. destructa*).

Pileus 12–60 mm, conico-convex, convex, plano-convex to applanate, more or less distinctly umbonate, with straight margin, not appendiculate, dark chestnut-brown [7.5 YR 4/3], sometimes with reddish tinges, with age sometimes mixed with olivaceous tinges, outwards slightly paler, smooth to subtomentose around disc, on age sometimes slightly breaking up and then minutely subsquamulose, outwards radially fibrillose, with diverging fibrils, at margin rimulose, often shiny, but sometimes dull; velipellis indistinct or absent. Lamellae, L = 30–40, l = 1–3, moderately crowded, 3–5 mm broad, subventricose, narrowly adnate, when young whitish, pale cream, or yellow, finally olivaceous brown; edge fimbriate, whitish or concolorous. Stipe 24–65 x 3–8 mm, equal to subbulbous at base (12 mm), solid, whitish, then pale yellowish or pale brownish, near apex sometimes with a pale pinkish ochraceous tinge [7.5 YR 7/4], pruinose in apical 1/3rd, longitudinally white-fibrillose downwards. Cortina present in young specimens. Smell and taste spermiatic.

Spores 8.5–11.0 x 5.0–6.0  $\mu\text{m}$ , on average 9.1–10.6 x 5.1–5.8  $\mu\text{m}$ , Q = (1.5–)1.6–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, subamygdaliform, with subconical apex. Pleurocystidia 50–70 x



Figs. 119–120. *Inocybe pseudodestructa*. — Spores, pleurocystidia (119. from holotype of *I. pseudodestructa*; 120. from holotype of *I. derbschii*).

(13–)14–22(–23)  $\mu\text{m}$ , fusiform, sometimes subutriform or slenderly subclavate, thick-walled, with up to 2.0  $\mu\text{m}$  thick, colourless to pale yellow wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 26–34 x 8–11  $\mu\text{m}$ , 4-spored. Caulocystidia present in apical part, descending to 1/3rd of stipe, similar to cheilocystidia, mixed with cauloparacystidia, downwards with scattered, rather undifferentiated caulocystidioid hairs, even in lower half.

HABITAT & DISTRIBUTION. — Under frondose and probably also under coniferous trees. Associated with *Quercus*, *Betula* and *Populus*. Widespread but apparently rare in Europe. Very rare in the Netherlands, known from two localities. June–Sept.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Neerijnen, 6.IX.1980, *Kuyper 1421*; prov. Zeeland, Terneuzen, 7.VII.1980, *de Meijer 107*. — CZECHOSLOVAKIA: Bohemia, Horní Počernice, 20.VI.1949, *Knížek* (PRM); Moravia, Ostrava, 30.VIII.1970, *Veselský* (holotype of *I. pseudodestructa*, PRM). — GERMANY: Baden-Württemberg, Karlsruhe, 19.VII.1980, *Schwöbel* (holotype of *I. derbschii*, KR); Bavaria, Augsburg, Gögginger Wäldchen, 2.VI.1970, *Stangl* (PRM).

Note: Very similar to *I. fuscidula* Velen., from which it differs in its shiny pileus and yellow-tinged lamellae.

The differences between *I. pseudodestructa* and *I. derbschii* are very small, the latter species being merely somewhat more yellow-brown. A separation on specific level seems not warranted. More material of this species is needed to judge on the status of this brighter-coloured variant.

### 59. *Inocybe fuscidula* Velen.

*Inocybe fuscidula* Velen., České Houby: 378. 1920, non *I. fuscidula* Bres. 1930.

*Inocybe pedunculata* Velen., České Houby: 374. 1920.

*Inocybe hypophaea* Furrer-Ziogas in Schweiz. Z. Pilzk. 30: 131. 1952.

*Inocybe virgatula* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 7. 1955.

*Inocybe descissa* var. *brunneoatra* R. Heim, Genre *Inocybe*: 234. 1931. — *Inocybe brunneoatra* (R. Heim) P.D. Orton in Trans. Br. mycol. Soc. 43: 177. 1960.

#### KEY TO THE VARIETIES OF *I. FUSCIDULA*

1. Basidia 4-spored.....var. *fuscidula*, p. 153
1. basidia 2-spored.....var. *bisporigera*, p. 156

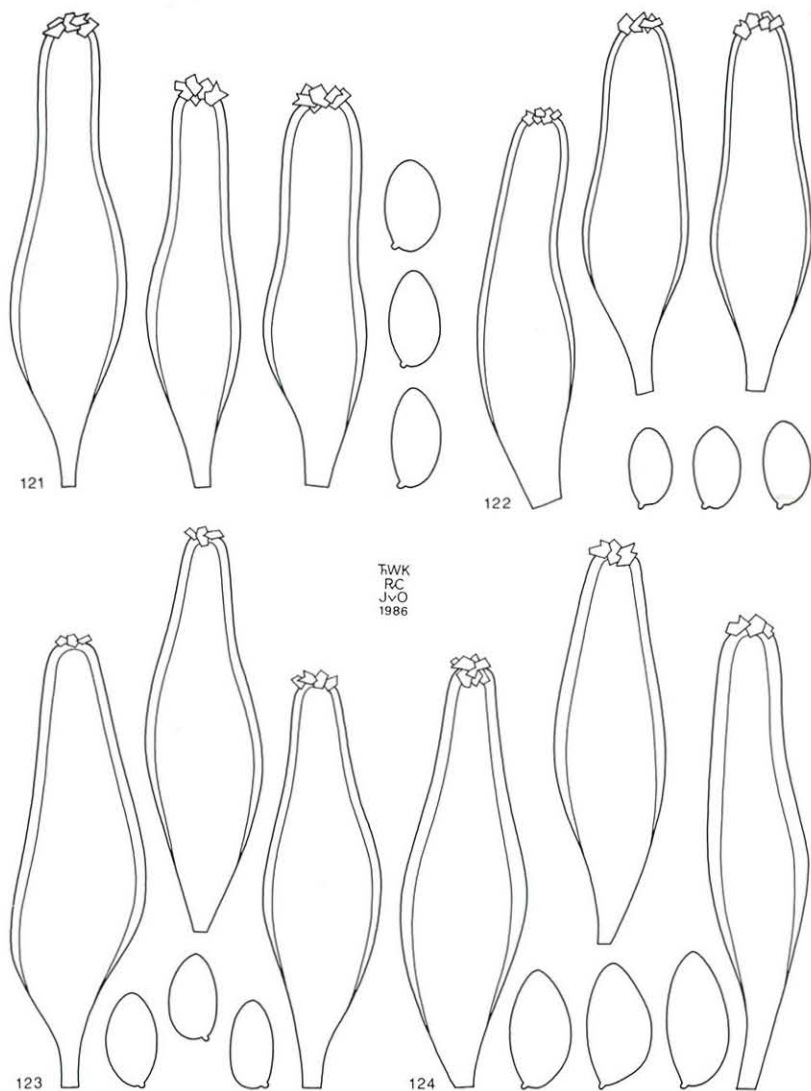
### 59.1. *I. fuscidula* var. *fuscidula* — Figs. 121–123

*Inocybe fuscidula* Velen. — *Inocybe pedunculata* Velen. — *Inocybe hypophaea* Furrer-Ziogas — *Inocybe virgatula* Kühner — *Inocybe descissa* var. *brunneoatra* R. Heim.

*Inocybe pallidipes* f. *flagellata* Reumaux in Docs mycol. 12(48): 9. (1982) 1983.

MISAPPLIED NAME. — *Inocybe rimosa* sensu Bres., Iconogr. mycol. 15: pl. 741. 1930.

SELECTED ICONES. — Bres., Iconogr. mycol. 15: pl. 741. 1930 (as *I. rimosa*). — R. Heim, Genre *Inocybe*: pl. 20, f. 1. 1931 (as *I. descissa* var. *brunneoatra*). — J. Lange, Fl. agar. dan. 3: pl. 113A, A1. 1938 (as *I. descissa* var. *brunneoatra*). — Furrer-Ziogas in Schweiz. Z. Pilzk. 30: pl. 1C. 1952



Figs. 121–124. *Inocybe fuscidula*. — Spores, pleurocystidia (121. from Kuyper 1576; 122. from Bresadola; 123. holotype of *I. hypophaea*; 124. from holotype of *I. fuscidula* var. *bisporigera*).

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(as *I. hypophaea*). — Stangl in Z. Pilzk. 39: pl. 2. ('1955') 1956 (as *I. virgatula*). — Stangl & Enderle in Mitt. Ver. Naturw. Math. Ulm 31: 124. 1981 (as *I. hypophaea*).

Pileus 15–43 mm, convex, plano-convex to applanate, with straight margin, without umbo or indistinctly umbonate when velipellis is well-developed, to prominently umbonate when velipellis is rather indistinct, dirty whitish to sordid isabella because of velipellis, to (dark) brown [7.5 YR 3/3, 4/4, 5/4] when velipellis is indistinct, outwards seemingly paler because of underlying context, at margin often whitish because of velipellis, smooth and subtomentose around centre, outwards, when velipellis rather indistinct, radially fibrillose with diverging fibrils and rimulose at margin, fibrils with age sometimes somewhat breaking up, and then recurvately subsquamulose, sometimes peeling with age. Lamellae, L = 30–50, l = 1–3, moderately crowded, 3–6 mm broad, (sub)ventricose, narrowly adnate, whitish when young, then (pale) yellowish brown [10 YR 6/4, 5/4]; edge fimbriate, whitish to concolorous. Stipe 21–70 x 3–7 mm, equal to subbulbous, but not marginately so, solid, white to whitish because of longitudinal fibrils, underneath slightly yellowish-tinged [10 YR 7/6], more distinctly so with age, especially in middle part, without orange-ochraceous tinges in upper part, pruinose from apex downwards to 1/3rd or even half-way stipe, below smooth. Cortina present in young specimens. Context whitish. Smell (sub)spermatic. Taste not distinct.

Spores 7.5–10.5(–11.0) x 4.5–6.0  $\mu$ m, on average 7.9–10.2 x 4.9–5.7  $\mu$ m, Q = 1.5–2.0,  $\bar{Q}$  = 1.6–1.9, smooth, subamygdaliform, with rather indistinctly conical apex. Pleurocystidia (41)–44–72(–75) x 11–22  $\mu$ m, cylindrical, fusiform to subutriform, a minority sublageniform but rather indistinctly so, (slightly) thick-walled, with up to 1.5–2.0  $\mu$ m thick, almost colourless wall but sometimes with a faint yellowish tinge, only slightly crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia pyriform to clavate, thin-walled, colourless, abundant. Basidia 26–36 x 9–12  $\mu$ m, 4-spored. Caulocystidia descending to 1/3rd, exceptionally even to half-way stipe, but sometimes only at extreme apex, similar to cheilocystidia, mixed with cauloparacystidia, below with a narrow intermediate zone of rather undifferentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil. Associated with *Fagus*, *Quercus*, *Castanea*, *Betula*, *Carpinus*, *Populus*, *Salix*, *Picea*, and *Larix*. Widespread in Europe, also occurring in North America, rare in the Netherlands. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: I J s s e l m e e r p o l d e r s: Bremerberg, 28.VIII.1984, *Tjallingii-Beukers*; Strandgaperweg, 6.X.1981, *Kuyper 1904*; prov. Z u i d - H o l l a n d: Leiden, 8.VIII.1981, *Noordeloos 1400*; Oegstgeest, 20.VIII.1981, *Kuyper 1692*; Voor- schoten, 4.VI.1981, *Kuyper 1576*, *1577* & *1579*; Wassenaar, 2.IX.1982, *Kuyper 2148*. — A U S T R I A: Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2174* & *2188*; Ötztal, Ötztal, Sölden, 15.VII.1956, *Maas Geesteranus 11620*. — B E L G I U M: prov. Luxembourg, Daverdisse, Barbouillon, 4.X.1982, *Kuyper 2273*. — C Z E C H O S L O V A K I A: Bohemia, Davle, VII.1918, *Velenovský* (holotype of *I. fuscidula*, PRC); Černošice, V.1920, *Velenovský* (holotype of *I. pedunculata*, PRC). — F R A N C E: Jura, Mignovillard, 1972, *Romagnesi 72.215* (herb. Romagnesi); Ardennes (holotype of *I. pallidipes* f. *flagellata*, herb. Reumaux). — G E R M A N Y: Eifel, Gerolstein, Scheuerbach, 21.IX.1980, *Jansen*. — I T A L Y: San Antonia, X.1900, *Bresadola* (authentic material of *I. rimosa* sensu Bres., S); prov. Alto Adige: Trento, Villazzano, 27.IX.1981, *Kuyper 1858* & *1863*; Trento, Alberghi di Margheri, 25.IX.1981, *Kuyper 1844*; Vezzena near Levico, 30.IX.1982, *Bas 7976*. — N O R W A Y: Østfold, Saupsborg, 30.VI.1985, *Weholt*. — S C O T L A N D: co. Perthshire, Blair Atholl, Struan Birch Forest, 22.IX.1983, *Kuyper 2414*. — S W I T Z E R L A N D: Kt. Luzern, Willisau, 17.IX.1984, *Kuyper 2555*; Schöfland, Hirschtal, 27.X.1947, *Haller* (holotype of *I. hypophaea*, herb. Furrer-Ziogas). — W A L E S: co. Montgomeryshire, Lake Vyrnwy, IX.1960, *Kits van Waveren*.

Notes: 1. *Inocybe fuscidula* is very variable in its macroscopical habit. The variant most commonly encountered in western Europe is characterised by a slender habit,

dark brown pileus and a relatively long stipe. It often grows under frondose trees on rather damp soil. This variant is well illustrated by Heim and Lange as *I. descissa* var. *brunneoatra*. In central Europe a more robust variant is encountered with a stouter habit, a somewhat to distinctly paler pileus (depending on the development of the velipellis) and relatively short and firm stipe. It grows mostly under conifers but can also be encountered under frondose trees. The illustration by Bresadola (sub nom. *I. rimosa*) is characteristic for this variant. Although the extremes of these variants are macroscopically strikingly different, they hardly differ in microscopical characters. Intermediates between the extremes are repeatedly encountered, and for that reason no formal status has been given to those variants.

The conspecificity of *I. virgatula* and *I. hypophaea* has also been confirmed by Kühner (in Bull. Soc. Nat. Oyonnax 9(Suppl.): 59–63, 1955) and Furrer-Ziogas (pers. comm.). The sole difference between both variants is to be found in the development of the velipellis, resulting in either a distinctly umbonate, brown rimulose pileus, or a sordid isabella-brown pileus without umbo. Intermediates are not seldomly encountered, even within a group that seems to originate from one mycelium.

2. *Inocybe pseudodestructa* is closely related to *I. fuscidula*, but differs in having a rather shiny, brown pileus often mixed with reddish tinges, yellowish lamellae and a stipe with pinkish tinges.

*Inocybe nitidiuscula* differs in having reddish tinges at the apex of the stipe and somewhat larger spores.

### 59.2. *I. fuscidula* var. *bisporigera* Kuyp., var. nov. — Fig. 124

*Inocybe descissa* f. *bisporigera* J. Lange, Fl. agar. dan. 5: 101. 1940 (inval., Art. 36.1.).

A var. *fuscidula* differt basidiis bisporigeris atque sporis majoribus. Holotypus: *J. Lange*, 17.IX.1938, Nørresø, Trolleborg, Fyn, Denmark (C).

SELECTED ICON. — *J. Lange*, Fl. agar. dan. 5: pl. 200F. 1940.

Pileus 20–25 mm, convex, then expanded, umbonate, pale Vandyke-brown, radially fibrillose, rimulose at margin. Lamellae slightly ventricose, narrowly adnate, pallid, greyish brown. Stipe 30–40 x 2.5 mm, equal, solid, pale brownish, pruinose above. Smell almost absent.

Spores 10.0–14.0(–14.5) x 5.5–7.0  $\mu\text{m}$ , on average 11.1–12.8 x 6.1–6.5  $\mu\text{m}$ , Q = 1.7–2.0,  $\bar{Q}$  = 1.8–1.9, smooth, (sub)amygdaliform, with conical apex. Pleurocystidia (54–)57–69(–70) x 11–18  $\mu\text{m}$ , cylindrical to subfusiform, sometimes tending to sublageniform, thick-walled, with up to 1.5–2.0  $\mu\text{m}$  thick, colourless wall, crystalliferous at apex. Cheilocystidia similar to pleurocystidia. Basidia 26–35 x 7–10  $\mu\text{m}$ , 2-spored. Caulocystidia descending to about half-way stipe, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Under frondose trees. Known hitherto from England and Denmark. July–Sept.

COLLECTIONS EXAMINED. — DENMARK: Fyn, Trolleborg, Nørresø, 17.IX.1938, *Lange* (holotype of *I. fuscidula* var. *bisporigera*, C). — ENGLAND: co. Kent, Shoreham, 25.VII.1965, *Sinnott* & *Thoday*.

Note: The macroscopical description has been copied from Lange (Fl. agar. dan. 5: 101. 1940). The type collection is very scanty, consisting of one small fragment of a lamella only.

### 60. *Inocybe xantholeuca* Kuyp., spec. nov. — Fig. 125

Pileus campanulatus, dein convexus, sine umbone, velipelle obtectus, initio albidus vel eburneus, subtus luteolus, sericeus, non radialiter rimulosus. Lamellae subventricosae, anguste adnatae vel subliberae, citrinae. Stipe subbulbosus, albidus, versus basim luteolus. Caro albidus. Odor spermatiscus. Sporae 7.5–9.0 x 4.5–5.0  $\mu\text{m}$ , laeves, apice subobtusos vel subconicos. Pleurocystidia (45–)46–60 x 10–17(–19)  $\mu\text{m}$ , fusiformia vel utriformia, crassiparietalia, pariete incolore, crystallifera. Cheilocystidia pleurocystidiis similia. Caulocystidia presentia in parte apicali, descendencia ad partem tertiam, cheilocystidiis similia. — Holotypus: *Th. W. Kuypers* 2545, 16.IX.1984, Willisau, Kanton Luzern, Switzerland (L).

Etymology:  $\xi\alpha\nu\theta\omicron\lambda\epsilon\upsilon\kappa\omicron\varsigma$ , yellow-white.

Pileus to 20 mm, campanulate when young, then more convex, without umbo, slightly inflexed when young, initially almost whitish to very pale yellowish [paler than 2.5 Y 8/4] because of velipellis, later more distinctly yellow [5 Y 8/4, even to 7/4], sericeous, without diverging fibrils, at margin not radially rimulose, dull, not shiny. Lamellae, L = 30–40, l = 1–3, moderately crowded, subventricose, to 4 mm broad, narrowly adnate to almost free, when young lemon-yellow [2.5 Y–5 Y 8/6], later more brownish-tinged; edge fimbriate, yellowish. Stipe to 27 x 4 mm, at base distinctly bulbous but not marginately so, solid, whitish, yellow-tinged towards base, pruinose in upper 1/3rd, smooth below. Cortina present in young specimens. Context whitish in pileus and stipe. Smell spermatisc. Taste not recorded.

Spores 7.5–9.0 x 4.5–5.0  $\mu\text{m}$ , on average 8.0–8.5 x 4.7–4.8  $\mu\text{m}$ , Q = 1.6–1.9,  $\bar{Q}$  = 1.7–1.8, smooth, regular to subamygdaliform, with almost rounded to indistinctly subconical apex. Pleurocystidia (45–)46–60 x 10–17(–19)  $\mu\text{m}$ , fusiform to utriform, often rather slender, a

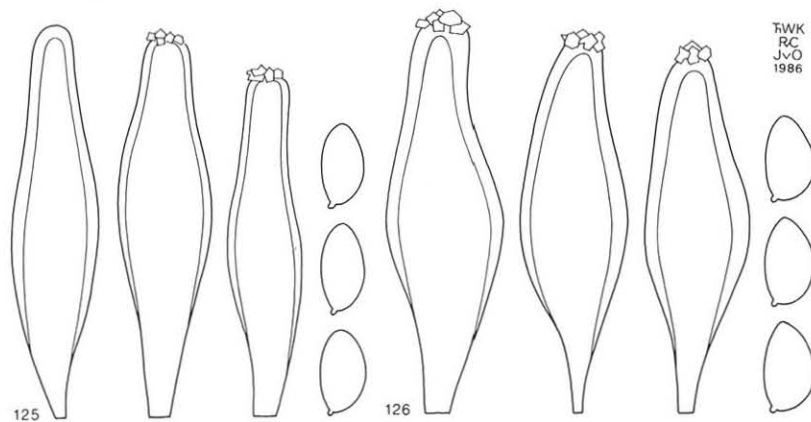


Fig. 125. *Inocybe xantholeuca*. — Spores, pleurocystidia (from holotype of *I. xantholeuca*).  
Fig. 126. *Inocybe queletii*. — Spores, pleurocystidia (from *Huijsman* 23.V.1965).



few even subcylindrical, sometimes more sublageniform, thick-walled, with up to 1.0(–1.5)  $\mu\text{m}$  thick, colourless wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 24–32  $\times$  7–10  $\mu\text{m}$ , 4-spored. Caulocystidia descending to about 1/4th of stipe, similar to cheilocystidia, mixed with cauloparacystidia.

HABITAT & DISTRIBUTION. — Under *Picea abies*. Very rare in Europe, not yet recorded from the Netherlands. Sept.–Nov.

COLLECTIONS EXAMINED. — FRANCE: Martignat, 5.XI.1967, *Huijsman* 67.461. — SWITZERLAND: Kt. Luzern, Willisau, 16.IX.1984, *Kuyper* 2545 (holotype of *I. xantholeuca*, L).

Note: Easily recognised because of yellow-tinged lamellae and pileus. *Inocybe flocculosa* (Berk.  $\rightarrow$ ) Sacc. var. *crocifolia* (Herink) Kuyper has a darker, subsquamulose pileus and lageniform cystidia with a (bright) yellow wall. *Inocybe auricoma* (Batsch) J. Lange differs in the lack of yellow lamellae, and has different cystidia too. In its microscopical characters *I. xantholeuca* comes rather close to *I. fuscidula* Velen., but the macroscopical differences are sufficient to allow separation of these taxa on the level of species.

#### 61. *Inocybe queletii* Maire & Konr. — Fig. 126

*Inocybe queletii* Maire & Konr. in Bull. trimest. Soc. mycol. Fr. 45: 40. 1929. — *Inocybe eutheles* var. *queletii* (Maire & Konr.) R. Heim, Genre Inocybe: 218. 1931.

EXCLUDED. — *Inocybe eutheles* var. *queletii* sensu R. Heim, Genre Inocybe: 218. 1931 (= *I. hirtella* var. *bispora*?).

MISAPPLIED NAMES. — *Inocybe sambucina* sensu Bres., Iconogr. mycol. 15: pl. 750. 1930.

*Inocybe fulvida* sensu Métrod in Rev. Mycol. 3: 18. 1938.

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 98. 1930. — Bres., Iconogr. mycol. 15: pl. 750. 1930 (as *I. sambucina*; excl. spores)

Pileus 30–60 mm, when young conical or campanulate with somewhat involute margin, soon convex to plano-convex, finally even applanate, usually without umbo, but sometimes with low, broad umbo, sometimes slightly appendiculate at margin in young specimens, whitish to pale cream when young because of thick velipellis, somewhat darkening on age and becoming ivory, ochraceous or even argillaceous under velipellis, sericeous-smooth around centre, outwards radially fibrillose, fibrils somewhat diverging and at margin radially rimulose. Lamellae, L = 60–70, l = 1–3, moderately crowded, 2–4 mm broad, straight to subventricose, (narrowly) adnate, whitish, soon becoming isabella-brown; edge fimbriate, white. Stipe 40–70  $\times$  6–12 mm, equal to subbulbous, in young specimens sometimes submarginately bulbous, solid, whitish to pale cream on age, pruinose in upper part (to about 1/3rd), below somewhat fibrillose. Cortina present in young specimens but leaving no remnants on the stipe. Context whitish, no pinkish tinges observed. Smell spermiatic. Taste as smell.

Spores (8.0)–8.5–11.5(–12.0)  $\times$  (5.0)–5.5–6.5(–7.0)  $\mu\text{m}$ , on average 8.9–10.8  $\times$  5.5–6.3  $\mu\text{m}$ , Q = 1.5–1.9(–2.0),  $\bar{Q}$  = 1.6–1.8, smooth, regular to subamygdaliform, with only indistinctly subconical, sometimes subobtusate apex, partly with an apical callus. Pleurocystidia (50)–54–69(–76)  $\times$  14–20(–21)  $\mu\text{m}$ , fusiform to (sub)lageniform, a minority slenderly clavate, thick-walled, with up to 3.0  $\mu\text{m}$  thick, colourless wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia (slenderly) clavate, thin-walled, colourless, numerous. Basidia 26–34  $\times$  9–12  $\mu\text{m}$ , 4-spored. Caulocystidia descending

to about 1/3rd of stipe, similar to cheilocystidia, below with an intermediate zone to about half-way, consisting of rather differentiated caulocystidioid hairs, but without cauloparacystidia.

HABITAT & DISTRIBUTION. — Under coniferous trees. Associated with *Picea*, *Abies*, and *Pinus*. Rather common in Central Europe (Jura), very rare in Northwestern Europe. Known from one locality in the Netherlands. May–June.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Noord-Brabant, Dorst, 11.V.1985, *Jansen* 85–105. — FRANCE: Jura, Martignat, 17.VI.1953, *Piane*. — NORWAY: Østfold, Borge, Torp Brük, 29.VI.1985 *Weholt*. — SWITZERLAND: Cernier, 10.V.1959, *Huijsman*; Enges, 11.V.1961, *Marti*; Le Locle, La Chaux du Milieu, 10.V.1961, *Marti* & 18.VI.1965, *Huijsman*; Pontarlier, 26.V.1958, *Huijsman*; Rochefort, 23.V.1965, *Huijsman*.

Notes: 1. According to Huijsman (pers. comm.) some collections lack the velipellis (almost) completely and in such cases the pileus is rather dark brown. No microscopical differences with the typical variant have been found by me. I could not find a description of this dark variant.

The collection from the Netherlands differs in being somewhat more slender than the collections from the Jura. A collection from Germany, depicted by Stangl & Veselský (in Česká Mykol. 30: 176. 1978) also shows a rather slender habit. No microscopical differences could be found, however.

2. Judging from the rather short description, *I. sambucina* var. *aestivalis* S. Petersen, Danske Agaricaceer: 335 (1911), might be identical with *I. queletii*, but in the absence of any type-material I regard this name as a nomen dubium.

3. The description by Bresadola (Iconogr. mycol. 15: pl. 750. 1930, sub nom. *I. sambucina*) most probably refers to *I. queletii*. Although Bresadola noted the spores to be 10–12  $\times$  6–7  $\mu\text{m}$  (Q about 1.7), he depicted them as having a Q about 2.5. Part of Bresadola's taxon might therefore refer to true *I. sambucina* (Fr.: Fr.) QuéL.

#### 62. *Inocybe flocculosa* (Berk. $\rightarrow$ ) Sacc.

*Agaricus flocculosus* Berk. in Sm., Engl. Fl. 5(2): 97. 1836, non *A. flocculosus* DC. in Lam. & DC. 1815: Fr. — *Inocybe flocculosa* (Berk.  $\rightarrow$ ) Sacc., Syll. Fung. 5: 768. 1887.

*Inocybe pluteoides* Höhn. in Sitzungsber. K. Akad. Wiss., math.-naturw. Kl. 66: 14. 1907.

*Inocybe cordae* Velen., České Houby: 375. 1920.

*Inocybe rohlenaee* Velen., České Houby: 379. 1920.

*Inocybe fulvidula* Velen., Novit. mycol.: 120. 1939.

*Inocybe dentifera* Velen., Novit. mycol. nov.: 60. 1947.

*Inocybe crocifolia* Herink in Česká Mykol. 8: 123. 1954, non *I. crocifolia* Beller 1976.

*Inocybe gausapata* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 4. 1955.

*Inocybe subtigrida* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 6. 1955.

*Inocybe geraniolens* M. Bon & Beller in Docs mycol. 6(24): 45. 1976.

*Inocybe crocifolia* Beller in Docs mycol. 7(25): 57. 1976, non *I. crocifolia* Herink 1954.

*Inocybe ferruginea* M. Bon in Docs mycol. 8(30–31): 69. 1978.

*Inocybe aurantiifolia* Beller in Docs mycol. 9(35): 26. 1979 (nom. nov. for *I. crocifolia* Beller, non *I. crocifolia* Herink).

KEY TO THE VARIETIES OF *I. FLOCCULOSA*

1. Lamellae when young almost whitish or pale greyish-brownish or pale ochraceous ..... var. *flocculosa*, p. 160  
 1. Lamellae when young much brighter coloured.  
 2. Lamellae citrine-yellow to saffran-yellow. .... var. *crocifolia*, p. 163  
 2. Lamellae orange-red to red-brown. .... var. *ferruginea*, p. 165

Notes: 1. The arrow (→) was introduced by Kuypers & Vuure (in Persoonia 12: 448, 1985) in order to bring Art. 72. Note 1 of the I.C.B.N. in concurrence with Art. 46.

2. Although these varieties look strikingly different in their macroscopical characters, they are almost completely identical under the microscope. As there is only one character difference between these three taxa, they are given here the rank of variety.

The holotypus of *I. pluteoides* Höhn. (Austria, Niederösterreich, Wienerwald, Pressbaum, 17.X.1906, FH) represents an albino variant of this species. As explained on p. 9, I do not want to confer taxonomic value upon these albinistic variants. This albino variant has also been found in the Netherlands (IJsselmeerpolders, Oost-Flevoland, Reverbos, 6.X.1981, *C. Bas 7800*). Both var. *flocculosa* and var. *crocifolia* were found at this locality.

62.1. *I. flocculosa* var. *flocculosa* — Figs. 127–130

*Agaricus flocculosus* Berk., non *A. flocculosus* DC.: Fr. — *Inocybe cordae* Velen. — *Inocybe rohlenae* Velen. — *Inocybe fulvidula* Velen. — *Inocybe dentifera* Velen. — *Inocybe gausapata* Kühner — *Inocybe subtrigina* Kühner — *Inocybe geraniolens* M. Bon & Beller.

*Inocybe langei* var. *heterosporoides* Reumaux in Docs mycol. 12(48): 6. ('1982') 1983.

MISAPPLIED NAMES. — *Inocybe trivialis* sensu P. Karst. in Acta Soc. Sci. fenn. 16: 521. 1888.

*Inocybe eutheles* sensu Konr. & M., Ic. sel. Fung. 2: pl. 101. 1930.

*Inocybe lucifuga* sensu R. Heim, Genre Inocybe: 201. 1931; sensu Stangl & Veselský in Česká Mykol. 27: 15. 1973.

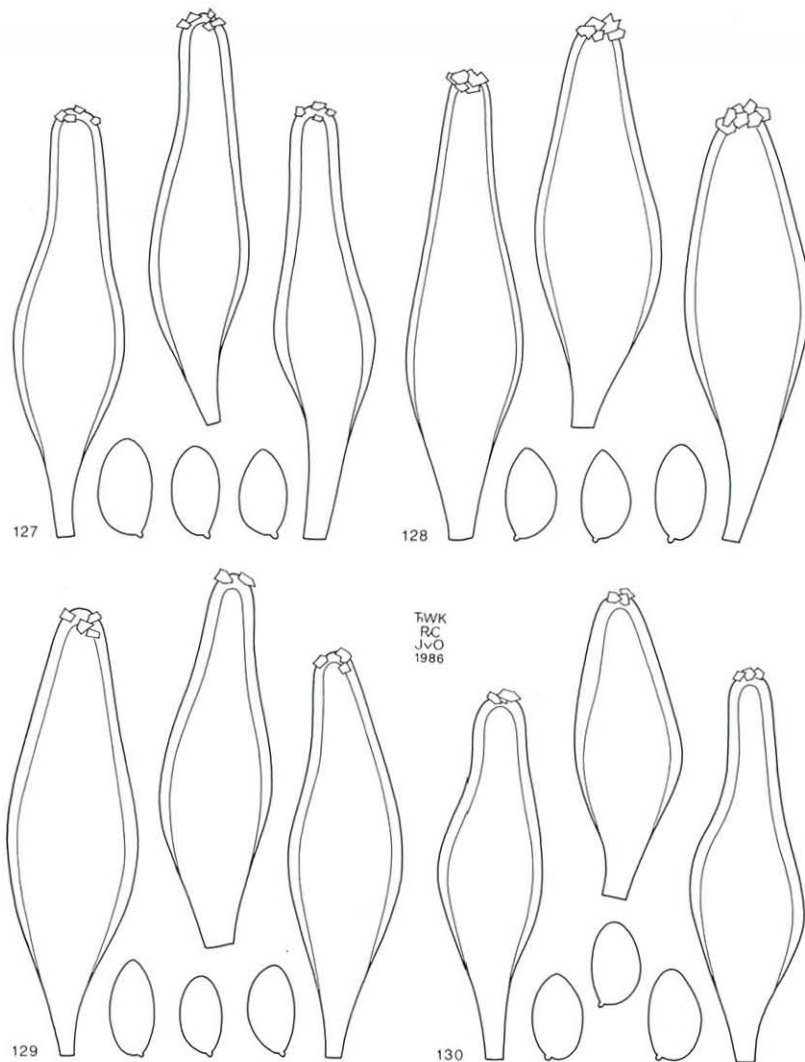
*Inocybe abjecta* sensu J. Lange, Fl. agar. dan. 3: 73. 1938.

*Inocybe deglubens* sensu J. Lange, Fl. agar. dan. 3: 77. 1938.

*Inocybe pallidipes* sensu J. Lange, Fl. agar. dan. 3: 74. 1938.

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 2: pl. 101. 1930 (as *I. eutheles*). — R. Heim, Genre Inocybe: pl. 13, f. 1–4. 1931 (as *I. lucifuga*). — J. Lange, Fl. agar. dan. 3: pl. 111C, 112D (as *I. deglubens*) & 113D (as *I. pallidipes*). 1938. — Alessio, Iconogr. mycol. 29: pl. 53 (as *I. gausapata*) & 54 (as *I. subtrigina*). 1980. — R. Phillips, Paddest. Schimm.: 152. 1981.

Pileus 7–58 mm, when young conico-convex to convex, soon spreading, finally applanate, with or without umbo, with inflexed margin when young, soon straight, brown, pale brown, ochraceous brown to ochraceous, fibrillose-squamulose, especially at centre, often excoriate and becoming recurvately squamulose-squarrose, towards margin more appressedly fibrillose but fibrils not diverging, at margin not rimulose; velipellis sometimes present, but rather indistinct, not persisting, exceptionally persisting for a long time and pileus than more or less (sub)toomentose. Lamellae, L = 25–60, l = 1–3, moderately crowded, 2–6 mm broad, ventricose or not, rather broadly to narrowly adnate, sometimes almost free, when young whitish to pale greyish-brownish or pale ochraceous, finally yellow-brown to olivaceous



Figs. 127–130. *Inocybe flocculosa*. — Spores, pleurocystidia (127. from neotype of *I. flocculosa*; 128. from Huijsman 20.X.1955; 129. from holotype of *I. pluteoides*; 130. from holotype of *I. geraniolens*).

brown; edge fimbriate to subflocculose, white. Stipe 12–75 x 2–8 mm, equal to clavate (at base to 10 mm), solid, white when young, becoming pale ochraceous or pale brownish buff on age, at apex pruinose or more hairy-pruinose (descending to 1/4th), but sometimes not pruinose under lens, downwards longitudinally white-fibrillose, only indistinctly so with age, base white-tomentose. Cortina present in young specimens. Smell spermatoc-acidulous, not *Pelargonium*-like, sometimes indistinct. Taste as smell.

Spores (7.5–)8.0–10.5 x 4.5–6.0  $\mu$ m, on average 8.5–9.6 x 5.0–5.7  $\mu$ m, Q = 1.5–2.0,  $\bar{Q}$  = 1.6–1.8, smooth, subamygdaliform, with (sub)conical apex. Pleurocystidia (46–)48–82(–87) x (12–)13–22  $\mu$ m, sublageniform to lageniform, sometimes subfusiform or subutriform, thick-walled, with up to 3.0(–3.5)  $\mu$ m thick, pale to bright yellow wall, but exceptionally almost colourless, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia clavate, thin-walled, colourless, abundant. Basidia 26–34 x 8–10  $\mu$ m, 4-spored. Caulocystidia only present in apical part, descending to 1/4th of stipe, but sometimes almost completely absent, similar to cheilocystidia, mixed with cauloparacystidia, downwards with a rather narrow zone of rather differentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION: Under frondose and coniferous trees on rather calcareous soil. Associated with *Betula*, *Salix*, *Populus*, *Alnus*, *Quercus*, *Fagus*, *Picea*, and *Pinus*. Widespread in Europe and North America. Common in the Netherlands, especially in the IJsselmeerpolders. May–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland: Terschelling, 20.X.1981, *Kuyper 1965* & 23.X.1981, *Kuyper 1992*; Weststellingwerf, 29.VIII.1982, *Jansen 82.158*; prov. Drenthe: Beilen, 2.X.1978, *Huijsman*; Diever, 24.IX.1952, *Huijsman*; Havelte, 16.X.1982, *Kuyper 2300*; Nieuwerood, X.1979, *Booy*; prov. Gelderland: Nunspeet, 27.IX.1958, *Bas 1561*; Vorden, 3.X.1947 & 11.X.1947, *Huijsman*; Wageningen, 13.V.1957, *Veth & Koopmans*; Winterswijk, 15.IX.1971, *de Kleuver 71.046*; IJsselmeerpolders: Voorsterbos, 18.IX.1982, *Kuyper 2226*; de Abbert, 7.X.1981, *Kuyper 1895*; Bremerberg, 1.VIII.1981, *Kuyper 1660*, 5.X.1981, *Kuyper 1887*, 8.IX.1982, *Kuyper 2374* & 22.IX.1984, *Tjallingii-Beukers*; Houtribbos, 28.VIII.1982, *Kuyper 2134*; Jagersveld, 16.VI.1981, *Kuyper 1592*; Revebos, 6.X.1981, *Kuyper 1897*; Roggebotzand, 1.XI.1980, *Kuyper 1565 & 1566*, 8.VII.1981, *Kuyper 1602*, 4.X.1981, *Jansen*, 9.X.1981, *Kuyper 1906*, 1907, 1922, 1927 & 1931, 11.VI.1983, *Tjallingii-Beukers*, 29.X.1983, *Hebing*, 4.XI.1983, *Tjallingii-Beukers*, 5.VII.1984, *Tjallingii-Beukers*; Spijk, 11.X.1980, *Kuyper 1428*, 1431, 1438 & 1441, 8.IX.1983, *Kuyper 2375*; Visvijverbos, 7.VII.1981, *Kuyper 1605*, 13.VIII.1981, *Jansen*, 30.XI.1983, *Jansen*; prov. Utrecht: Bunnik, 26.IX.1972, *Arnolds 754*; Utrecht, 22.IX.1981, *Vellinga 409*; Veenendaal, 6.XI.1971, *de Kleuver 71.096 & 71.097*; prov. Noord-Holland: Amstelveen, 21.VII.1960, *Kits van Waveren*; Castricum, 23.X.1955, *Maas Geesteranus 10851*, 23.IX.1982, *Kuyper 2251*, 8.IX.1954, *Maas Geesteranus 10148 & 2.XI.1984, Kuyper 2670*; Egmond, 23.IX.1982, *Kuyper 2249*; Laren, 6.V.1973, *van Winden 120*; Velsen, 13.XI.1962, *Bas 2914*; Vogelenzang, 28.X.1957, *Huijsman*, 21.X.1980, *Kuyper 1544 & 24.X.1981, Kuyper 1991*; prov. Zuid-Holland: Leiden, 21.VII.1954, *Bas 531*; Oegstgeest, 6.XI.1982, *Uljé*; Oostvoorne, 7.X.1980, *Kuyper 1511 & 19.X.1982, Kuyper 2304*; Rockanje, 4.XI.1981, *Kuyper 2010 & 19.X.1982, Kuyper 2302*; Voorschoten, 23.VII.1981, *Kuyper 1629*; Wassenaar, 28.V.1981, *Bas 7765 & 2.IX.1982, Kuyper 2141*; prov. Zeeland: Haamstede, 1.XI.1972, *Huijsman & 23.X.1982, Kuyper 2311*; Walcheren, 30.X.1936, *Huijsman*; Terneuzen, 26.VIII.1981, *Kuyper 1702*; prov. Noord-Brabant: Breda, X.1936, *Huijsman*; Wouw, 12.X.1936 & 19.IX.1937, *Huijsman*; prov. Limburg: Gronsveld, 26.X.1958, *Bas 1646 & Maas Geesteranus 12766*, 5.VIII.1981, *Kuyper 1668*; Tegelen, 6.IX.1954, *Bas 591*. — AUSTRIA: Tirol, Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2172*; Voldertal, 8.IX.1967, *Huijsman 67.201*. — BELGIUM: prov. Namur, Vonêche, 7.X.1977, *van der Laan*. — CZECHOSLOVAKIA: Bohemia, Radotin, VIII.1915, *Velenovský* (holotype of *I. cordae*, PRM); Mnichovice, 15.X.1941, *Velenovský* (holotype of *I. dentifera*, PRM); Mnichovice, IX.1937, *Velenovský* (lectotype of *I. fulvidula*, PRM); Libochovičky, V.1916, *Fechtner* (holotype of *I. rohlenae*, PRM). — ENGLAND: Hornstock Wood, 6.X.1840 (authentic material of *Agaricus flocculosus*, neotype, design. mihl, K). — FINLAND: Tavastia australis, Tammela, Mustiala, Runkomäki, 11.IX.1878, *Karsten 2493* (as *I. deglubens* var. *trivialis*, H). — FRANCE: Doubs, Lougres, 20.X.1955, *Huijsman*; dpt. Somme, Creuse, 1.IX.1975, *Bon* (holotype of *I. geraniolens*, herb. Bon); Ardennes, Semuy (holotype of *I. langei* var. *heterosporoides*, herb. Reumaux). — GERMANY: Teutoburgerwald, Melle, 24.VIII.1977, *Huijsman*; Eifel, Gerolstein, Papenkäule, 23.IX.1980, *Kuyper 1470, 1471 & 1473*. —

SCOTLAND: Co. Perthshire, Black Wood of Rannoch, 24.IX.1983, *Kuyper 2430*. — SWITZERLAND: Kt. Luzern, Willisau, 19.IX.1984, *Kuyper 2561*; Kt. Ticino, Morgala, 27.IX.1984, *Brocchi*; Kt. Vaud, Les Plans sur Bex, 7.IX.1984, *Kuyper 2524*.

Notes: 1. *Inocybe flocculosa* is a rather variable species and several mycologists have tried to arrive at a satisfactory taxonomy of this complex. Stangl & Veselský (in *Česká Mykol.* 31: 15–27. 1977) asserted that 5 different species could be recognised. These species were said to differ in spore-form (length/breadth-ratio) and ecological preference. However, my observations failed to confirm their results as both characters were found to be far more variable and without correlation. For that reason their taxonomy of this complex is not accepted here.

In a previous publication (in *Persoonia* 12: 385. 1985) I considered *I. dentifera* to represent an autonomous species. However, after the completion of the manuscript, more material came to my attention, and these additional collections showed that the appendiculate-dentate pileal margin was overrated as a taxonomic criterion. For that reason I now reduce *I. dentifera* in the synonymy of *I. flocculosa*.

2. Slender forms with yellowish tinges in the pileus often resemble *I. auricoma* (Batsch) J. Lange, but can be separated on account of their somewhat larger, distinctly lageniform pleurocystidia. The pileus of *I. flocculosa* is somewhat more squamulose too.

3. A variant with a well-developed velipellis has been described under the misapplied name *I. abjecta* (P. Karst.) Sacc., e.g. by Lange (Fl. agar. dan. 3: 73. 1938) and Kühner (in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 79. 1955). Such variants also possess somewhat smaller spores and cystidia than typical var. *flocculosa*. As some overlap in the critical characters can be observed, such variants are not given independent status for the time being. However, more material might indicate that they are better recognised as an autonomous form.

## 62.2. *I. flocculosa* var. *crocifolia* (Herink) Kuyp., *comb. & stat. nov.* — Fig. 131

*Inocybe crocifolia* Herink in *Česká Mykol.* 8: 123. 1954 (basionym).

*Inocybe crocifolia* Beller — *Inocybe aurantiifolia* Beller

SELECTED ICON. — M. Bon in *Fung. rar. Ic. col.* 11: pl. 86, f. 1. 1979 (as *I. aurantiifolia*).

Pileus 12–42 mm, conico-convex, convex to almost applanate, with margin inflexed when young, then straight, with or without umbo, brown or slightly greyish-tinged brown [7.5 YR 4/3, 4/4–6, 5/4], outwards slightly paler and more greyish-tinged because of velipellis, tomentose to subsquamulose around centre, outwards coarsely fibrillose, at margin not radially rimulose; velipellis indistinct to rather distinct. Lamellae, L = 30–40, l = 1–3, moderately crowded, 2–4 mm broad, not ventricose to subventricose, moderately broadly to narrowly adnate, orange-yellow when young [7.5 YR 7/6, 7/8, 8/8], with age more ochraceous-yellow, sometimes with a faint olivaceous tinge [2.5 Y 7/6, 6/4–6/6]; edge indistinctly fimbriate, concolorous. Stipe 18–60 x 2–4 mm, equal to slightly clavate, not bulbous, solid, at first longitudinally white-fibrillose over pale ochraceous or more orange-ochraceous background, pruinose at apex, sometimes more hairy-pruinose. Cortina present in young specimens. Context whitish in pileus, ochraceous yellow or orange-yellow in stipe. Smell faint, subspERMATIC. Taste not distinct.

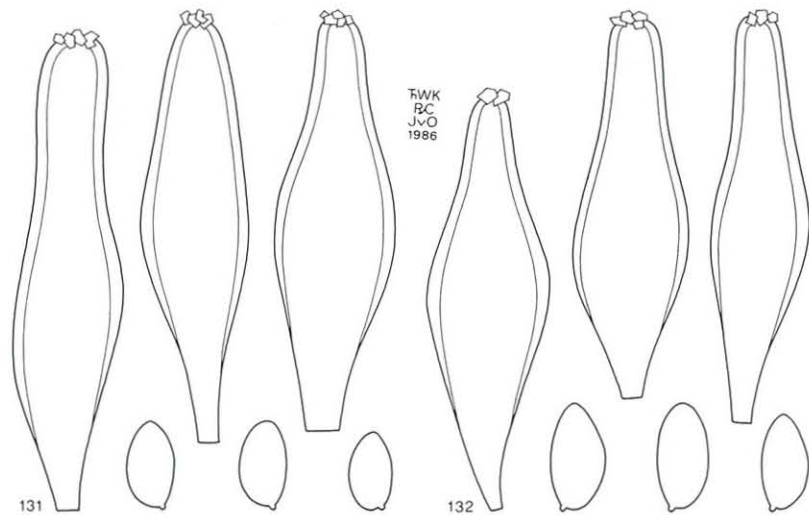
Spores 8.0–11.0(–12.0) x 4.5–6.0(–6.5)  $\mu\text{m}$ , on average 8.7–10.6 x 4.9–5.7  $\mu\text{m}$ ,  $Q = 1.6$ –2.1,  $\bar{Q} = 1.7$ –1.9, smooth, subamygdaliform, with (sub)conical apex. Pleurocystidia 51–90 x (13–)14–22(–26)  $\mu\text{m}$ , slenderly (sub)lageniform, sometimes more slenderly fusiform-cylindrical, thick-walled, with up to 2.0  $\mu\text{m}$  thick, pale to bright yellow wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia clavate to pyriform, thin-walled, colourless, abundant. Basidia 23–33 x 7–10  $\mu\text{m}$ , 4-spored. Caulocystidia only at extreme apex to descending to 1/6th of stipe, similar to cheilocystidia, downwards on stipe a narrow zone of somewhat differentiated caulocystidioid hairs.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil. Associated with *Picea*, *Pinus*, *Fagus*, *Quercus*, and *Tilia*. Apparently (very) rare in Europe, known from four localities in the Netherlands. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: IJsselmeerpolders: Revebos, 6.X.1981, *Kuyper* 1892; Roggebotzand, 29.X.1983, *Hebing*; Jagersveld, 9.VII.1982, *Kuyper* 2040; prov. Noord-Holland: Velzen, 11.VIII.1962, *Kits van Waveren*. — AUSTRIA: Tirol, Kramsach, Bergsteinerwald, 10.IX.1982, *Kuyper* 2197. — CZECHOSLOVAKIA: Mladá Boleslav, Mnichovo Hradiště, Velká Horká, 27.VI.1953, *Herink* (holotype of *I. crocifolia*, PRM). — FRANCE: dpt. Doubs, Lougres, 4.X.1955 & 10.X.1955, *Huijsman*.

Notes: 1. Forms growing under frondose trees generally possess somewhat longer and more slender spores. It is doubtful whether this difference is taxonomically relevant.

2. Einhellinger (in Ber. bayer. bot. Ges. 52:195. 1981) described a form of *I. gausapata* with lemon-yellow lamellae. It might well belong to *I. flocculosa* var. *crocifolia*.



Figs. 131–132. *Inocybe flocculosa*. — Spores, pleurocystidia (131. from holotype of *I. ferruginea*; 132. from holotype of *I. crocifolia*).

### 62.3. *I. flocculosa* var. *ferruginea* (M. Bon) Kuyp., *comb. & stat. nov.* — Fig. 132

*Inocybe ferruginea* M. Bon in Docs mycol. 8(30–31): 69. 1978 (basionym).  
SELECTED ICON. — M. Bon in Fung. rar. Ic. col. 11: pl. 86, f. 2. 1979.

Pileus 10–25 mm, conical to convex, umbonate, with margin somewhat inflexed when young, then straight, vivid red-brown or more reddish-orange, fibrillose, towards margin slightly radially rimulose. Lamellae, L = 25–45, l = 1–3, 4–5 mm broad, narrowly adnate, emarginate, orange-red, finally more red-brown. Stipe 15–30 x 2–3 mm, equal to subbulbous, but only indistinctly so, orange-reddish, towards base with a vinaceous purplish sheen, pruinose at apex, downwards longitudinally fibrillose. Context concolorous with surface or somewhat paler. Smell and taste spermatic.

Spores (8.0–)8.5–10.0 x 4.5–5.5  $\mu\text{m}$ , on average 9.1 x 5.1  $\mu\text{m}$ ,  $Q = 1.7$ –1.9,  $\bar{Q} = 1.8$ , smooth, regular to subamygdaliform, with subconical apex. Pleurocystidia (54–)56–74(–78) x (14–)16–19(–21)  $\mu\text{m}$ , (sub)lageniform, but a few tending to fusiform or utriform, thick-walled, with up to 1.5  $\mu\text{m}$  thick, pale yellow wall, slightly crystalliferous at apex, not frequent. Cheilocystidia similar to pleurocystidia, rather scarce. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 26–31 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia in apical part of stipe descending to about 1/6th, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Under *Quercus* and *Pinus*. Known up to now only from the type-locality. Nov.

COLLECTION EXAMINED. — FRANCE: Vendée, Olonne, Conche verte, 11.XI.1977, *Bon* 77111102 (holotype of *I. ferruginea*, herb. Bon).

### 63. *Inocybe frigidula* J. Favre — Fig. 133

*Inocybe frigidula* J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: 200. 1955.  
SELECTED ICON. — J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: pl. 8, f. 4. 1955.

Pileus up to 20 mm, conico-convex, without umbo, brownish with a faint yellowish tinge, subfibrillose, on age becoming subsquamulose, with fibrils not diverging, not rimulose at margin, with an indistinct velipellis around disc. Lamellae, L = 30–35, l = 1–3, moderately crowded, to 4.5 mm broad, ventricose, rather narrowly adnate, yellowish brown; edge fimbriate, whitish. Stipe to 25 x 3 mm, equal to somewhat broadened at base, pale ochraceous without reddish tinges, pruinose at apex. Context pale ochraceous. Smell faint, subspermatic.

Spores (10.0–)10.5–12.0 x 6.0–7.0  $\mu\text{m}$ , on average 11.0 x 6.6  $\mu\text{m}$ ,  $Q = 1.6$ –1.8,  $\bar{Q} = 1.7$ , smooth, subamygdaliform, with indistinctly subconical apex. Pleurocystidia 42–72(–77) x 20–29  $\mu\text{m}$ , cylindrical to clavate, sometimes tending to fusiform, thick-walled, with up to 3.0  $\mu\text{m}$  thick, pale yellow wall, crystalliferous at apex. Cheilocystidia similar to pleurocystidia. Paracystidia clavate, thin-walled, colourless. Basidia 25–33 x 9–11  $\mu\text{m}$ , 4-spored. Stipe in apical part with caulocystidia, similar to cheilocystidia and mixed with cauloparacystidia, descending to 1/6th of stipe.

HABITAT & DISTRIBUTION: In the alpine zone associated with *Dryas octopetala*, *Pinus mugo* or *Salix* spec. Known so far only from the Alps. Sept.

COLLECTIONS EXAMINED. — AUSTRIA: Tirol, Pertisau, Plumsjoch, alt. 1700 m, 11.IX.1982, *Kuyper* 2208. — SWITZERLAND: Kt. Graubünden, Pass del Fuorn, Murtaröl d'Aint, alt. 2500 m, 15.VIII.1953, *Favre* (lectotype of *I. frigidula*, design. Monthoux & Kuyper, G).

Note: The macroscopical description is partly based on Favre (l.c.).

Easily recognised because of its very broad cystidia resembling those of *I. serotina* Peck. Alpine variants of *I. inodora* Velen. (see p. 171), another species with broad cystidia, differ in having a stipe that is pruinose over half-way to pruinose throughout.

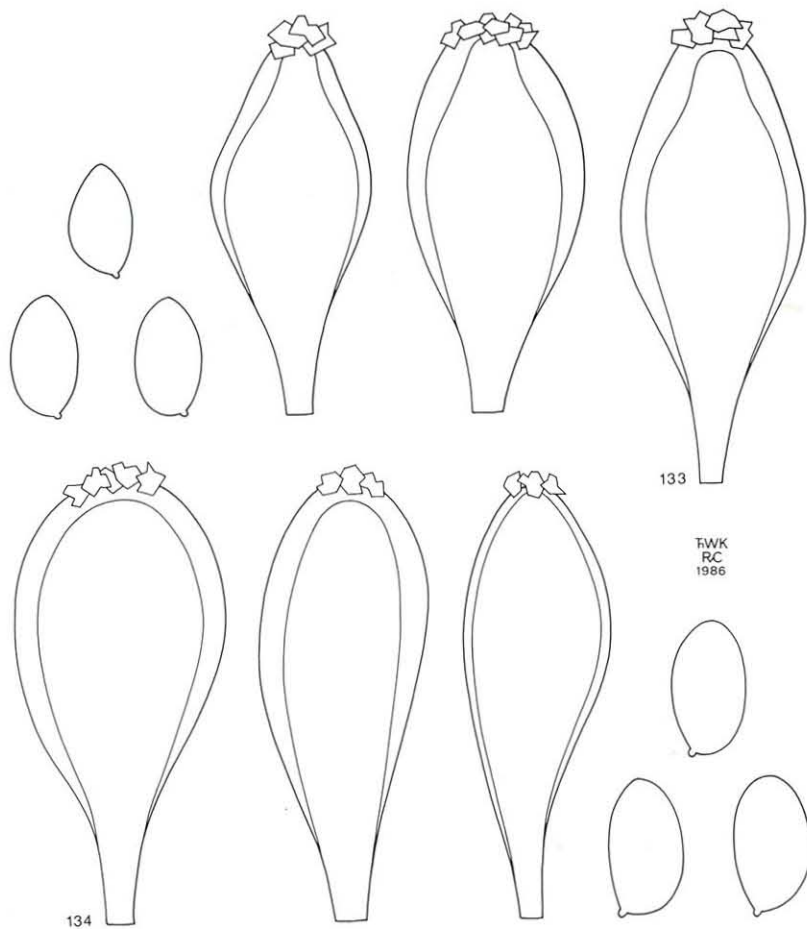


Fig. 133. *Inocybe frigidula*. — Spores, pleurocystidia (from lectotype of *I. frigidula*).  
Fig. 134. *Inocybe serotina*. — Spores, pleurocystidia (from holotype of *I. devoniensis*).

#### 64. *Inocybe serotina* Peck — Figs. 134–136

*Inocybe serotina* Peck in Bull. N.Y. State Mus. 75: 17. 1904.

*Inocybe ammophila* Atk. in Amer. J. Bot. 5: 210. 1918, non *I. ammophila* Hongo & Matsuda.

*Inocybe devoniensis* P. D. Orton in Trans Br. mycol. Soc. 43: 274. 1960.

*Inocybe psammophila* M. Bon in Doec mycol. 14(53): 25. 1984.

EXCLUDED. — *Inocybe serotina* sensu M. Lange in Medd. Grønland 148: 17. 1957 (= *I. vulpinella*).  
SELECTED ICONES, — R. Heim, Genre *Inocybe*: pl. 10, f. 1. 1931. — J. Lange, Fl. agar. dan. 3: pl. 1111. 1938.

Pileus 31–44 mm, conico-convex to convex, finally applanate, without or with low, broad umbo, almost whitish around centre because of velipellis, and with scattered whitish velar patches in outer half, with velipellis persisting or disappearing around centre, ochraceous [2.5 Y 7/6, 6/6] to brown [10 YR 5/4, 4/4], especially in marginal part, smooth around disc, outwards sericeous-fibrillose, but fibrils not diverging, at margin not rimulose when velipellis distinct, but rimulose to even subrimulose when velipellis only weakly developed, completely covered with grains of sand; velipellis greasy-subviscid after removal of sand. Lamellae, L = 45–65, l = 1–3, moderately crowded, 3–5 mm broad, (sub)ventricose, adnate to almost free, pale cream or yellowish-greyish when young, finally greyish-brownish, sometimes with a faint olivaceous tinge [2.5 Y 5/4]; edge fimbriate, white or concolorous. Stipe 34–63 x 7–10 mm, equal to subbulbous, sometimes seemingly submarginately bulbous, solid, partly buried in sand, whitish, then pale yellowish [2.5 Y 8/6], but subterranean part remaining white, somewhat hairy-pruinose only from apical part over half-way, below indistinctly fibrillose. Cortina not observed. Context whitish in pileus, somewhat yellowish-tinged in stipe. Smell strong, disagreeable-sweetish, as of *Amanita phalloides*. Taste as smell.

Spores 11.5–17.5(–19.0) x 6.5–8.5(–9.0)  $\mu\text{m}$ , on average 12.6–15.6 x 6.7–7.9  $\mu\text{m}$ , Q = 1.7–2.3(–2.5),  $\bar{Q}$  = 1.9–2.2, smooth, mostly subamygdaliform, often with a suprahilar depression, with subobtuse to subconical apex, conspicuously thick-walled. Pleurocystidia (42–)43–69(–80) x 17–33(–37)  $\mu\text{m}$ , (broadly) clavate to balloon-shaped, thick-walled, but sometimes only slightly so, with up to 2.0–3.0  $\mu\text{m}$  thick, (almost) colourless wall, crystalliferous at apex, often also at base, rather infrequent to very scarce. Cheilocystidia similar to pleurocystidia or somewhat more slender, rather infrequent. Paracystidia spheropedunculate to broadly clavate, thin-walled, colourless, frequent. Basidia 30–46 x 10–15  $\mu\text{m}$ , 4-spored, but a minority 2-spored and then often with deformed sterigmata. Caulocystidia present in apical part, exceptionally completely absent, similar to cheilocystidia and mixed with cauloparacystidia, descending to maximally 1/6th of stipe, gradually changing into an intermediate zone descending far downwards, even to base of stipe and caulocystidioid hairs even there differentiated, thick-walled, crystalliferous and broadly cylindrical to subclavate, but intermediate zone sometimes very narrow and not even reaching half-way stipe.

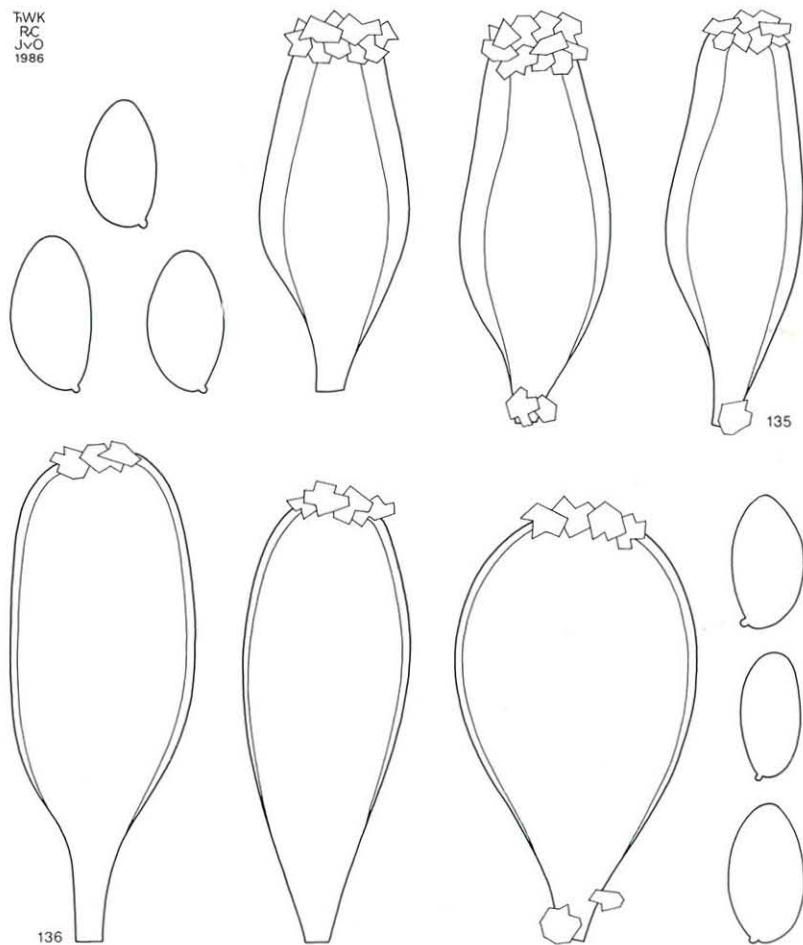
HABITAT & DISTRIBUTION. — In dune-sand under frondose and coniferous trees in dry and moist places. Associated with *Populus*, *Salix repens*, and *Pinus*, but sometimes with only *Ammophila arenaria* (and not mycorrhizal at all?). Widespread along the Atlantic coast in Europe, also occurring in North America. Not uncommon in the Netherlands in the coastal dunes, once found inland. (July–) Sept.–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland, Terschelling, 14.IX.1954, *Jansen-van der Plaats*; IJsselmeerpolders, Almere, 4.XI.1981, *Daams 81.22*; prov. Noord-Holland, Vogelenzang, 22.X.1965, *Reijnders* & 11.X.1981, *Kuyper 1943*; prov. Zuid-Holland: Noordwijkerhout, 3.X.1967, *Maas Geesteranus 15141*; Oostvoorne, 17.X.1981, *Kuyper 1961*, 20.X.1963, *van Brummelen 1746*, 4.XI.1981, *Kuyper 2003 & 2004* & 14.X.1960, *Bas 2274*; Wassenaar, 11.VII.1972, *Bas 5856* & 28.X.1981, *Kuyper 1994*. — ENGLAND: co. Devon, Braunton Burrows, 3.X.1951, *T.J. Wallace* (holotype of *I. devoniensis*, K); co. Lancashire, Freshfield,

31.X.1968, Hartman (K). — UNITED STATES: Lake Ontario, Sadus Bays, X.1902, Burbank (holotype of *I. serotina*, NYS); Michigan, Grand Haven, 23.IX.1907, W.T. Wallace (holotype of *I. ammophila*, CUP).

Notes: 1. Easily recognisable because of great spores, voluminous cystidia and specialised habitat. It could, however, be confused with some variants of *I. inodora*,

TWK  
RC  
JvO  
1986



Figs. 135–136. *Inocybe serotina*. — Spores, pleurocystidia (135. from Kuyper 1994; 136. from holotype of *I. serotina*).

but the latter species differs in having somewhat smaller spores with thinner wall, less broad cystidia, a more strongly rim(ul)ose pileus and in lacking a viscid velipellis.

2. *Inocybe serotina* is rather variable in several macroscopical characters. Stipe covering can be greatly different between the various collections, depending on the development and differentiation of the intermediate zone. Specimens with a bulbous stipe often possess caulocystidioid hairs almost all over, whereas specimens with an equal stipe can lack them altogether. As intermediate cases also occur, no taxonomic significance can be attributed to this character, and *I. psammophila* M. Bon is therefore relegated to synonymy.

The bulbous stipe can even seem to be marginate, as the outer side is covered with remnants of the (greasy) velipellis which is completely covered with grains of sand.

3. The development of the velipellis seems at least partly environmentally determined. Specimens growing in damp habitats have a more weakly developed velipellis, which causes a darker colour of the pileus (brown) without a persisting white centre. These variants, originally described as *I. devoniensis*, occur in dune valleys, associated with *Salix repens*, but do not deserve autonomous taxonomic status.

#### 65. *Inocybe pruinosa* R. Heim — Figs. 137–138

*Inocybe pruinosa* R. Heim, Genre *Inocybe*: 245. 1931.

*Inocybe halophila* R. Heim, Genre *Inocybe*: 242. 1931.

*Inocybe albidodisca* var. *reidii* Stangl & Veselský in Česká Mykol. 29: 70. 1975.

EXCLUDED. — *Inocybe halophila* sensu A. Pears. in Trans. Br. mycol. Soc. 26: 45. 1943 (= *I. impexa*); sensu Huijsman in Persoonia 9: 479. 1978 (= *I. vulpinella*); sensu auct. (= *I. lacera* var. *lacera*).

MISAPPLIED NAME. — *Inocybe albidodisca* sensu D. Reid in Fung. rar. Ic. col. 6: 28. 1972.

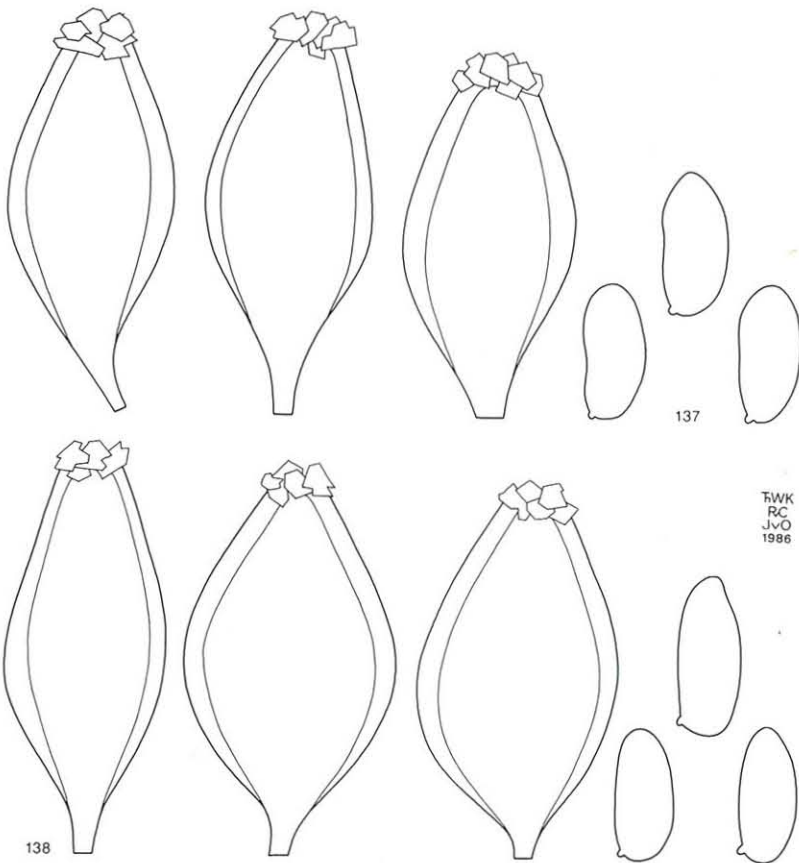
SELECTED ICONS. — R. Heim, Genre *Inocybe*: pl. 17, f. 1, 2. 1931 (as *I. pruinosa* and *I. halophila* respectively). — D. Reid in Fung. rar. Ic. col. 6: pl. 45b. 1972 (as *I. albidodisca*).

Pileus 18–32 mm, convex to plano-convex, not umbonate or with low broad umbo, with straight margin, white to whitish when young because of thick, sericeous-smooth, subshiny, but not greasy, mostly persisting velipellis, (but sometimes becoming indistinct), underneath velipellis brownish buff [10 YR 7/6, 6/6] to finally yellowish brown [10 YR 5/6, with a tinge of 4/4], radially fibrillose, but fibrils not diverging, at margin not rimulose, without adhering grains of sand on velipellis. Lamellae, L = 40–55, l = 1–3, crowded, 4–6 mm broad, (sub)ventricose, narrowly adnate, greyish-brownish [10 YR 5/3]; edge almost even to fimbriate, ochraceous. Stipe 21–43 x 3–6 mm, equal to subbulbous, but without marginate bulb, solid, whitish, discolouring with age to brownish yellow [10 YR 6/8, 7/8] especially in middle part, under lens indistinctly pruinose on upper half or even to base (?), but pruinosity very indistinct in lower half. Cortina present in young specimens, soon disappearing and leaving no remnants. Context whitish in pileus and stipe. Smell and taste indistinct.

Spores (11.0–)11.5–17.0 x 5.0–6.5  $\mu$ m, on average 12.1–15.5 x 5.5–6.4  $\mu$ m, Q = 1.9–2.7(–2.8),  $\bar{Q}$  = 2.1–2.5, smooth, subamygdaliform, sometimes slightly irregular, only with indistinct suprahilar depression, with subconical apex. Pleurocystidia (45–)47–71(–77) x (13–)14–29(–30)  $\mu$ m, (broadly) clavate to fusiform, sometimes subutriform, very thick-walled, with up to more than 5.0  $\mu$ m thick, almost colourless to pale yellowish wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate to pyriform, thin-walled, colourless, frequent. Basidia 28–37 x 9–13  $\mu$ m, 4-spored. Caulocystidia

present, descending to half-way stipe and mixed with cauloparacystidia, but sometimes only present in a rather narrow apical zone, similar to cheilocystidia, downwards gradually changing into differentiated, cylindrical, thick-walled and crystalliferous caulocystidioid hairs without cauloparacystidia descending even to base of stipe and there rather irregular and only slightly thick-walled.

**HABITAT & DISTRIBUTION.** — Under coniferous and frondose trees on dry, sandy places. Associated with *Pinus*, *Picea*, and *Quercus*. Widespread but rare in Europe, known from two localities in the Netherlands (IJsselmeerpolders). May-Aug.



Figs. 137–138. *Inocybe pruinoso*. — Spores, pleurocystidia (137. from neotype of *I. pruinoso*; 138. from holotype of *I. albidodisca* var. *reidii*).

**COLLECTIONS EXAMINED.** — NETHERLANDS: IJsselmeerpolders: Revebos, 1.VI.1985, *Tjallingii-Beukers*; Roggebotzand, 8.VII.1981, *Kuyper 1612*, 5.VII.1984 & 28.VI.1985, *Tjallingii-Beukers*. — CZECHOSLOVAKIA: Bohemia, Český Kras, Velká hore, 2.VIII.1979, *Klán*. — ENGLAND: co. Surrey, Guildford, Blackheath, 20.VII.1968, *Reid* (holotype of *I. albidodisca* var. *reidii*, K). — FRANCE: dpt. Manche, Biville, 19.VIII.1971, *Romagnesi 71.164* (herb. Romagnesi), 31.V.1973, *Romagnesi 73.33* (herb. Romagnesi), 13.VIII.1974, *Romagnesi 74.147* (herb. Romagnesi), 18.V.1983, *Kuyper 2353* & 22.V.1983, *Kuyper 2357* (neotype of *I. pruinoso*, design. mihi, L) & *Kuyper 2360*.

Notes: 1. *Inocybe halophila* has been an enigmatic species that has been variously interpreted. I concur with Romagnesi (pers. comm.) who asserted that *I. halophila* is only a variant of *I. pruinoso* with somewhat less prominent velipellis. I studied several collections in his herbarium (e.g. *Romagnesi 73.33* & *74.147*) which corresponded in all respects to Heim's protologue of *I. halophila*.

2. *Inocybe pruinoso* differs from the North American *I. bulbosa* Peck (in Bull. Torrey bot. Club. 36: 333. 1909) in having somewhat smaller cystidia, larger spores and an (almost) equal stipe.

*Inocybe longispora* M. Lange (in Medd. Grønland 148: 13. 1957) shows some superficial resemblance to *I. pruinoso* but differs in narrower spores (4.5–5.5  $\mu$ m broad), less thick-walled pleurocystidia and a stipe that is pruinose over only 1/10th of its length.

#### 66. *Inocybe inodora* Velen. — Figs. 139–142

*Inocybe inodora* Velen., České Houby: 373. 1920.

*Inocybe fulvida* Bres., Iconogr. mycol. 15: pl. 720, f. 2. 1930.

*Inocybe albidodisca* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 3. 1955.

*Inocybe canescens* J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: 200. 1955.

*Inocybe hirtella* var. *paupera* F. Möller, Fungi Faröes 1: 227. 1945.

*Inocybe fulvida* var. *subserotina* M. Bon in M. Bon & Chevassut in Docs mycol. 3(11): 27. 1973.

*Inocybe fulvida* var. *subserotina* f. *luteophylla* M. Bon in M. Bon & Chevassut in Docs mycol. 3(11): 27. 1973.

EXCLUDED. — *Inocybe fulvida* sensu Métrod in Rev. Mycol. 3: 18. 1938 (= *I. queletii*).

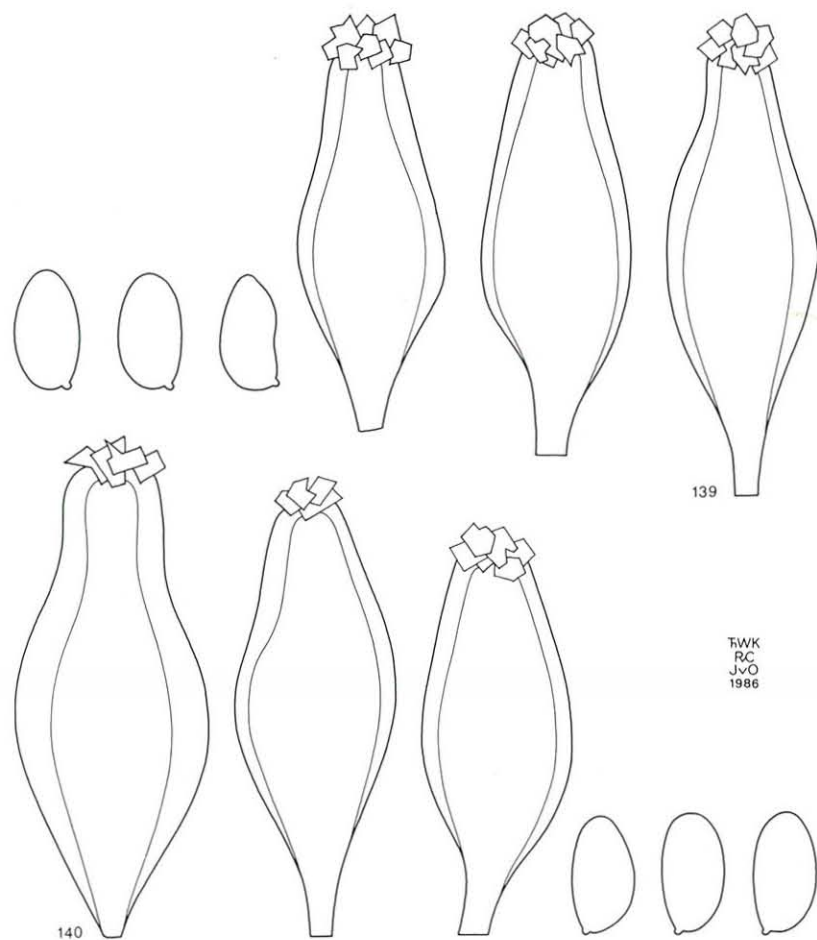
*Inocybe fulvida* sensu Schweers in Fungus 15: 2. 1944 (= *I. splendens* var. *splendens*).

*Inocybe albidodisca* sensu D. Reid in Fung. rar. Ic. col. 6: 28. 1972 (= *I. pruinoso*).

SELECTED ICONES. — Bres., Iconogr. mycol. 15: pl. 720, f. 2. 1930 (as *I. fulvida*). — J. Favre in Ergebn. wiss. Unters. schweiz. NatParks, N.F. 5: pl. 6, f. 10. 1955 (as *I. canescens*). — Stangl & Veselský in Česká Mykol. 29: pl. 87, f. 2. 1975 (as *I. albidodisca*). — Alessio, Iconogr. mycol. 29: pl. 64, f. 2 & pl. 65. 1980 (as *I. fulvida* var. *subserotina* and *I. albidodisca* respectively).

Pileus 20–57 mm, campanulate, convex, plano-convex to applanate, with large broad umbo, pale ochraceous or brownish, finally brownish ochraceous, with paler, almost whitish centre on account of velipellis, smooth around centre, outwards fibrillose with fibrils often diverging, at margin (sub)rimose; velipellis present around disc, and in young specimens also at margin but disappearing with age. Lamellae, L = 40–45, l = 1–3, moderately crowded, ventricose, narrowly adnate, slightly greyish-tinged buff when young, finally greyish brown, without olivaceous tinge; edge fimbriate, whitish. Stipe 25–70 x 3.5–10 mm, equal to bulbosa at base, solid, white when young, discolouring with age to pale ochraceous brownish, pruinose throughout under lens, but pruina rather hard to see especially in lower 1/3rd. Cortina absent in young specimens. Context whitish or pale ochraceous buff. Smell absent or indistinctly spermiatic. Taste not distinct.

Spores 10.5–13.5(–14.0) x 5.5–7.0  $\mu\text{m}$ , on average 10.8–12.6 x 6.0–6.6  $\mu\text{m}$ ,  $Q = 1.7\text{--}2.1\text{--}(2.2)$ ,  $\bar{Q} = 1.8\text{--}2.0$ , smooth, subamygdaliform, sometimes with suprahilar depression, apex indistinctly conical. Pleurocystidia (46–)47–76(–82) x 15–28(–29)  $\mu\text{m}$ , fusiform to utriform, not lageniform, thick-walled, with up to 3.0(–4.0)  $\mu\text{m}$  thick, almost colourless, only very faintly yellowish-tinged wall, scarcely crystalliferous at apex, not frequent. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia (broadly) clavate, thin-walled, colourless, very frequent. Basidia 25–34 x 10–12  $\mu\text{m}$ , 4-spored. Caulocystidia descending to over half-way of stipe

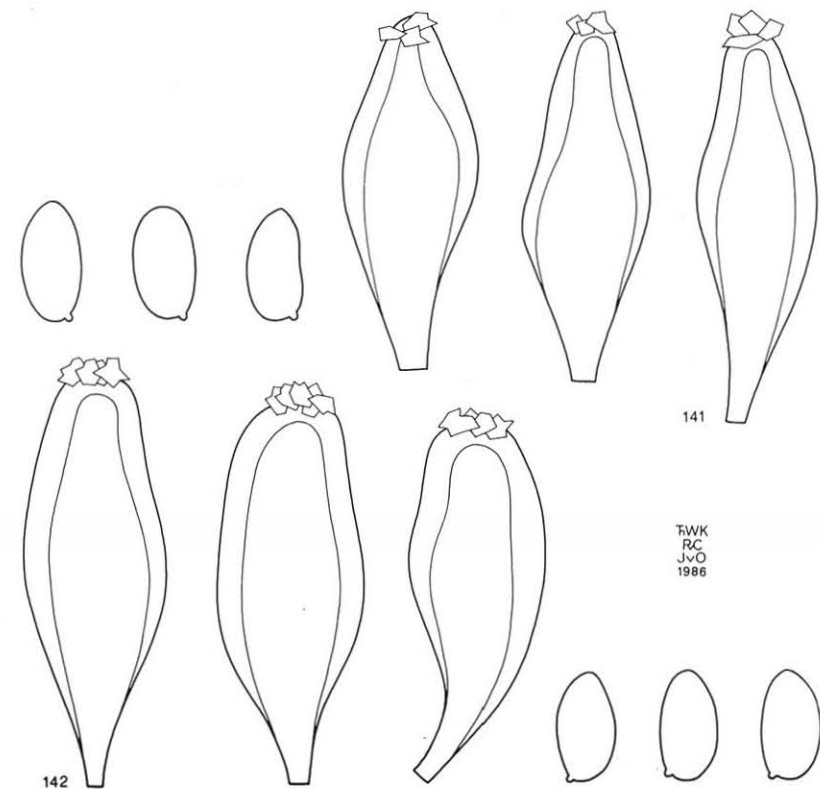


Figs. 139–140. *Inocybe inodora*. — Spores, pleurocystidia (139. from *Romagnesi 68.66*; 140. from *Bresadola*).

and mixed with cauloparacystidia, similar to cheilocystidia, gradually changing into differentiated, cylindrical to subfusiform, thick-walled, crystalliferous caulocystidioid hairs descending even to base of stipe.

HABITAT & DISTRIBUTION. — Under frondose trees, also in alpine vegetation. Widespread in Europe, but rather uncommon. Known from two localities in the coastal dunes of the Netherlands. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Zuid-Holland, Oostvoorne, 28.VI.1972, *Bas 5833*; Wassenaar, 14.VI.1981, *Bas 7782*. — CZECHOSLOVAKIA: Bilichov, VI.1920, *Velenovský* (holotype of *I. inodora*, PRC). — FAROES: Slattaratinde, 5.VIII.1938, *Møller* (holotype of *I. hirtella* var. *paupera*, C). — FRANCE: Saintes-Maries-de-la-Mer, 19.V.1973, *RiOUSSET* (holotype of *I. fulvida* var. *subserotina* f. *luteophylla*, herb. Bon); dpt. Oise, Forêt de Hez, Mont de Hermes, 25.VII.1968, *Romagnesi 68.66* (herb. Romagnesi). — ITALY: prov. Alto Adige, Trento, Margone, X.1913, *Bresadola* (as *I. hirtella*, probably authentic material of *I. fulvida*, S). — NORWAY:



Figs. 141–142. *Inocybe inodora*. — Spores, pleurocystidia (141. from holotype of *I. hirtella* var. *paupera*; 142. from lectotype of *I. canescens*).



Hordaland, Ulvik, Finse, 13.VIII.1985, *Vellinga* 774. — SWITZERLAND: Kt. Graubünden, Parc National, Val Nügli, 16.VIII.1949, *Favre* (lectotype of *I. canescens*, design. Monthoux & Kuyper, G); Kt. Bern, Gemmi-Spittelmatten, alt. 1900 m, 9.VIII.1984, *Irlet* 84.103 (BERN).

Note: *Inocybe inodora* differs from *I. pruinosa* R. Heim in possessing a less distinct velipellis and broader spores. Both species are closely related and further investigations might eventually show that they are better regarded as varieties of one species.

Specimens growing in coastal sand-dunes are macroscopically very close to *I. serotina* Peck but differ in smaller spores and less voluminous cystidia. Specimens from the alpine zone could be confused with *I. frigidula* J. Favre but that latter species has only caulocystidia in the upper 1/6th part of the stipe.

### 67. *Inocybe grammopodia* Malenç. — Fig. 143

*Inocybe grammopodia* Malenç, in Mal. & Bert., Fl. Champ. sup. Maroc 1: 371. 1970.  
SELECTED ICON: Mal. & Bert., Fl. Champ. sup. Maroc 1: pl. 13. 1970.

Pileus 30–60 mm, campanulate, then convex, plano-convex to applanate, broadly umbonate, alutaceous red-brown to red-brown, initially with a whitish velipellis, somewhat persisting at margin, smooth around centre, outwards radially fibrillose, at margin rimulose to distinctly rimose. Lamellae moderately crowded, 4–6 mm broad, narrowly adnate to almost free, whitish then greyish argillaceous, finally reddish-tinged brownish with somewhat paler edge. Stipe

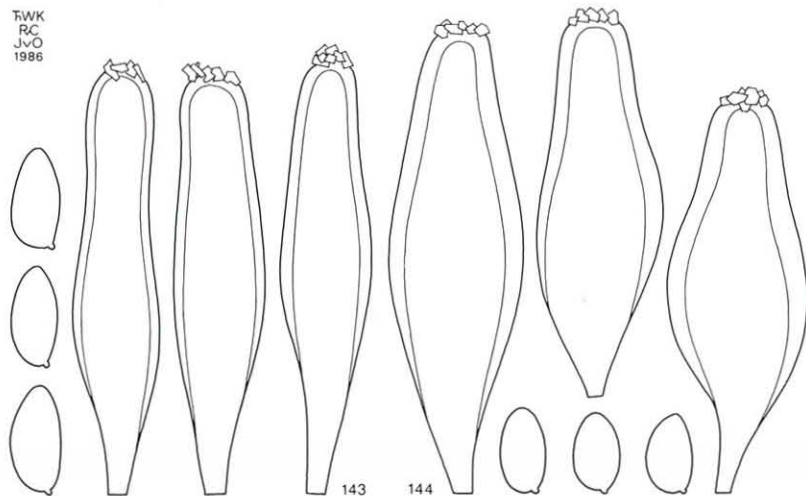


Fig. 143. *Inocybe grammopodia*. — Spores, pleurocystidia (from holotype of *I. grammopodia*).  
Fig. 144. *Inocybe pseudoreducta*. — Spores, pleurocystidia (from holotype of *I. pseudoreducta*).

30–60 x 6–10 mm, at base somewhat swollen to submarginately bulbous (to 15 mm), solid, reddish-brownish in apical part, downwards somewhat paler and reddish tinges less conspicuous, pruinose over greater part to pruinose throughout, under pruina conspicuously longitudinally striate. Cortina not observed. Context whitish in pileus, somewhat brownish in stipe. Smell when cut more or less spermiatic, later on more fruit-like. Taste slightly farinaceous.

Spores 9.5–11.0(–11.5) x 4.5–5.0(–5.5)  $\mu\text{m}$ , on average 10.4 x 4.9  $\mu\text{m}$ , Q = (1.9–)2.0–2.3,  $\bar{Q}$  = 2.1, smooth, subamygdaliform, often with rather distinct suprahilar depression, with distinctly conical apex. Pleurocystidia (48–)53–67(–70) x (10–)11–17  $\mu\text{m}$ , cylindrical to slenderly fusiform, slightly thick-walled, with up to 1.0(–1.5)  $\mu\text{m}$  thick, colourless wall, crystalliferous at apex, moderately frequent. Cheilocystidia similar to pleurocystidia. Paracystidia clavate, thin-walled, colourless. Basidia 26–33 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia descending to about half-way stipe, similar to cheilocystidia, gradually turning into differentiated caulocystidioid hairs and these hairs descending almost to base of stipe.

HABITAT & DISTRIBUTION. — Under *Cedrus* and *Quercus*. Known from the Mediterranean Region. April–May and Nov.

COLLECTION EXAMINED. — MOROCCO: Azrou, l'Ich Ouharrock, 11.V.1952, *Malençon* (holotype of *I. grammopodia*, MPU).

Note: The macroscopical description has been copied from Malençon & Bertault (Fl. Champ. sup. Maroc 1: 368. 1970).

Related to *I. pruinosa* R. Heim from which it differs in colour of pileus and stipe, smaller spores and more slender cystidia. *Inocybe longispora* M. Lange shows even more resemblance, but that species has only caulocystidia at extreme apex of stipe (less than 1/10th of length).

### 68. *Inocybe sambucina* (Fr.: Fr.) Quél. — Figs. 145–146

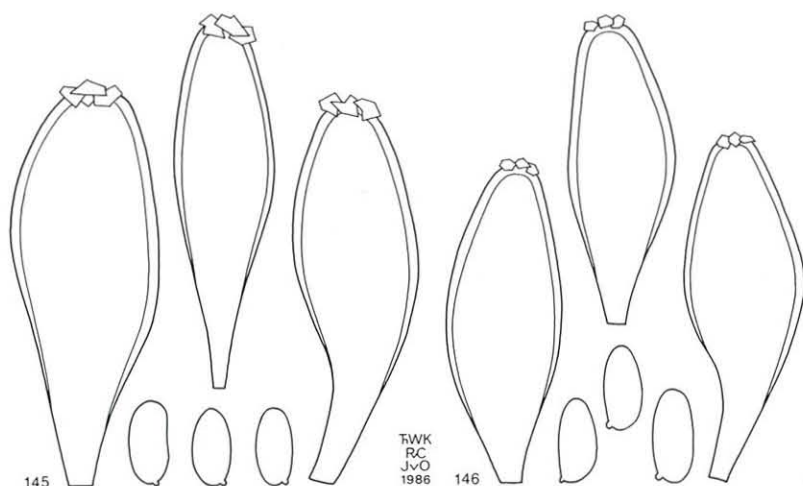
*Agaricus sambucinus* Fr.: Fr., Syst. mycol. 1: 257. 1821. — *Inocybe sambucina* (Fr.: Fr.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 182. 1872.

*Ripartites laevigatus* P. Karst. in Bidr. Känned. Finl. Nat. Folk 32: 478. 1879. — *Inocybe laevigata* (P. Karst.) P. Karst. in Bidr. Känned. Finl. Nat. Folk 48: 210. 1889, non *I. laevigata* Velen. 1920.

*Inocybe geophylla* var. *maxima* Torrend in Broteria 10: 209. 1912.  
EXCLUDED. — *Inocybe sambucina* sensu Bres., Iconogr. mycol. 15: pl. 750. 1930 (= *I. queletii*?); sensu Alessio, Iconogr. mycol. 29: 147. 1980 (= *Inocybe* spec.).

MISAPPLIED NAME. — *Inocybe fibrosa* sensu Rick., Blätterpilze: 104. 1915.  
SELECTED ICONES. — Rick., Blätterpilze: pl. 29, f. 8. 1915 (as *I. fibrosa*). — Bruylants in Bull. trimest. Soc. mycol. Fr. 73(Atlas): pl. 111 ('1957') 1958. — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 11, f. 2. 1985.

Pileus 26–45 mm, conico-convex, convex to applanate, without or with broad, low umbo, almost whitish to pale ochraceous [10 YR 7/6, 6/6], smooth, sericeous-subtomentose around centre, outwards radially fibrillose with fibrils diverging or not, at margin indistinctly rimulose or not rimulose; velipellis present around disc but rather indistinct. Lamellae, L = 60–80, l = 1(–3), rather crowded, 3–4 mm broad, not ventricose to subventricose, sinuate, narrowly adnate, remarkably pale, pale isabella-yellow [10 YR–2.5 Y 7/4]; edge minutely fimbriate, colorous or whitish. Stipe 34–80 x 5–8 mm, often subbulbous at base (to 10 mm) but bulb not marginate, solid, whitish or with (very) pale cream tinge, pruinose down to half-way to (almost) all over under lens. Context whitish to very pale cream. Smell almost nihil to slightly disagreeable. Taste indistinct.



Figs. 145–146. *Inocybe sambucina*. — Spores, pleurocystidia (145. from *Jansen 81.360*; 146. from holotype of *I. laevigata*).

Spores 7.5–10.5 x 3.5–5.0  $\mu\text{m}$ , on average 8.4–9.7 x 3.8–4.5  $\mu\text{m}$ ,  $Q = (1.8\text{--})1.9\text{--}2.5\text{--}(2.6)$ ,  $\bar{Q} = 2.0\text{--}2.3$ , smooth, slightly irregular in outline, with subconical apex, remarkably pale. Pleurocystidia (40–)42–71(–74) x 14–23(–26)  $\mu\text{m}$ , cylindrico-clavate, clavate, broadly fusiform, sometimes even subutriform, thick-walled, with up to 3.0  $\mu\text{m}$  thick, (almost) colourless wall, not or scarcely crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, not frequent. Paracystidia (broadly) clavate, thin-walled, colourless. Basidia 22–28 x 7–9  $\mu\text{m}$ , 4-spored. Caulocystidia descending over upper half of stipe, in upper part similar to cheilocystidia and mixed with cauloparacystidia, downwards changing into differentiated but somewhat irregular caulocystidioid hairs without cauloparacystidia in lower half and these sometimes even reaching base.

**HABITAT & DISTRIBUTION.** — Under frondose and coniferous trees on (very) nutrient-poor, acid sand. Associated with *Picea*, *Pinus*, *Quercus*, and *Fagus*. Widespread in northern and western Europe. Rare in the Netherlands and clearly decreasing. July–Nov.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Gelderland: Doetinchem, VIII.1953, *Huijsman*; Ede, 23.VII.1953, *Ferguson*, 5.X.1958, *Bas 1573*, 23.VIII.1952, *Maas Geesteranus 8971* & 3.XI.1981, *Jansen 81.360*; Hoenderlo, 17.X.1970, *van Brummelen 2793*; Klarenbeek, 9.X.1966, *Bas 4805*; Kootwijk, 21.VIII.1952, *Huijsman*; Rheden, 30.X.1960, *Schutte-Apeldoorn*; Vorden, 15.X.1953, *Huijsman*; Wageningen, 9.VIII.1953, *Maas Geesteranus 9429* & 16.X.1970, *Huijsman*; Winterswijk, 20.IX.1953, *Maas Geesteranus 9512*; prov. Utrecht, Rhenen, 16.IX.1955, *Bas 879*. — BELGIUM: Antwerpen, Marienburg, 24.X.1937, *Huijsman*. — FINLAND: Tavastia australis, Tammela, Syrjä, 18.IX.1878, *Karsten 2496* (holotype of *Ripartites laevigatus*, H). — SCOTLAND: co. Perthshire, Black Wood of Rannoch, 24.IX.1983, *Kuyper 2426*. — SWEDEN: Småland: Femsjö, 21.IX.1943, *Lundell 3490* (Fungi exsiccati succici 2315, PC); Femsjö, Källebo, 17.IX.1970, *Moser 70.242* (IB); Femsjö, Hagnen, 20.VIII.1970, *Moser 70.16* (IB); Mulseryd Socken, Ryd, 2.VIII.1972, *Moser 72.149* (IB).

### 69. *Inocybe sindonia* (Fr.) P. Karst. — Figs. 147–150

*Agaricus sindonius* Fr., Epicr.: 176. 1838. — *Inocybe sindonia* (Fr.) P. Karst. in Bidr. Känned. Finl. Nat. Folk 32: 465. 1879.

*Agaricus muticus* Fr., Monogr. Hymenomyc. Sueciae 2: 346. 1863. — *Inocybe mutica* (Fr.) Sacc., Syll. Fung. 5: 769. 1887.

*Inocybe cortinata* Rolland in Bull. Soc. mycol. Fr. 17: 177. 1901.

*Inocybe uliginosa* Velen., České Houby: 374. 1920.

*Inocybe commutabilis* Furrer-Ziogas in Schweiz. Z. Pilzk. 30: 127. 1952.

*Inocybe kuehneri* Stangl & Veselský in Česká Mykol. 28: 199. 1974.

*Inocybe lepiotoides* Reumaux in Docs mycol. 12(48): 10. ('1982') 1983.

*Inocybe euehes* var. *claricolor* Reumaux in Bull. trimest. Soc. mycol. Fr. 100: 205. 1984.

*Inocybe euehes* var. *fusoideicystis* Reumaux in Bull. trimest. Soc. mycol. Fr. 100: 206. 1984.

*Inocybe lucifuga* f. *gralla* Furrer-Ziogas in Schweiz. Z. Pilzk. 30: 134. 1952.

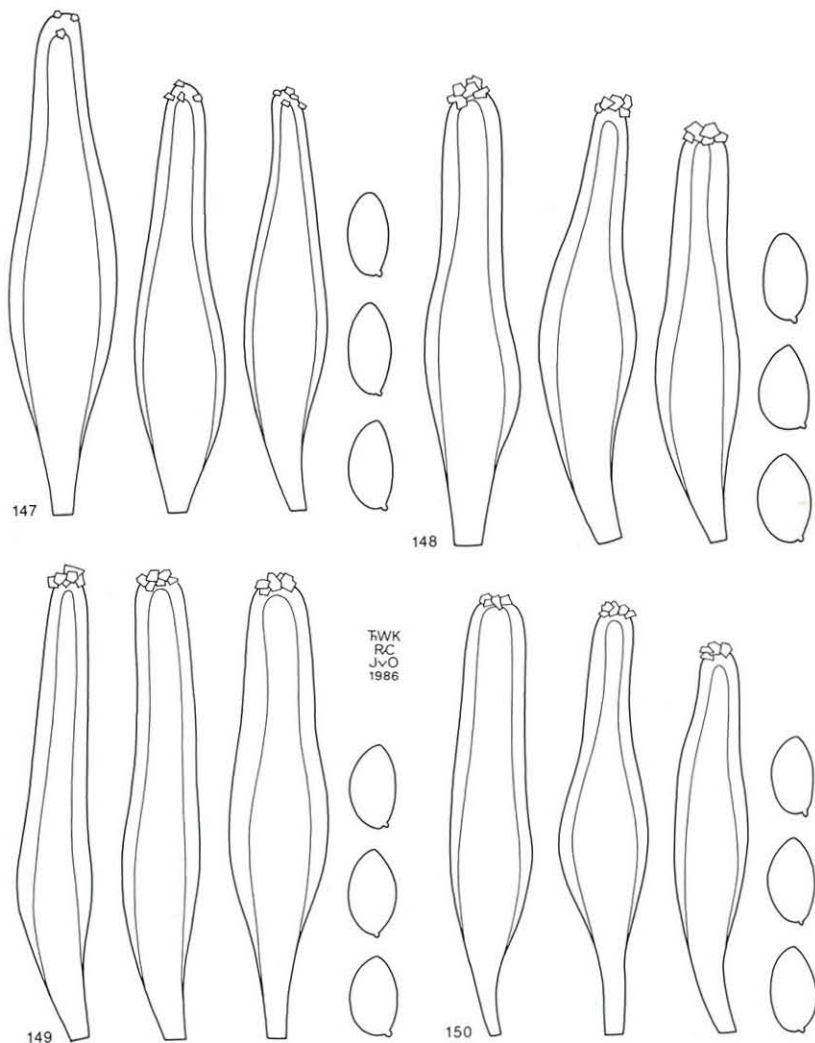
MISAPPLIED NAME. — *Inocybe euehes* sensu Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 21. 1955; sensu auct. eur. (see p. 225).

SELECTED ICONES. — J. Lange, Fl. agar. dan. 3: pl. 112F. 1938. — Furrer-Ziogas in Schweiz. Z. Pilzk. 30: pl. 1A, 1B. 1952 (as *I. lucifuga* f. *gralla* and *I. commutabilis* respectively). — Alessio, Iconogr. mycol. 29: pl. 39, 40, f. 2. 1980 (as *I. euehes* and *I. lucifuga* f. *gralla* respectively). — R. Phillips, Paddest. Schimm.: 152. 1981 (as *I. kuehneri*).

Pileus 10–70 mm, when young (highly) conical, then convex to plano-convex, in oldest stages even almost applanate, young specimens umbonate, or even with a small papilla, then broadly umbonate or not umbonate at all, with margin inflexed when young, often subappended because of remnants of cortina, remarkably pale, almost pure white, whitish isabella, isabella, pale greyish ochraceous to ochraceous brownish, silky-fibrillose when young, later radially appressedly fibrillose to fibrillose-subsquamulose, finally often excoriate and recurvately squamulose-squarrose, with tips of scales somewhat darker than rest of pileus, brown; no velpellis observed. Lamellae,  $L = 30\text{--}50$ ,  $l = 1\text{--}3$ , thin, crowded, 2–7 mm broad, ventricose or not, emarginate, (narrowly) adnate, sometimes almost free, yellowish-greyish, dirty greyish ochraceous to yellowish brown; edge fimbriate, whitish or concolorous. Stipe 25–100 x 2–8 mm, equal, clavate to subbulbous (at base to 11 mm), but without marginate bulb, solid, finally fistulose, whitish, often with pinkish tinges near apex, sometimes pale ochraceous, somewhat yellowing with age, especially in lower half, exceptionally even becoming pale pinkish brown on damage, pruinose over half-way, sometimes to base of stipe, but in lower half often more hairy-pruinose, at base white-felted. Cortina conspicuous in young specimens, finally disappearing and leaving no remnants on the stipe. Context whitish, sometimes turning yellow in stipe. Smell spermatic, but mixed with a farinaceous component. Taste as smell.

Spores 7.0–9.5 x 4.0–5.5  $\mu\text{m}$ , on average 7.8–9.0 x 4.5–5.2  $\mu\text{m}$ ,  $Q = 1.6\text{--}1.9\text{--}(2.0)$ ,  $\bar{Q} = 1.7\text{--}1.8$ , smooth, subamygdaliform, with subconical apex. Pleurocystidia (53–)54–94(–108) x (10–)11–18  $\mu\text{m}$ , (slenderly) cylindrical to slenderly fusiform, a minority tending to sublageniform, but never distinctly lageniform, thick-walled, with up to 3.0(–3.5)  $\mu\text{m}$  thick, pale to bright yellow wall, crystalliferous at apex, abundant. Cheilocystidia similar to pleurocystidia, moderately frequent. Paracystidia pyriform to broadly clavate, thin-walled, colourless, frequent. Basidia 26–34 x 7–10  $\mu\text{m}$ , 4-spored, but a few 2-spored. Caulocystidia descending to below half-way or (almost) to base of stipe, more or less similar to cheilocystidia in upper half and there mixed with cauloparacystidia, more in the shape of strongly differentiated caulocystidioid hairs and without cauloparacystidia in lower half.

**HABITAT & DISTRIBUTION.** — Under frondose and coniferous trees on calcareous soil. Associated with *Picea*, *Pinus*, *Fagus*, *Quercus*, *Betula*, and *Tilia*. Widespread in Europe, also occurring in North America. Rather common in the Netherlands. Sept.–Dec.



Figs. 147–150. *Inocybe sindonia*. — Spores, pleurocystidia (147. from authentic material of *I. mutica*; 148. from Furrer-Ziogas; 149. from holotype of *I. kuehneri*; 150. from holotype of *I. leptotooides*).

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland: Oude Mirdum, 29.IX.1972, *Stobbe*; Terschelling, 23.X.1981, *Kuyper 1981 & 1983*; prov. Drenthe: Beilen, 2.X.1978, *Huijsman*; Nieuweroord, 28.X.1980, *Booy*; prov. Overijssel: De Weerribben, 9.X.1983, *Kuyper 2458*; prov. Gelderland: Doetinchem, 6.X.1943 & 6.X.1953, *Huijsman*; Gorsseel, 18.XI.1951 & 26.X.1952, *Reuvecamp*; Lochem, 19.IX.1981, *Piepenbroek 1232*; Ubbergen, 16.X.1971, *de Kleuver 71.080*; Vorden, 15.X.1953, *Huijsman*; Winterswijk, 16.X.1983, *Schreurs 821*; IJsselmeerpolders: Kuinderbos, 29.X.1974, *Jansen & Noordeloos*; Schokkerbos, 19.XI.1983, *Tjallingii-Beukers*; Urkerbos, 13.X.1983, *Kuyper 2478 & 2479*; Voorsterbos, 8.X.1981, *Kuyper 1915 & 1917*; Abbert, 31.X.1981, *Tjallingii-Beukers*; Bremerberg, 5.X.1981, *Kuyper 1885*; Revebos, 6.X.1981, *Kuyper 1898*; Spijk, 5.X.1981, *Kuyper 1888*; Zuigerplaspark, 29.X.1982, *Jansen*; prov. Utrecht, Doorn, 22.X.1970, *Huijsman*; prov. Noord-Holland: Amsterdam, 1.X.1950 & 19.IX.1951, *Reijnders*; Bergen, 23.X.1965, *van Brummelen 1957*; Schoorl, 7.XI.1981, *Kuyper 2020*; Vogelenzang, 1.I.1985, *Vellinga*; Wieringermeer, 12.X.1974, *van der Laan*; prov. Zuid-Holland, Rockanje, 24.X.1970, *van Brummelen 3218*; prov. Noord-Brabant: Dorst, 19.IX.1954, *van Alphen*, 26.X.1954, *Maas Geesteranus 10206*, 9.XI.1955, *Bas 965*, 25.IX.1956, *Maas Geesteranus 11748*, 29.IX.1957, *Jansen*, 2.IX.1960, *Jansen*, 2.X.1960, *Jansen & 26.XI.1961, Jansen*; Ginneken, 9.X.1955, *Bas 900*; Wouw, 19.IX.1937, *Huijsman*; prov. Limburg: Gronsveld, 26.X.1958, *Bas 1644*; Gulpen, 12.X.1952, *Maas Geesteranus 9132*; Maastricht, 26.IX.1951, *Maas Geesteranus 7998 & 10.XI.1951, Maas Geesteranus 8167*; Noordervaart, 5.X.1963, *Verschuieren*. — AUSTRIA: Tirol, Pertisau, Dristenautal, 6.IX.1982, *Kuyper 2185*. — BELGIUM: prov. Namur, Rochefort, Fond des Vaux, 5.X.1982, *Kuyper 2269*. — CZECHOSLOVAKIA: Moravia, Ostrava, Halda Hrabuvka, 19.IX.1971, *Veselský* (holotype of *I. kuehneri*, PRM); Slovakia, Nizke Tatry, Stanišovská Dolina, 12.IX.1981, *Kuyper 1761 & 1765*. — ENGLAND: co. Kent, Bedgebury Pinetum, 29.X.1968, *Reid* (as *I. eutheles*, K). — FRANCE: Altkirch, 4.X.1955, *Becker*; dpt. Doubs, Lougres, 28.IX.1955, 7.X.1955 & 11.IX.1956, *Huijsman*; Bois de Vandy, *Reumaux* (holotype of *I. eutheles* var. *claricolor*, herb. Reumaux); Ile-de-France, La Sablonnière, 1982 *Chiaffi*, (holotype of *I. eutheles* var. *fusoideicystis*, herb. Reumaux); Bois de Vandy, *Reumaux* (holotype of *I. leptotooides*, herb. Reumaux). — GERMANY: Westfalen, Heiligenkirchen, 12.IX.1972, *Huijsman*; Eifel: Gerolstein, Grosse Moss, 30.IX.1979, *Boekhout 79.56*; Gerolstein, Felsenhof, 20.IX.1980, *Jansen*. — ITALY: prov. Alto Adige: Ferrari near Baselga di Piné, 1.X.1982, *Bas 7977*; Levico, Parco di Levico, 25.IX.1981, *Kuyper 1834*; Trento, Sopramonte, 24.IX.1981, *Kuyper 1816 & 1822*; Trento, Villazzano, 27.IX.1981, *Kuyper 1861*. — POLAND: Swieta Katarzyna, Wilkowska Dolina, 11.IX.1966, *Bas 4753*. — SCOTLAND: co. Inverness-shire, Fort William, Nevis Forest, 18.IX.1983, *Kuyper 2400*; co. Perthshire: Black Wood of Rannoch, 24.IX.1983, *Kuyper 2427*; Inver, The Hermitage, 26.IX.1983, *Kuyper 2444*. — SWEDEN: Småland: Femsjö, 5.IX.1940 & 19.IX.1943, *Lundell* (Fungi exsiccati suecici 2316, 2317 & 2318, PC); Femsjö, Dullaberg, 20.IX.1980, *Moser 80.384* (as *I. lucifuga*, IB); Femsjö, Södra Bökeberg, 18.IX.1974, *Moser 74.447* (IB); Femsjö, Stubbeoda, 8.IX.1979, *Moser 79.503* (IB); Färgaryd, Färgan, 10.IX.1979, *Moser 79.530* (IB); Uppland, Jacobsberg, 7.IX.1974, *van der Laan*; locality unknown, *Fries* (authentic material of *A. muticus*, K). — SWITZERLAND: Kt. Luzern, Nelikon, Santenberg, 20.IX.1984, *Furrer-Ziogas*; Willisau, 17.IX.1984, *Kuyper 2550*; Kt. Vaud, Pont-de-Nant sur Bex, Jardin alpin, 5.IX.1984, *Kuyper 2518*. — PROVENANCE UNKNOWN: herb. Persoon L 910.255.185 (as *Agaricus pyridorus*).

Notes: 1. The correct nomenclature of this species has been questioned for a long time. According to Stangl & Veselský (in *Česká Mykol.* 28: 205. 1974) the name *Agaricus sindonius* must be considered a nomen dubium. They cited the opinion of Lundell (in Lundell & Nannfeldt, *Fungi exs. succ.* 47–48: 8. 1956) that *A. sindonius* could well refer to an unusually pale variant of *Psathyrella candolleana* (Fr.: Fr.) Maire because of its hollow stipe and subappendiculate cortina. However, both characters can (occasionally) be encountered in the taxon described above. And as this species is very common around Femsjö, it seems very likely that it must have been described by Fries. As I cannot see any discrepancies between Fries's protologue of *A. sindonius* (Epicr.: 176. 1838) and the description above, the application of the epithet *sindonius* is necessary. Unfortunately, it means also the abandonment of the name *I. kuehneri* Stangl & Veselský.

Fries's wording makes clear that *A. sindonius* is only apparently superfluous, and

the name is therefore not automatically typified with the type of *A. pallidus* Sow. (Art. 7.9).

2. Reumaux (in Bull. trimest. Soc. mycol. Fr. 100: 177. 1984) has subdivided this species in 7 varieties for which he provided a provisional key. However, none of these characters are sufficiently constant or clear-cut to allow taxonomic splitting, and these varieties are consequently reduced to insignificant variants. It seems that too much attention has been given to subtle differences in colour of stipe and degree of development of caulocystidioid hairs.

3. A collection from the Netherlands (prov. Friesland, Gaasterland, Oude Mirdum) consists of albinistic specimens.

4. *Inocybe sindonia* usually appears not before the second half of September and is one of the latest-fruiting *Inocybes*.

### 70. *Inocybe vulpinella* Bruylants — Figs. 151–153

*Inocybe vulpinella* Bruylants in Bull. trimest. Soc. mycol. Fr. 85: 341 ('1969') 1970.

*Inocybe chondrospora* Einh. & Stangl in Z. Mykol. 45: 163. 1979.

*Inocybe immigrans* Malloch in Can. J. Bot. 60: 40. 1982.

*Inocybe vulpinella* var. *fuscolamellata* M. Bon in Docs mycol. 12(46): 8. 1982.

*Inocybe vulpinella* var. *fuscolamellata* M. Bon in Docs mycol. 13(50): 27. 1983 (illegitimate, Art. 64.1, different type)

MISAPPLIED NAMES. — *Inocybe serotina* sensu M. Lange in Medd. Grønland 148: 17. 1957.

*Inocybe halophila* sensu Huijsman in Persoonia 9: 479. 1978.

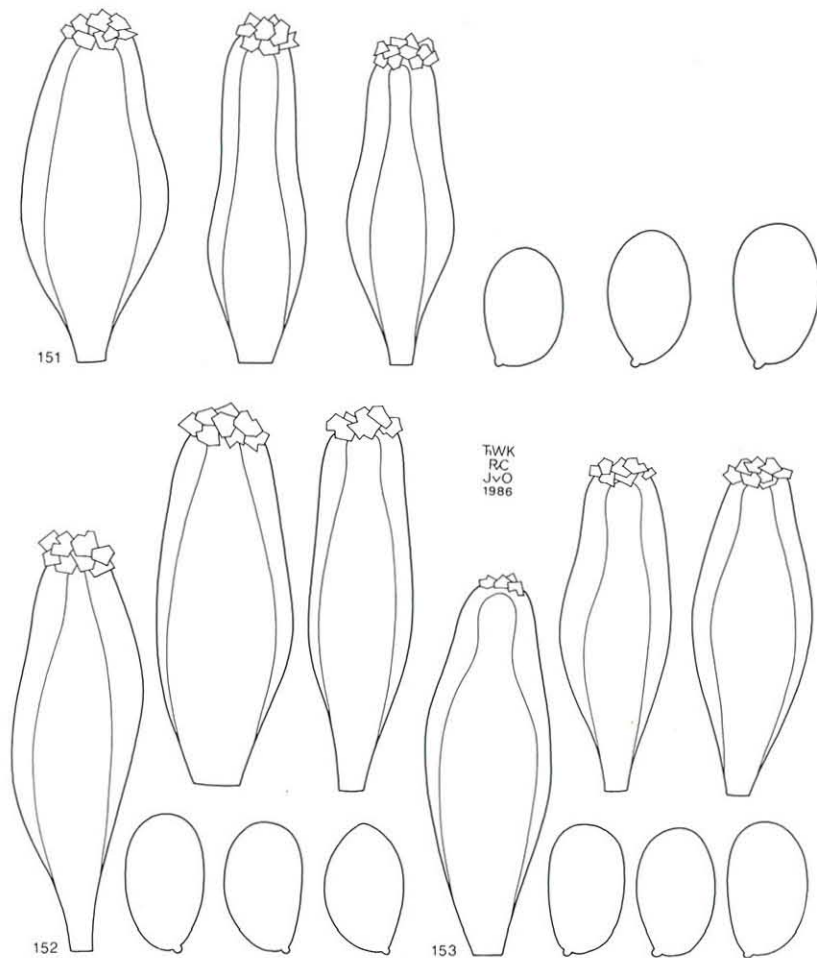
SELECTED ICONES. — Bruylants in Bull. trimest. Soc. mycol. Fr. 85: pl. s.n. 1970 [rather untypical]. — Einh. in Hoppea 41: pl. 3. ('1983') 1984 (as *I. chondrospora*).

Pileus 12–40 mm, convex, plano-convex to applanate, indistinctly umbonate or without umbo, brown to dark brown around centre, outwards orange-brown to ochraceous brown [5 YR–7.5 YR 4/6, 5/6, 6/6], coarsely fibrillose-tomentose, appressedly subsquamose to minutely subsquarrollose, initially covered with an arachnoid greyish velipellis with adhering sand-grains and this persisting around centre. Lamellae, L = 30–50, l = 1–3, moderately crowded, 5–10 mm broad, ventricose, rather narrowly adnate, greyish brown to yellow-brown, finally dark brown [10 YR 5/4, 5/6, 4/4]; edge fimbriate, whitish or (dark) brown. Stipe 22–74 x 2–9 mm, clavate to submarginately bulbous (to 10 mm), solid, yellow-brown or orange-brown in upper part [5 YR–7.5 YR 5/8], downwards darkening, near base dark brown [5 YR 3/6–2/4], but bulb whitish, pruinose all over. Cortina even in youngest specimens not observed. Context whitish in pileus and stipe, pure white in bulb. Smell absent. Taste indistinct.

Spores (11.5–)12.0–18.0(–18.5) x 7.0–9.0(–9.5)  $\mu\text{m}$ , on average 13.0–16.0 x 7.3–8.4  $\mu\text{m}$ , Q = (1.4–)1.5–2.2(–2.3),  $\bar{Q}$  = 1.6–1.9, 'smooth' to minimally angular, subapplanate towards apex, very thick-walled. Pleurocystidia (41–)44–77(–83) x (13–)14–26(–28)  $\mu\text{m}$ , cylindric-clavate, (slenderly) clavate to fusiform, a minority subutriform, very thick-walled, with up to more than 5.0  $\mu\text{m}$  thick, almost colourless to rather bright yellow wall, heavily crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia spheropedunculate to clavate, thin- to somewhat thick-walled, colourless or brownish. Basidia 27–46 x 10–16  $\mu\text{m}$ , 4-spored. Caulocystidia descending to base of stipe, in upper half similar to cheilocystidia, in lower half often rather irregular; cauloparacystidia present near base of stipe.

HABITAT & DISTRIBUTION. — Under frondose trees on calcareous, rather damp soil.

Associated with *Salix* and *Populus*. Widespread in Europe and North America, rather rare but probably overlooked. Not common in the Netherlands, both in the coastal dunes and inland. May–Nov.



Figs. 151–153. *Inocybe vulpinella*. — Spores, pleurocystidia (151. from isotype of *I. immigrans*; 152. from Kuyper 1622; 153. from holotype of *I. chondrospora*).

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland: Ameland, 27.X.1973, *van der Laan*; Terschelling, 28.VII.1958, *Bas 1495*; prov. Gelderland, Buren, 18.X.1970, *Huijsman 70.240*; IJsselmeerpolders: Lelystad, 2.VII.1982, *van Zonneveld & 20.VIII.1982, Jansen*; Roggebotzand, 5.VII.1984, *Tjallingii-Beukers*; Spijk, 13.VI.1981, *Tjallingii-Beukers*; Muiderzand, 30.X.1981, *Daams 81.14*, 9.IX.1982, *Daams 82.67 & 4.VII.1984, van Zanen*; Woldstrand, 28.VI.1983, *Tjallingii-Beukers*; prov. Noord-Holland: Amsterdam, 17.VII.1985, *Becker*; Ankeveen, 8.IX.1976, *Noordeloos 168*; Muiden, 14.VI.1981, *Frencken*; Nederhorst-den-Berg, 25.VI.1972, *Daams*; prov. Zuid-Holland: Oostvoorne, 11.XI.1957, *Bas 1375*, 4.XI.1958, *Bas 1670 & 6.XI.1958, Bas 1688*; Rockanje, 22.IX.1957, *Reijnders*; prov. Zeeland, Veerse Meer, 20.VII.1981, *Kuyper 1622*. — CANADA: Ontario, Hastings Co., Faraday Township, Bow Lake, Madawaska Mines, 16.VI.1979, *Malloch* (isotype of *I. immigrans*, L); Temiskaming Dist., Powell Township, Mistinikon Lake, 22.VIII.1979, *Malloch*; Temiskaming Dist., McEvoy Township, Lockpot Lake, Watabeag River, 25.VIII.1980, *Malloch & Brolley*; Temiskaming Dist., McVittie Township, Pancake Lake, 7.IX.1980, *Buelow*. — ENGLAND: co. Devon, Braunton Burrows, 25.X.1953, *Wallace* (as *I. halophila*, K); co. Northumberland, Ross Links Seashouses, 21.X.1972, *Reid* (as *I. devoniensis*, K). — FRANCE: dpt. Manche, Biville, 8.VIII.1978, *Romagnesi 78.91* (herb. Romagnesi); Haute Savoie, Annecy, Griffy, 20.V.1981, *Moenne-Lozoz* (holotype of *I. vulpinella* var. *fuscolamellata* 1983, herb. Bon). — GERMANY: Lübeck, border of Trave, 19.VII.1985, *Jahn & van Vuure*; Borkum, 21.VII.1984, *Weeda*; Bavaria, Murnauer Moor, 31.V.1966, *Einhellinger* (holotype of *I. chondrospora*, M) & 15.VII.1979, *Einhellinger*; Usedom, near Heringsdorf, 2.VII.1963, *Marvanova*. — GREENLAND: Sandflugtdalen, 24.VIII.1946, *Lange 372* (as *I. serotina*, C). — SWEDEN: Uppland, Ranäs, 26.VIII.1975, *Huijsman & Suber*.

Notes: 1. Specimens from North America are generally somewhat less brightly coloured than those from Europe.

Variants with slightly thick-walled, brownish paracystidia can be found mixed with the typical variant, and for that reason var. *fuscolamellata* M. Bon does not deserve formal taxonomic status.

2. *Inocybe vulpinella* can only be confused with *I. similis* Bres. The latter species, however, differs in being cortinate and possessing caulocystidia in the apical part solely, spores without an applanate apex, and less thick-walled pleurocystidia that are, moreover, rather scarce. Both species seem to have comparable ecological requirements.

3. Bas (pers. comm.) recorded a dextrinoid wall of some unripe spores in one collection. No dextrinoid reaction has been observed by me in ripe spores.

### 71. *Inocybe godeyi* Gillet — Fig. 154–155

*Inocybe godeyi* Gillet, Hyménomycètes: 517. 1876.

*Inocybe rubescens* Gillet in Rev. mycol. 5: 31. 1883. — *Agaricus trinitii* var. *rubescens* (Gillet) Pat., Tab. anal. Fung. 1: 156. 1885.

*Inocybe rickenii* Kallenb. in Pilz- und Kräuterfreund 4: 192. 1921, non *I. rickenii* Killerm. 1925, nec *I. rickenii* R. Heim 1931.

*Inocybe cinnabarina* Hruby in Hedwigia 70: 276. 1930.

*Inocybe godeyi* var. *rufescens* Cooke in Trans. Br. mycol. Soc. 3: 110. 1909.

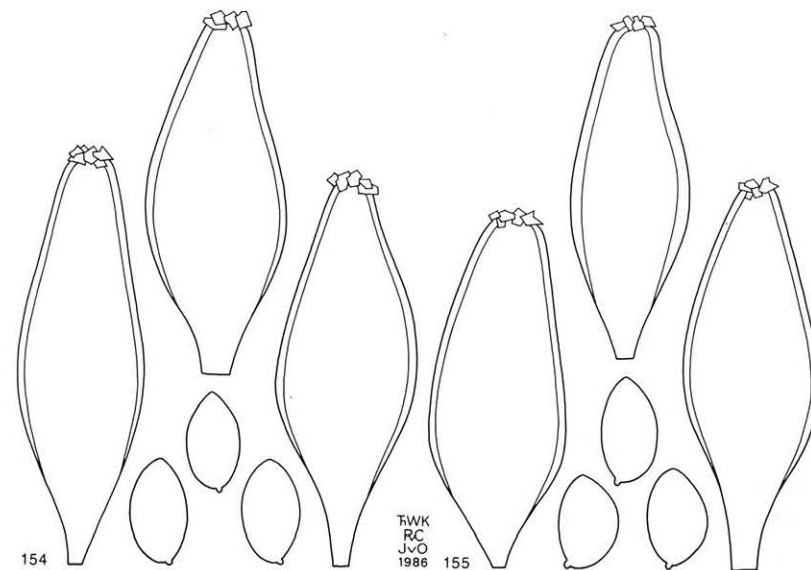
EXCLUDED. — *Inocybe rubescens* sensu J. Lange, Fl. agar. dan. 3: 76. 1938 (= *I. whitei* f. *whitei*). *Agaricus trinitii* var. *rubescens* sensu Pat., Tab. anal. Fung. 1: 156. 1885 (= *I. erubescens*).

MISAPPLIED NAME. — *Inocybe trinitii* sensu Bres., Iconogr. mycol. 15: pl. 747. 1930.

SELECTED ICONES. — Bres., Iconogr. mycol. 15: pl. 747. 1930 (as *I. trinitii*). — R. Heim, Genre *Inocybe*: pl. 27, f. 3. 1931. — J. Lange, Fl. agar. dan. 3: pl. 112C. 1938 (as *I. rickenii*). — Alessio, Iconogr. mycol. 29: pl. 26, f. 1. 1980. — Konr. & M., Ic. sel. Fung. 1: pl. 96. 1926. — R. Phillips, Paddst. Schimm.: 148. 1981.

Pileus 17–50 mm, conico-campanulate, conico-convex, convex to plano-convex, finally subapplanate, with or without umbo, with margin inflexed when young, soon straight, initially almost whitish to very pale creamy buff, discolouring with age and from damage to orange-red [5 YR 6/8, 5/8] and finally to vinaceous brown [2.5 YR 5/6, 5/8], smooth, radially fibrillose but fibrils not or hardly diverging, exceptionally subrimulose at margin, with age becoming subsquamulose or even recurvately squamulose, dull; velipellis present around disc but hardly distinct. Lamellae, L = 40–60, l = 1–3, moderately crowded, 2–5 mm broad, not ventricose to subventricose, narrowly adnexed to almost free, initially whitish, then sordid greyish brown, finally olivaceous-tinged yellow-brown [2.5 Y 5/4], but often mixed with red-brown tinges; edge fimbriate to subfloculose, white, becoming red-brown on damage. Stipe 14–70 x 3–6 mm, at base with an indistinct to conspicuous (sub)marginate bulb (to 11 mm), solid, white, discolouring to pale brownish orange and finally to vinaceous red (concolorous with pileus), pruinose all over, at bulb white, then scarlet-red. Cortina not observed in young specimens. Context whitish, soon discolouring to orange-red or vinaceous, especially in stipe. Smell and taste spermatic.

Spores 8.5–12.0 x 5.5–7.0  $\mu\text{m}$ , on average 9.3–11.0 x 5.7–6.5  $\mu\text{m}$ , Q = 1.5–1.9,  $\bar{Q}$  = 1.5–1.8, smooth, subamygdaliform, with (sub)conical apex. Pleurocystidia (44–)48–69(–70) x 14–27(–28)  $\mu\text{m}$ , slenderly to broadly fusiform, sometimes tending to subutriform, thick-walled, with up to 2.0(–2.5)  $\mu\text{m}$  thick, colourless wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate to pyriform, thin-walled, colourless, not frequent. Basidia 27–38 x 10–14  $\mu\text{m}$ , 4-spored. Caulocystidia descending to base of stipe, in upper half similar to cheilocystidia, in lower half more slender and irregular; cauloparacystidia also present at base of stipe.



Figs. 154–155. *Inocybe godeyi*. — Spores, pleurocystidia (154. from *Kuyper 2077*; 155. from holotype of *I. cinnabarina*).

HABITAT & DISTRIBUTION. — Under frondose trees on calcareous soil. Associated with *Fagus*, *Quercus*, *Corylus*, *Carpinus*, *Betula*, and *Alnus*. Widespread in Europe, also occurring in North America. Rare in the Netherlands. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Steenderen, 12.VII.1953, *Huijsman*; prov. Utrecht, Breukelen, 12.VIII.1972, *de Vries*; prov. Zuid-Holland, Rockanje, 12.IX.1954, *Bas 621*, 9.X.1969, *Bas 5159* & 18.VIII.1981, *Kuyper 1683*; prov. Zeeland, Axel, 20.VI.1981, *de Meijer 311*; prov. Limburg, Gulpen, 12.X.1952, *Huijsman*. — BELGIUM: prov. Namur, Olloy-sur-Viroin, Forêt de Nismes, 8.X.1982, *Kuyper 2293*. — CZECHOSLOVAKIA: Moravia, Brno, Löscher Wald, 1927, *Hruby* (holotype of *I. cinnabarina*, BRNO). — DENMARK: Møn, Klinteskov, 17.IX.1980, *Noordeloos 1241*. — FRANCE: dpt. Doubs, Lougres, 14.VI.1956, *Huijsman 4126*. — GERMANY: Teutoburgerwald, Dissen, 25.VIII.1977, *Huijsman*; Bavaria, Augsburg, Siebentisch Park, 2.VIII.1982, *Kuyper 2077*; Augsburg, Wittelsbacher Park, 27.VII.1982, *Kuyper 2045*, 1.VIII.1982, *Kuyper 2069* & 5.VIII.1982, *Kuyper 2115*. — SWITZERLAND: Planeyse, 10.VI.1965, *Huijsman*; Rochefort-Ducommun, 10.VIII.1965, *Huijsman*.

## 72. *Inocybe furfurea* Kühner

*Inocybe furfurea* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 4. 1955.

*Inocybe rufotacta* Schwöbel & Stangl in Carolinea 40: 9. 1982.

EXCLUDED. — *Inocybe furfurea* sensu Stangl & Veselský in Česká Mykol. 30: 67. 1976 (= *Inocybe* spec.). — sensu Alessio, Iconogr. mycol. 29: 167. 1980 (= *Inocybe* spec.).

### KEY TO THE VARIETIES OF *I. FURFUREA*

1. Lamellae not staining from damage. . . . . var. *furfurea*, p. 184  
 1. Lamellae becoming red-brown from damage, especially in young stage. . . . . var. *rufotacta*, p. 186

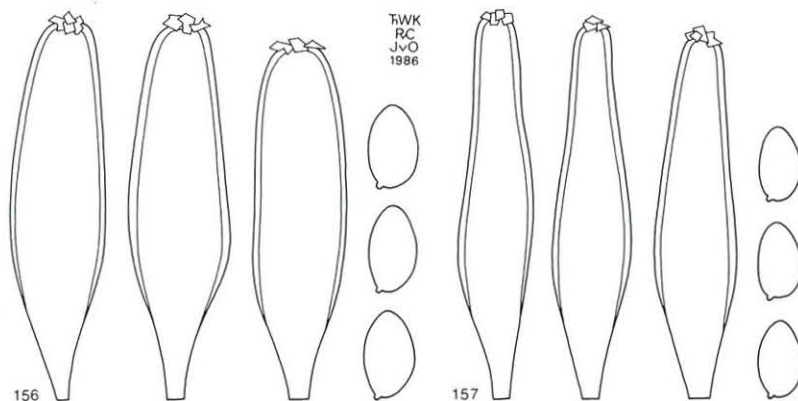
Note: The structure of the pileipellis of this species, consisting of short and inflated elements, is reminiscent of that of Sect. *Petiginosae*. Stipe colour would support such a classification.

### 72.1. *I. furfurea* var. *furfurea* — Fig. 156

*Inocybe furfurea* Kühner

SELECTED ICON. — Stangl & Enderle in Mitt. Ver. Naturw. Math. Ulm 31: 116. 1981.

Pileus 9–24 mm, conico-convex, convex to almost applanate, without umbo, with straight margin, dark brown to blackish brown around centre [7.5 YR 2/3 or even darker], outwards brown [10 YR 3/4, 4/4], smooth and subtomentose around disc, irregularly concentrically diffracting in outer part, and then appressedly squamose, these squamose patches fibrillose with somewhat diverging fibrils, at margin radially subrimose; no velipellis observed. Lamellae, L = 30–40, l = 1–3, moderately crowded, 1–3 mm broad, not ventricose, rather narrowly adnate, whitish when young, then pale yellowish grey-brown [2.5 Y 5/3]; edge fimbriate,



Figs. 156–157. *Inocybe furfurea*. — Spores, pleurocystidia (156. from holotype of *I. rufotacta*; 157. from *Kuyper 1644*).

whitish. Stipe 24–47 x 1–3 mm, equal to slightly swollen at base, but without bulb, solid, pruinose all over when young, but pruina disappearing from lower half and then pruinose only to half-way, orange brownish throughout [7.5 YR 5/6–5/8], pallescent in basal part, almost whitish at base. Cortina not observed. Context whitish in pileus, orange-brownish in cortex of stipe. Smell when cut spermatric. Taste not recorded.

Spores (7.5–)8.0–9.0 x 4.5–5.0  $\mu$ m, on average 8.2–8.4 x 4.6–5.0  $\mu$ m, Q = (1.5–)1.6–1.8(–1.9), Q = 1.7–1.8, smooth, regular to subamygdaliform, with almost obtuse to indistinctly conical apex. Pleurocystidia (55–)57–70(–73) x (11–)12–19  $\mu$ m, cylindrical to subfusiform, slightly thick-walled, with up to 1.0  $\mu$ m thick, colourless to yellowish wall, scarcely crystalliferous at apex, exceptionally with a transverse septum. Cheilocystidia similar to pleurocystidia. Paracystidia subpyriform to clavate, thin-walled, colourless. Basidia 26–31 x 8–10  $\mu$ m, 4-spored. Caulocystidia descending to half-way, similar to cheilocystidia, but partly thin-walled and rather inconspicuous, mixed with scattered cauloparacystidia.

HABITAT & DISTRIBUTION. — Under frondose trees on calcareous soil. Associated with *Fagus*, *Quercus*, *Carpinus*, *Corylus*, and *Tilia*. Very rare in Europe, known from two localities in the Netherlands. July–Sept.

COLLECTIONS EXAMINED. — NETHERLANDS: IJsselmeerpolders, de Abbert, 27.IX.1981, *Tjallingii-Beukers*; prov. Limburg, Neercanne, 28.VII.1981, *Kuyper 1644*. — GERMANY: Bavaria, Augsburg, Wittelsbacher Park, 5.VIII.1982, *Kuyper 2112*.

Note: As no mention is made of a discolouration of the young lamellae in the original description of *I. furfurea* (Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 15–17. 1955), it is supposed to be absent. However, this character needs to be assessed from fresh material, and it might well be that further investigations will result in the abandonment of var. *rufotacta*.

72.2. *I. furfurea* var. *rufotacta* (Schwöbel & Stangl) Kuyp., *comb. & stat. nov.*  
Fig. 157

*Inocybe rufotacta* Schwöbel & Stangl in *Carolinae* 40: 9. 1982 (basonym).  
SELECTED ICON. — Schwöbel & Stangl in *Carolinae* 40: 10. 1982.

Pileus (6–)10–25(–32) mm, campanulate-convex, finally applanate to even slightly depressed, without or with indistinct umbo, red-brown or chestnut-brown, even blackish brown around centre, becoming somewhat paler towards margin, initially minutely subtomentose especially around centre, then radially and concentrically diffracting, and becoming appressedly squamose; finally pellis peeling; velipellis absent. Lamellae moderately crowded, 2–3.5 mm broad, sometimes subventricose, narrowly adnate, whitish to greyish white when young, but from damage red-brown, with age yellow-brown with an olivaceous tinge and not any longer discolouring from damage; edge fimbriate, whitish. Stipe 15–30(–35) x 2–4(–5.5) mm, cylindrical to somewhat swollen, not distinctly bulbous, red-brown, but somewhat paler than pileus, somewhat pallescent with age, at base almost whitish, pruinose on apical part, below indistinctly pruinose to almost smooth or minutely longitudinally fibrillose. Context whitish in pileus, in stipe more pinkish-brownish, especially in upper 1/3rd. Smell faint, slightly acidulous.

Spores 8.0–9.5 x 5.0–5.5  $\mu$ m, on average 8.8 x 5.2  $\mu$ m, Q = 1.6–1.7,  $\bar{Q}$  = 1.7, smooth, regular to subamygdaliform, with almost obtuse to indistinctly subconical apex. Pleurocystidia (50–)52–59(–62) x 14–18  $\mu$ m, cylindrical, slightly thick-walled, with up to 1.0(–1.5)  $\mu$ m thick, colourless to pale yellow wall, minutely crystalliferous at apex. Cheilocystidia similar to pleurocystidia, (very) scarce. Paracystidia broadly clavate to pyriform, thin-walled, colourless, (very) frequent. Basidia 23–30 x 8–11  $\mu$ m, 4-spored. Caulocystidia descending to half-way of stipe, similar to cheilocystidia, lacking in lower half.

HABITAT & DISTRIBUTION. — Under frondose trees. Associated with *Quercus* and *Carpinus*. Known only from the type-locality. July.

COLLECTION EXAMINED. — G E R M A N Y: Baden-Württemberg, Karlsruhe, Erzbergerstrasse, 12.VII.1980, Schwöbel (holotype of *I. rufotacta*, KR).

Note: The macroscopical description has been copied from Schwöbel & Stangl (l.c.).

73. *Inocybe albomarginata* Velen. — Figs. 158–159

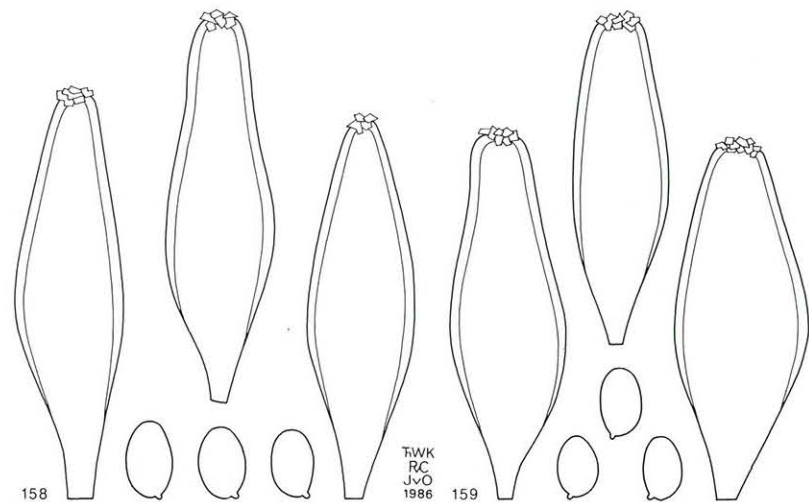
*Inocybe albomarginata* Velen., *České Houby*: 379. 1920.  
*Inocybe ovalispora* C.H. Kauffm. in *N. Amer. Fl.* 10: 248. 1924.  
*Inocybe reducta* J. Lange, *Fl. agar. dan., taxon. Consp.*: iv. 1940.  
EXCLUDED. — *Inocybe albomarginata* sensu Stangl & Veselský in *Česká Mykol.* 36: 223. 1982 (= *I. pseudoreducta*).  
*Inocybe ovalispora* sensu Kühner in Kühn. & Romagn., *Fl. anal. Champ. sup.*: 222. 1953 (= *I. tjallingiorum*).

SELECTED ICONES. — J. Lange, *Fl. agar. dan.* 5: pl. 200E. 1940 (as *I. reducta*). — Huijsman in *Fungus* 25: pl. 2, f. 7–8. 1955 (as *I. reducta*).

Pileus 23–31 mm, plano-convex to almost applanate, without or with low, broad umbo, with margin slightly inflexed when young, then straight, dark reddish brown [5 YR 2–3/4] especially around disc, outwards seemingly paler because of pale underlying context, tomentose around centre, outwards radially fibrillose, with diverging fibrils, soon radially rimose (reminiscent of *I. asterospora*); velipellis absent or indistinct, giving centre indistinct greyish hue. Lamellae, L = 40–50, l = 1–3, moderately crowded, 2–7 mm broad, ventricose or not, emarginate, narrowly adnate to almost free, yellowish-brownish [2.5 Y 5/4]; edge almost even to indistinctly fimbriate, whitish or concolorous. Stipe 31–45 x 3–4 mm, at base with a rather conspicuous (sub)marginate bulb (to 8 mm), pale brown to brownish orange [7.5 YR 5–6/8], especially in upper part, pruinose almost to base of stipe, but rather indistinctly so on lower 1/3rd, with white bulb. Cortina not observed. Context whitish in pileus and stipe, pure white in bulb. Smell none or faintly spermiatic. Taste indistinct.

Spores (6.0–)6.5–8.0(–8.5) x 4.0–5.0  $\mu$ m, on average 6.8–7.7 x 4.3–4.7  $\mu$ m, Q = 1.4–1.7(–1.8),  $\bar{Q}$  = 1.5–1.7, smooth, regular to subamygdaliform, with almost obtuse apex. Pleurocystidia (41–)43–67(–70) x (10–)13–19(–22)  $\mu$ m, fusiform to somewhat utriform, somewhat thick-walled, with up to 1.0(–1.5)  $\mu$ m thick, colourless wall, somewhat crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia or somewhat more slender, frequent. Paracystidia clavate, thin-walled, colourless, infrequent. Basidia 24–29 x 8–10  $\mu$ m, 4-spored. Caulocystidia descending over half-way to almost to base, but (very) scarce in lower 1/3rd, in upper half similar to cheilocystidia, more irregular in lower half, but cauloparacystidia present at base of stipe.

HABITAT & DISTRIBUTION. — Under frondose trees on calcareous soil. Associated with *Quercus* and *Fagus*. Widespread but rare in Europe, also occurring in North America. Rare in the Netherlands. June–Oct.



Figs. 158–159. *Inocybe albomarginata*. — Spores, pleurocystidia (158. from holotype of *I. reducta*; 159. from holotype of *I. ovalispora*).

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Overijssel, Oldenzaal, 17.VI.1960, *Kits van Waveren*; prov. Gelderland: Doetinchem, 4.X.1952, *Huijsman*; Gendringen, 13.VIII.1983, *Jansen 83.163*; Leuvenum, 26.VII.1975, *van der Laan*; IJsselmeerpolders, Voorsterbos, 8.X.1981, *Kuyper 1901*, 18.IX.1982, *Kuyper 2225* & 12.X.1983, *Kuyper 2474*; prov. Utrecht, Baarn, 18.VII.1981, *van Winden 691*; prov. Zuid-Holland, Ridderkerk, 17.VIII.1985, *Kuyper 2678*; prov. Noord-Brabant, Udenhout, 6.VIII.1981, *Jansen*. — CZECHOSLOVAKIA: Bohemia, Mnichovice, VIII.1915, *Velenovský* (holotype of *I. albomarginata*, PRM); Moravia, Zarošice (Lysov), 28.VIII.1946, *Vacek* (PRM). — DENMARK: Odense, Husmandsskolen, IX.1938, *Lange* (holotype of *I. reducta*, C); Gerup skov near Holstenskus, 8.IX.1940, *Lange* (C). — ENGLAND: co. Sussex, Lodsworth, 28.IX.1971, *Reid* (K). — FRANCE: dpt. Doubs, Lougres, 4.IX.1956, *Huijsman 4430* & 25.VI.1957, *Huijsman*. — NORWAY: Østfold, Saupsberg, Bonegårdsparken, 29.VII.1985, *Weholt*. — SWITZERLAND: Bois de Chabrey, 18.VIII.1961, *Huijsman*; Planeyse, 3.X.1965, *Huijsman*. — UNITED STATES: Michigan, Washtenaw Co., Ann Arbor, 4.IX.1912, *Kauffman* (holotype of *I. ovalispora*, MICH).

Note: Easily recognised because of marginate bulb, and smooth, minute spores. Macroscopically it is not unlike small specimens of *I. asterospora* Quél. *Inocybe glabripes* Rick. differs in being cortinate and having an equal stipe that is hardly pruinose. *Inocybe amblyspora* Kühner differs in having a smooth pileus covering, a larger marginate bulb and somewhat larger spores. *Inocybe pseudoreducta* Stangl & Glowinski also has larger spores with a more conical apex and broader pleurocystidia.

#### 74. *Inocybe amblyspora* Kühner — Figs. 160–161

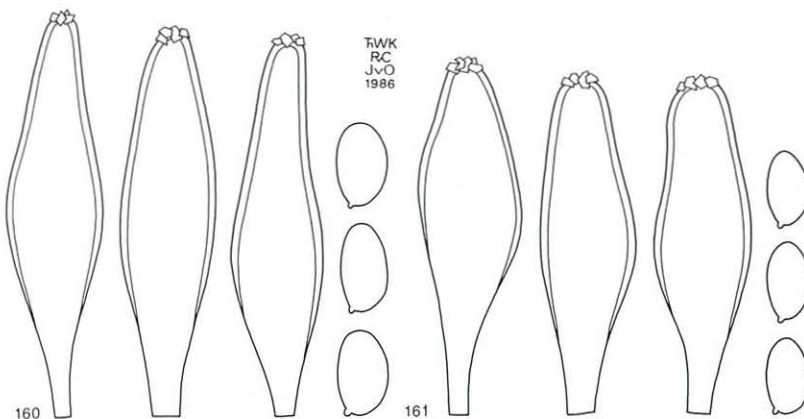
*Inocybe amblyspora* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 3. 1955.

*Inocybe tristis* Mal. & Bert., Fl. Champ. sup. Maroc 1: 404. 1970, non *I. tristis* Hruby 1930.

SELECTED ICONES. — Mal. & Bert., Fl. Champ. sup. Maroc 1: pl. 18. 1970 (as *I. tristis*).

Pileus 25–62 mm, campanulate, soon spreading and becoming plano-convex to almost applanate, with a large but low umbo, chestnut-brown or somewhat ochraceous-tinged brown, sometimes with a greyish tinge because of velipellis, smooth around disc, hardly fibrillose outwards, at margin not radially rimulose, somewhat shiny or dull and then with a rather distinct velipellis. Lamellae, L = 45–60, l = 1–3, crowded, subventricose, narrowly adnate, greyish-brownish, then more olivaceous brownish; edge fimbriate, whitish. Stipe 28–60 x 4–10 mm, at base with a very conspicuous marginate bulb (7–15 mm), solid, reddish-brownish, pruinose all over. Cortina not observed. Context whitish, but somewhat reddish in cortex of stipe, pure white in bulb. Smell subspermiatic. Taste not recorded.

Spores 7.5–9.5 x 4.5–5.5  $\mu\text{m}$ , on average 8.2–9.0 x 4.8–5.1  $\mu\text{m}$ , Q = (1.5–)1.6–1.9(–2.0),  $\bar{Q}$  = 1.7–1.8, smooth, regular to subamygdaliform, with almost obtuse to only indistinctly subconical apex. Pleurocystidia (46–)50–62(–70) x (12–)13–18  $\mu\text{m}$ , cylindrical, subfusiform or subutriform, only slightly thick-walled, with up to 1.0–1.5  $\mu\text{m}$  thick, colourless wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia broadly clavate, thin-walled, colourless, frequent. Basidia 22–28 x 7–9  $\mu\text{m}$ , 4-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia, but in lower 1/4th predominantly with cauloparacystidia, mostly little differentiated.



Figs. 160–161. *Inocybe amblyspora*. — Spores, pleurocystidia (160. from holotype of *I. tristis*; 161. from Huijsman).

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees. Associated with *Quercus*, *Picea*, and *Cedrus*. Apparently very rare, reported from France, Germany, Switzerland, and Morocco, not yet found in the Netherlands. May, Aug.–Sept.

COLLECTIONS EXAMINED. — MOROCCO: Rif, l'Azib de Ktama, 4.V.1958, *Malençon 3365* (holotype of *I. tristis*, MPU). — SWITZERLAND: Kt. Neuchâtel, Mauborghet, Forêt de Vaux, 10.IX.1966, *Huijsman*.

Notes: 1. The macroscopical description has been copied from Kühner (in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 18. 1955) and Malençon & Bertault (Fl. Champ. sup. Maroc 1: 402. 1970).

2. *Inocybe amblyspora* resembles *I. oblectabilis* (Britz.) Sacc. very much in its macroscopical characters, but differs in having smooth spores. *Inocybe albomarginata* Velen. has a distinctly radially rim(ul)ose pileus and smaller spores, *I. pseudoreducta* Stangl & Glowinski has broader cystidia with a thicker wall and a somewhat smaller bulb. The differences between *I. amblyspora* and *I. pseudoreducta* are rather small, however, and more material is needed for a better judgement about their taxonomic status.

I failed to note any significant difference in the protologue of *I. tristis* Mal. & Bert. except for the well-developed velipellis, but this character rarely has taxonomic significance.



75. *Inocybe pseudoreducta* Stangl & Glowinski — Fig. 144

*Inocybe pseudoreducta* Stangl & Glowinski in Karstenia 21: 30. 1981.

MISAPPLIED NAME. — *Inocybe albomarginata* sensu Stangl & Veselský in Česká Mykol. 36: 223. 1982.

Pileus 20–55 mm, campanulate or conico-convex when young, then convex to plano-convex, with a low broad umbo, brown, sometimes more reddish brown, smooth around disc, outwards radially fibrillose, at margin rimulose; velipellis present in young specimens but rather indistinct. Lamellae, L = 45–60, l = 1–3, moderately crowded, to 7 mm broad, (sub)ventricose, adnate to almost free, when young whitish or pale ochraceous, finally greyish-brownish with an olivaceous tinge; edge fimbriate, whitish or concolorous. Stipe 20–60 x 3–7 mm, at base with a conspicuous marginate bulb (12 mm), solid, brownish or pinkish-brownish, with pinkish tinges most conspicuous in upper part, with white bulb, pruinose all over. Cortina not observed. Context whitish in pileus, faintly pinkish in cortex of stipe, pure white in bulb. Smell spermiatic or somewhat acidulous.

Spores 7.5–9.5(–10.0) x 4.5–5.5(–6.0)  $\mu\text{m}$ , on average 8.1–9.4 x 4.9–5.5  $\mu\text{m}$ , Q = (1.5–)1.6–1.9(–2.0),  $\bar{Q}$  = 1.6–1.7, smooth, subamygdaliform, with subconical apex. Pleurocystidia (50–)51–70 x (16–)17–22(–24)  $\mu\text{m}$ , fusiform to ventricose-fusiform, sometimes sub-fusiform or even subutriform, never distinctly lageniform, thick-walled, with up to 2.5  $\mu\text{m}$  thick, almost colourless wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia slenderly to broadly clavate, thin-walled, colourless, numerous. Basidia 24–29 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia descending to base, but scarce in lower 1/3rd, similar to cheilocystidia or somewhat more irregular, especially near base, mixed with cauloparacystidia all over.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil. Associated with *Picea* and *Fagus*. Apparently very rare in Europe, not known from the Netherlands. July–Sept.

COLLECTIONS EXAMINED. — CZECHOSLOVAKIA: Bohemia, Karlštejn, 1.IX.1946, Pilát (as *I. albomarginata*, PRM). — GERMANY: Lübeck, Muggenbusch, 2.VIII.1980, Glowinski (holotype of *I. pseudoreducta*, M); ibidem, 21.VIII.1980 & 28.VII.1982, Glowinski. — SWITZERLAND: Kt. Ticino, Monte Generoso, 28.IX.1984, Kuyper 2593.

Note: The macroscopical description is for the greater part taken from Stangl & Glowinski (in Karstenia 21: 30. 1980). These authors also stated that the walls of the cystidia are yellow in alkaline solution, but this turned out to be an error. I investigated three collections from the type locality, and found the cystidial wall to be almost colourless.

76. *Inocybe leiocephala* Stuntz — Figs. 162–163

*Inocybe leiocephala* Stuntz in A.H. Smith & Stuntz in Mycologia 42: 98. 1950.

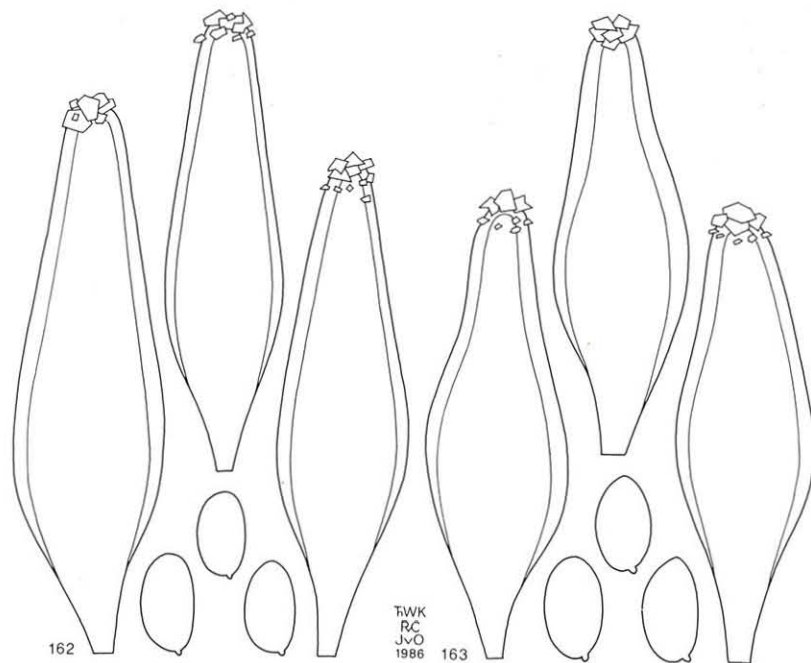
*Inocybe subbrunnea* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 6. 1955.

*Inocybe subbrunnea* var. *subconicospora* M. Bon in Docs mycol. 14(53): 35. 1984.

SELECTED ICONES. — Stangl & Veselský in Česká Mykol. 29: pl. 87, f. 4. 1975 [rather atypical]. — Alessio, Iconogr. mycol. 29: pl. 47, f. 1. 1980. — Stangl & Enderle in Mitt. Ver. Naturw. Math. Ulm 31: 143. 1981 (all as *I. subbrunnea*).

Pileus 9–30 mm, conico-convex, convex, plano-convex to almost applanate, (in)distinctly umbonate, brown, often with distinct reddish tinges [7.5 YR 4/4–4/6], or dark brown [7.5 YR 3/3], smooth and slightly greasy around disc, outwards radially fibrillose but fibrils not diverging, exceptionally subrimulose at margin, with age becoming sometimes minutely recurvately subsquamulose; velipellis absent or present but thin and inconspicuous. Lamellae, L = 25–45, l = 1–3, moderately crowded, 2–4 mm broad, slightly ventricose, narrowly adnate, greyish yellow [2.5 Y 6/4, 5/4]; edge fimbriate, whitish. Stipe 12–51 x 4–5 mm, equal to indistinctly submarginately bulbous, solid, orange-brown, especially in upper part [5–7.5 YR 6/8], pallescent and less reddish downwards, at bulb white, pruinose (almost) all over. Cortina not observed. Context whitish in pileus, orange-brown in cortex of upper part of stipe. Smell and taste spermiatic.

Spores 9.0–11.0 x 5.5–6.5  $\mu\text{m}$ , on average 9.4–10.4 x 5.7–6.2  $\mu\text{m}$ , Q = 1.5–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, regular to subamygdaliform, with almost obtuse to only indistinctly subconical apex. Pleurocystidia (45–)53–75(–82) x (13–)14–21(–22)  $\mu\text{m}$ , broadly fusiform to broadly utriform, sometimes sublageniform but only indistinctly so, thick-walled, with up to 3.0  $\mu\text{m}$  thick, colourless, sometimes slightly yellowish-tinged wall, at apex with small calciumcrystals, frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia pyriform to clavate, thin-walled, colourless, frequent. Basidia 26–37 x 8–11  $\mu\text{m}$ , 4-spored. Caulocystidia descending



Figs. 162–163. *Inocybe leiocephala*. — Spores, pleurocystidia (162. from holotype of *I. leiocephala*; 163. from Kuyper 2177).

to base of stipe, similar to cheilocystidia, mixed with cauloparacystidia, sometimes rather irregular in lower 1/3rd and there less thick-walled and rather scarce.

HABITAT & DISTRIBUTION. — Under coniferous and frondose trees, also with dwarf shrubs in the alpine zone. Associated with *Picea*, *Quercus*, *Pinus mugo*, *Salix retusa*, and *Dryas octopetala*. Widespread in Europe, also occurring in North America. Very rare in the coastal dunes in the Netherlands. July–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Zuid-Holland: Rockanje, 4.XI.1981, *Kuyper 2008*; Oostvoorne, 4.XI.1981, *Kuyper 2013* & 17.X.1981, *Kuyper 1961*. — AUSTRIA: Tirol, Rosskogel, alt. 1900 m, 7.IX.1982, *Kuyper 2165*; Achenwald near Achenkirch, 6.IX.1982, *Kuyper 2177* & 2178. — CZECHOSLOVAKIA: Slovakia, Nižke Tatry, Stanišovská Dolina, 12.IX.1981, *Kuyper 1763*. — FRANCE: dpt. Somme, Quend-les-Pins, Petite Californie, IX.1970, *Bon 70299* (holotype of *I. subbrunnea* var. *subconicospora*, herb. Bon). — GERMANY: Bavaria, Augsburg, Gögginger Wäldchen, 29.VII.1982, *Kuyper 2058*. — SWITZERLAND: Valangin, 9.XI.1958, *Huijsman*; Arosa, 24.VIII.1968, *Huijsman*; Kt. Bern: Steingletscher, 16.VIII.1984, *Irllet 84.149* (BERN); Gemmi-Spittelmatten, 5.IX.1984, *Irllet 84.257* (BERN). — UNITED STATES: Washington, Mt. Rainier National Park, Longmire, 24.IX.1948, *Stuntz 4739* (holotype of *I. leiocephala*, WTU).

Notes. 1. *Inocybe leiocephala* shows much resemblance to *I. nitidiuscula* (Britz.) Sacc., but the latter specie differs in being cortinate, having a different stipe covering and spores with a distinctly conical apex.

2. *Inocybe tjallingiorum* Kuyp. comes also close to *I. leiocephala*, but differs in having shorter cystidia and somewhat smaller spores.

3. The spore apex in *I. leiocephala* varies from almost obtuse to indistinctly conical. Variants with the latter character are occasionally met in the dunes of West Europe, and have been described by Bon (in *Docs mycol.* 14(53): 35. 1984) as var. *subconicospora*. However, intermediate cases do also occur and for that reason no taxonomic significance can be given to this character difference.

### 77. *Inocybe tjallingiorum* Kuyp., *spec. nov.* — Figs. 164–166

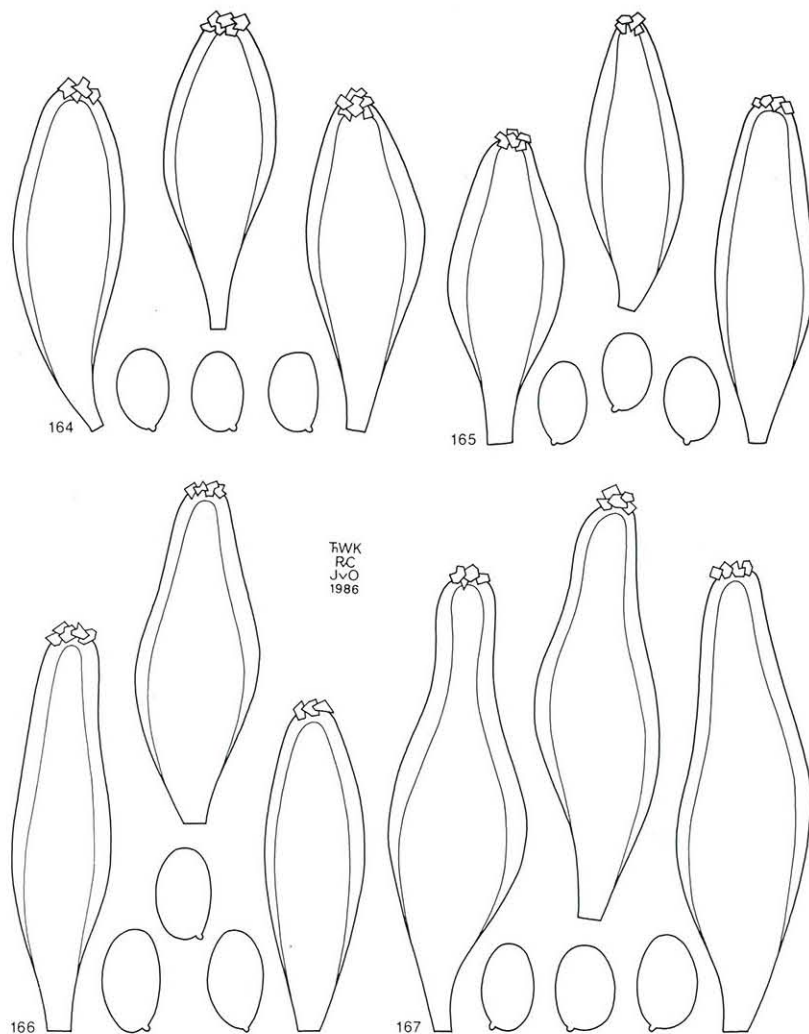
*Inocybe ovalispora-subbrunnea* f. *brunneola* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 100. 1955 (inval., Art. 34.1).

*Inocybe ovalispora-subbrunnea* f. *tenerella* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: 100. 1955 (inval., Art. 34.1).

MISAPPLIED NAME. — *Inocybe ovalispora* sensu Kühner in Kühn. & Romagn., *Fl. anal. Champ. sup.*: 222. 1953.

SELECTED ICONES. — J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks*, N.F. 5: pl. 6, f. 9 & pl. 7, f. 7. 1955 (as f. *tenerella* & f. *brunneola* respectively).

Pileus convexus vel applanatus, brunneus vel ochraceo-brunneus, glaber vel minute subsquamulosus in centro, versus marginem non rimulosus, velipelle distincti in juventute. Lamellae adnatae, pallide griseae, deinde ochraceo-brunneae vel brunneae, margine fimbriato, albedo. Stipes aequalis vel subbulbosus, primus albidus vel pallide ochraceus, deinde deorsum fuscans, in media parte croceo-ochraceus, in parte basali cupreo-brunneus, sicut in *I. vulpinella*, totus pruinosis. Odor indistinctus. Sporae (7.0–)7.5–10.0(–10.5) x 5.0–6.0  $\mu$ m, Q = 1.4–1.8, laeves, regulares vel subamygdaliformes, apice subobtusos. Pleurocystidia (39–)41–59(–62) x (13–)14–20(–21)  $\mu$ m, clavata vel subfusiformia vel subutriformia, crassiparietalia, pariete pallide flava. Cheilocystidia pleurocystidiis similia. Caulocystidia descendientia ad basim, cheilocystidiis similia. Ab *I. vulpinella* differt sporibus minoribus, ab *I. vaccina* differt pileo



Figs. 164–166. *Inocybe tjallingiorum*. — Spores, pleurocystidia (164, from *I. ovalispora-subbrunnea* f. *tenerella*; 165, from holotype of *I. tjallingiorum*; 166, from *I. ovalispora-subbrunnea* f. *brunneola*). Fig. 167. *Inocybe saponacea*. — Spores, pleurocystidia (from holotype of *I. saponacea*).

obscuriori atque stipite fuscante, ab *I. leiocephala* differt stipite aequali, apice non roseo-tincto, pleurocystidiis minoribus, ab *I. splendens* var. *phaeoleuca* differt stipite fuscante, cystidiis minoribus atque sporis cum apice subobtusis. Holotypus Th. W. Kuyper 1902, 9.X.1981, Roggebotzand, Oost Flevoland, IJsselmeerpolders, Netherlands (L).

Etymology: named in honour of Dr F. Tjallingii & Mrs G. Tjallingii-Beukers, honorary members of the Netherlands' Mycological Society, for their invaluable contributions to the knowledge of the mycoflora of the IJsselmeerpolders.

Pileus 11–32 mm, slightly conico-convex, campanulato-convex or convex, soon spreading, finally plano-convex to almost applanate, not or only indistinctly umbonate, with margin somewhat inflexed when young, then straight, dark brown, brown to ochraceous brown around disc [7.5 YR 3/3, 3/4, 4/4, 10 YR 4/6, 5/6], outwards slightly paler, but often only indistinctly so, submentose-smooth around disc, on age becoming minutely fluffy, outwards sericeous-fibrillose, but fibrils not diverging, at margin not radially rimulose, not or hardly breaking up with age; velipellis rather conspicuous in young specimens, less distinct in older specimens but never disappearing altogether, dull, not greasy when moist. Lamellae, L = 30–35, l = 1–3, moderately crowded to subdistant, 2–5 mm broad, (sub)ventricose, broadly to narrowly adnate, sometimes sinuate, pale grey when young, finally ochraceous brown to brown [2.5 Y 6/4, 10 YR 5/4]; edge fimbriate, whitish or concolorous. Stipe 19–40 x 3–5 mm, equal to slightly bulbous, but without marginate bulb, solid, whitish to pale ochraceous all over when young, often discolouring in lower half as *I. vulpinella*, and then whitish at apex, slightly orange-tinged ochraceous half-way [7.5 YR 5/6, 6/6], at base copper-coloured brown [7.5 YR 4/6–3/4], pruinose throughout, white-felted at base. Cortina not observed in youngest specimens. Context whitish in pileus, slightly brownish-tinged in stipe, not darkening towards base. Smell indistinct or (very) faint, subspermatric. Taste indistinct.

Spores (7.0–)7.5–10.0(–10.5) x 5.0–6.0  $\mu\text{m}$ , on average 7.9–9.7 x 5.2–5.7  $\mu\text{m}$ , Q = 1.4–1.8,  $\bar{Q}$  = 1.5–1.7, smooth, regular to subamygdaliform, with almost obtuse apex, exceptionally with indistinctly subconical apex. Pleurocystidia (39–)41–59(–62) x (13–)14–20(–21)  $\mu\text{m}$ , clavate, but sometimes tending to subfusiform or subutriform, never lageniform, thick-walled, with up to 3.0(–4.0)  $\mu\text{m}$  thick, slightly yellowish-tinged to pale yellow wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia pyriform to clavate, thin-walled, colourless, abundant. Basidia 24–33 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia descending to base, in lower half of stipe often somewhat more irregular than cheilocystidia, mixed with cauloparacystidia throughout.

HABITAT & DISTRIBUTION. — Under coniferous and frondose trees. Associated with *Pinus*, *Quercus*, *Salix herbacea*, and *Dryas octopetala*. Widespread in Europe, also in the Alpine Zone. Very rare in the Netherlands. April–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: Prov. Gelderland, Wageningen, 10.VII.1980 & 28.IX.1981, Tjallingii-Beukers; IJsselmeerpolders, Roggebotzand, 9.X.1981, Kuyper 1902 (holotype of *I. tjallingiorum*, L); ibidem (but other lots), 24.IV.1983, 15.V.1983, 11.VI.1983, 4.XI.1983 & 5.VII.1984, Tjallingii-Beukers. — NORWAY: Hordaland, Ulvik, Finse, 13.VIII.1985, Vellinga 773; Østfold, Krakerøy, Ekheim, 17.VIII.1985, Weholt. — SWITZERLAND: Kt. Graubünden: Fuorn, Val dal Botsch, alt. 2600 m, 20.VIII.1950, Favre (authentic material of f. *brunneola*, G); between Val Tavrü and Val Foras, Baisch Bella, alt. 2450 m, 8.VIII.1943, Favre (authentic material of f. *tenerella*, G); Kt. Bern, Gemmi-Spittelmatten, 28.VIII.1985, Irlet 85.136 (BERN).

Note: *Inocybe tjallingiorum* has the same colour of pileus as *I. splendens* var. *phaeoleuca* (Kühner) Kuyper., but the latter species differs in having spores with a distinctly conical apex and almost colourless, somewhat larger cystidia. *Inocybe leiocephala* Stuntz differs in a different colour of stipe and larger spores and cystidia.

## 78. *Inocybe saponacea* Kuyper, spec. nov. — Fig. 167

Pileus glaberrimus, nitidus, ochraceo-brunneus vel brunneus, versus marginem velipelle alba obtectus. Lamellae pallide olivaceo-luteae, dein argillaceae. Stipes subbulbosus, pallide brunneus, pruinosis ad basim. Odor saponaceus, sicut in *Tricholomate saponaceo*. Sporae 7.5–9.0 x 5.0–5.5  $\mu\text{m}$ , Q = 1.4–1.7, laeves, regulares, apice (sub)obtusis. Pleurocystidia 60–74 x (12–)13–18  $\mu\text{m}$ , cylindracea vel subfusiformia vel sublageniformia, crassiparietalia, parietate incolore. Cheilocystidia pleurocystidiis similia. Caulocystidia descendunt ad basim, cheilocystidiis similia. Holotypus: C. Bas 6048, 27.VIII.1973, Kevo Subarctic Station, Utsjoki, Lapland, Finland (L).

Etymology: saponaceus, soapy, because of its peculiar smell.

Pileus convex, umbonate, sometimes prominently so, ochraceous brown [7.5 YR 5/6 or slightly darker] to moderately dark brown [7.5 YR 4/4], with whitish appressed remnants of velipellis near margin, remarkably smooth, somewhat shiny. Lamellae when young with pale olivaceous yellow tinge, then clay-coloured. Stipe subbulbosus, pale brown, pruinose nearly throughout but rather hard to see. Context sordid whitish. Smell rather strong, soapy, reminiscent of *Tricholoma saponaceum*.

Spores 7.5–9.0 x 5.0–5.5  $\mu\text{m}$ , on average 8.2 x 5.3  $\mu\text{m}$ , Q = 1.4–1.7, smooth, regular to subamygdaliform, with (sub)obtusate apex. Pleurocystidia 60–74 x (12–)13–18  $\mu\text{m}$ , cylindrical to subfusiform or with sublageniform tendency, thick-walled, with up to 2.5  $\mu\text{m}$  thick, colourless wall, crystalliferous at apex, not frequent. Cheilocystidia similar to pleurocystidia or less slender, more utriform, rather frequent. Paracystidia slenderly clavate to broadly clavate, thin-walled, colourless. Basidia 24–32 x 8–10  $\mu\text{m}$ , 4-spored. Stipe with caulocystidia throughout, although scarce in lower 1/3rd of stipe, caulocystidia similar to cheilocystidia, mixed with cauloparacystidia.

HABITAT & DISTRIBUTION. — Under *Betula nana* and *Salix* species on boggy, rather acid soil. Known only from the type-locality, but probably more widespread in Arctic regions. Aug.

COLLECTION EXAMINED. — FINLAND: Lapland, Utsjoki, near Kevo Subarctic Station, 27.VIII.1973, Bas 6048 (holotype of *I. saponacea*, L).

Note: A collection from Greenland (Lyngmarksfjeld, 19.VIII.1967, Lange 67.400, C) almost certainly belongs to the same species, but is unfortunately without macroscopical annotations.

## 79. *Inocybe hirtella* Bres.

*Inocybe hirtella* Bres., Fungi trident. 1: 52. 1881.

*Inocybe amygdalispora* Métrod in Bull. trimest. Soc. mycol. Fr. 72: 129. 1956 (inval., Art. 36.1). *Inocybe pseudoconfusa* Métrod in Bull. trimest. Soc. mycol. Fr. 72: 123. 1956 (inval., Art. 36.1). EXCLUDED. — *Inocybe hirtella* sensu J. Lange, Fl. agar. dan. 3: 78. 1938 (= *I. muricellata*).

### KEY TO THE VARIETIES OF *I. HIRTELLA*

1. Basidia 4-spored; spores on average 8.2–9.9 x 5.2–5.9  $\mu\text{m}$  . . . . . var. *hirtella*, p. 196
1. Basidia 2-spored; spores on average 10.5–12.1 x 6.2–6.8  $\mu\text{m}$  . . . . . var. *bispora*, p. 198

Notes: 1. *Inocybe bubaci* Velen. (České Houby: 378. 1920) is probably another synonym of *I. hirtella* (see Kuyper in Persoonia 12. 379. 1985).

2. As authentic material of *I. hirtella* seems to be lacking, I have assumed that Bresadola's type illustration (Fungi trident 1: pl. 58. f. 1. 1881) refers to the four-spored variety, which is known from Italy and is generally somewhat more bright yellow than the two-spored variety. Although the basidium was depicted with only two sterigmata, it should be borne in mind that Bresadola was rather inaccurate in this respect (cf. 2-spored basidia of *I. praetervisata* (pl. 38), *I. cincinnata* (pl. 51), and *I. fastigiata* (pl. 57)).

### 79.1. *I. hirtella* var. *hirtella* — Figs. 168–169

*Inocybe hirtella* Bres.

*Inocybe pseudoconfusa* Métrod (inval., Art. 36.1)

*Inocybe hirtella* f. *tetraspora* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 25. 1955 (inval., Art. 26.1).

MISAPPLIED NAME. — *Inocybe langei* s. J. Lange, Fl. agar. dan. 3: 78. 1938

SELECTED ICONES. — Bres., Fungi trident. 1: pl. 58, f. 1. 1881. — Bres., Iconogr. mycol. 15: pl. 734, f. 1. 1930. — J. Lange, Fl. agar. dan. 3: pl. 113F. 1938 (as *I. langei*).

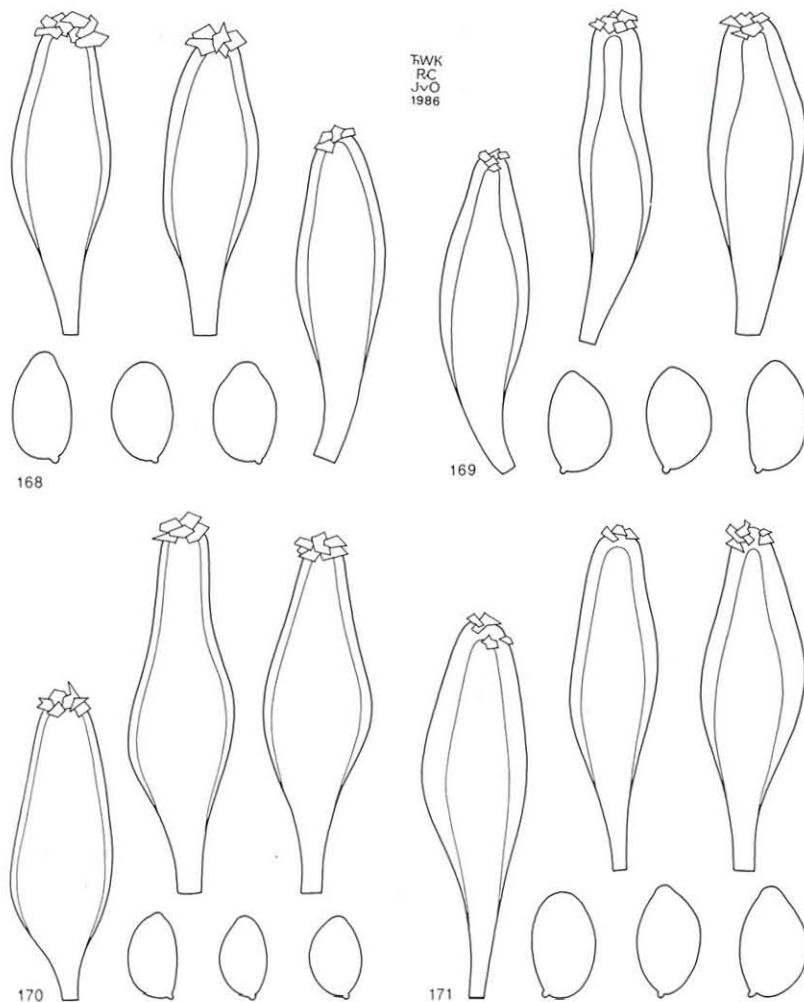
Pileus 15–31 mm, convex, plano-convex to applanate, not or only indistinctly umbonate, with straight margin, ochraceous to slightly brownish-tinged yellow [10 YR 6/6, 5/8], fibrillose, squamulose or even squarrose, with age somewhat excoriating and becoming recurvately squarrose. Lamellae, L = 30–45, l = 1–3, crowded, 2–4 mm broad, not or slightly ventricose, narrowly adnate, exceptionally rather broadly adnate, greyish yellow-brown or brownish yellow, finally with a faint olivaceous tinge; edge fimbriate, whitish. Stipe 20–58 x 3–4 mm, equal to subbulbous, without marginate bulb, solid, pale yellowish or pale orange-ochraceous at apex, downwards pallescent to almost whitish at base, pruinose under lens (almost) to base. Cortina not observed. Context whitish. Smell of hymenium strong, as bitter almonds, but of context spermatic when cut. Taste not distinct.

Spores (7.5–)8.0–10.5 x 5.0–6.0  $\mu$ m, on average 8.2–9.9 x 5.2–5.9  $\mu$ m, Q = (1.5–)1.6–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, subamygdaliform, often with an indistinct suprahilary depression, with conical apex. Pleurocystidia 42–60(–64) x 10–16(–20)  $\mu$ m, cylindrico-clavate, slenderly fusiform to subutriform, thick-walled, with up to 2.0(–2.5)  $\mu$ m thick, colourless to pale yellow wall, slightly crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia pyriform to broadly clavate, thin-walled, colourless, numerous. Basidia 25–30 x 8–10  $\mu$ m, 4-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia, but somewhat less thick-walled; cauloparacystidia also present at base of stipe, but sometimes very scarce.

HABITAT & DISTRIBUTION. — Under frondose trees on calcareous soil. Associated with *Fagus*, *Corylus*, and *Carpinus*. Widespread in Europe, not yet known from the Netherlands. Sept.–Oct.

COLLECTIONS EXAMINED. — BELGIUM: prov. Namur, Resteigne, Bois de Resteigne, 8.X.1982, Kuyper 2283. — CZECHOSLOVAKIA: Bohemia, Mnichovice, X.1937, Velenovský (as *I. bubaci*, PRM). — FRANCE: dpt. Doubs, Lougres, 26.IX.1956, Bas 1133. — GERMANY: Eifel, Gerolstein, Hundsbach, 26.IX.1980, Kuyper 1490. — ITALY: prov. Alto Adige, Trento, Parco Gocciadoro, 26.IX.1981, Kuyper 1847 & 1850. — SWITZERLAND: Kt. Bern, Bern, Bremgartenwald, 23.IX.1984, Kuyper 2578.

Note: *Inocybe hirtella* var. *hirtella* seems to prefer somewhat more natural vegetation types, whereas var. *bispora* is more commonly found in parks and other anthropogenic vegetation.



Figs. 168–171. *Inocybe hirtella*. — Spores, pleurocystidia (168. from holotype of *I. hirtella* var. *bispora*; 169. from authentic material of *I. pseudoconfusa*; 170. from Kuyper 1847; 171. from authentic material of *I. amygdalispora*).

79.2. *I. hirtella* var. *bispora* Kuyp., var. nov. — Figs. 170–171

*Inocybe amygdalispora* Métrod (inval., Art. 36.1)

*Inocybe hirtella* f. *bispora* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 26. 1955 (inval., Art. 36.1).

*Inocybe langei* f. *bispora* J. Lange, Fl. agar. dan. 5: 102. 1940 (inval., Art. 36.1).

SELECTED ICONES. — J. Lange, Fl. agar. dan. 5: pl. 199C. 1940 (as *I. langei* f. *bispora*). — R. Phillips, Paddest. Schimm.: 151. 1981.

A varietate *hirtella* differt basiis bisporigeris atque sporibus majoribus. Holotypus: *C. Bas 2413*, 11.IX.1961, Hortus Botanicus, Leiden, prov. Zuid-Holland, the Netherlands (L; isotypus BP, C, GZU, H, K, UPS).

Pileus 11–54 mm, conico-convex, convex, plano-convex, applanate or finally even slightly depressed, not or indistinctly umbonate, with margin inflexed when young, soon straight, pale yellow, ochraceous yellow to ochraceous brownish [10 YR 8/8, 7/8, 6/8, 2.5 Y 7/6, 6/6, 6/8], radially fibrillose to squamulose, often exoriating and becoming recurvately squarrose, with tips of scales often somewhat darker, more or less brown; velipellis present in young specimens, exceptionally persisting and pileus then subtomentose-smooth all over. Lamellae, L = 25–45, l = 1–3, crowded, 2–8 mm broad, (sub)ventricose, narrowly adnate to almost free, at first pale yellowish-greyish, then yellow-brown, finally even slightly olivaceous-tinged; edge fimbriate, whitish or concolorous. Stipe 18–62 x 2–5 mm, equal to subbulbous, but without marginate bulb, solid, whitish to pale yellowish, at apex often with pink tinges, pruinose (almost) all over, but sometimes indistinctly so in lower 1/3rd. Cortina absent in youngest specimens. Context whitish to pale yellowish in pileus, in apex of stipe often with pinkish or orange tinges. Smell of hymenium as bitter almonds, but of context spermiac when cut. Taste not conspicuous to subspermatic.

Spores (9.5–)10.0–13.5 x 5.5–7.5  $\mu$ m, on average 10.5–12.1 x 6.2–6.8  $\mu$ m, Q = 1.5–1.9(–2.0),  $\bar{Q}$  = 1.6–1.8, smooth, subamygdaliform to amygdaliform, often with apical papilla, often with suprahilar depression, somewhat more thick-walled than in var. *hirtella*. Pleurocystidia (37–)39–67(–70) x (11–)12–19(–20)  $\mu$ m, (slenderly) clavate, subutriform or subfusiform, thick-walled, with up to 3.0(–3.5)  $\mu$ m thick, pale to bright yellow wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, moderately frequent. Paracystidia pyriform to broadly clavate, thin-walled, colourless, numerous. Basidia 27–34 x 8–11  $\mu$ m, 2-spored, a minority 1-spored, with somewhat longer sterigmata than in var. *hirtella*. Caulocystidia descending to base of stipe, similar to cheilocystidia but less thick-walled; cauloparacystidia also present at base of stipe.

HABITAT & DISTRIBUTION. — Under frondose trees, often in parks and other anthropogenic habitats. Associated with *Fagus*, *Quercus*, *Tilia*, *Betula*, and *Populus*. Widespread in Europe, not uncommon in the Netherlands. Aug.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland: Neerijnen, 14.X.1980, *Kuyper 1529 & 1534*, 29.IX.1981, *Vellinga 420*; Rheden, 19.VIII.1961, *Bas 2365 & 21.X.1980, Kuyper 1545, 1546 & 1547*; prov. Utrecht: Breukelen, 9.X.1955, *Maas Geesteranus 10765*; Harmelen, 13.VIII.1981, *Kuyper 1682 & 15.X.1981, Kuyper 1952*; Utrecht, 13.X.1981, *Kuyper 1939 & 1941*; prov. Noord-Holland: Egmond, 23.IX.1982, *Kuyper 2236*; Overveen, 27.X.1929, *Lütjeharms*; prov. Zuid-Holland: Leiden, 22.IX.1950, *Maas Geesteranus 7456*, 11.X.1950 *Maas Geesteranus 7524 & 11.IX.1961, Bas 2413* (holotype of *I. hirtella* var. *bispora*, L); Oostvoorne, 16.X.1981, *Kuyper 1954*; Rockanje, 7.X.1980, *Kuyper 1519 & 1520*; Rotterdam, 17.IX.1960, *Bas 2197*; Wassenaar, 27.VIII.1953, *Bas 121 & 27.IX.1970, Bas 5431*; prov. Noord-Brabant: Oisterwijk, 26.X.1947, *Huijsman*; Wouw, 16.X.1938, *Huijsman 403 & 405*; prov. Limburg: Gronsveld, 26.X.1958, *Bas 1645*; Gulpen, 12.X.1952, *Maas Geesteranus 9120*. — BELGIUM: prov. Namur, Nismes, Forêt de Nismes, 1.X.1984, *Kuyper 2601*. — DENMARK: Fyn, Gelsted, 21.X.1937, *Lange* (authentic material

of *I. langei* f. *bispora*, C). — ENGLAND: co. Kent, Chevening Park, 16.X.1982, *Reid* (K). — FRANCE: vicinity of Dijon, 3.X.1954, *Métrod 2933* (authentic material of *I. amygdalispora*, herb. Métrod, PC). — GERMANY: Eifel, Kyllburg, 26.IX.1980, *Kuyper 1492*. — SCOTLAND: co. Perthshire, Killiecrankie, 24.IX.1983, *Kuyper 2429*. — SWITZERLAND: Kt. Ticino, Monte Generoso, 28.IX.1984, *Kuyper 2592*; Vaumarcus, 7.IX.1960, *Huijsman*.

80. *Inocybe muricellata* Bres. — Figs. 172–175

*Inocybe muricellata* Bres. in Annl. mycol. 3: 160. 1905.

*Inocybe scabelliformis* Malenç. in Mal. & Bert., Fl. Champ. sup. Maroc 1: 401. 1970.

*Inocybe phlotinoides* Romagn. in Beih. Sydowia 8: 355. 1979.

*Inocybe scabella* var. *minor* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 5. 1955.

MISAPPLIED NAMES. — *Inocybe petiginosa* sensu Bres., Iconogr. mycol. 16: pl. 754, f. 2. 1930.

*Inocybe hirtella* sensu J. Lange, Fl. agar. dan. 3: 78. 1938.

*Inocybe scabella* sensu Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 211. 1955; sensu auct. cur.

*Inocybe hirtelloides* sensu Jacobson & Stridvall in Göteborgs Svampklubb Arsskrift 1979: 14. 1979.

SELECTED ICONES. — Bres., Iconogr. mycol. 15: pl. 730, f. 1. 1930. — Bres., Iconogr. mycol. 16: pl. 754, f. 2. 1930 (as *I. petiginosa*). — J. Lange, Fl. agar. dan. 3: pl. 113G. 1938 (as *I. hirtella*). — Mal. & Bert., Fl. Champ. sup. Maroc 1: pl. 17. 1970 (as *I. scabelliformis*). — Stangl & Enderle in Mitt. Ver. Naturw. Math. Ulm 31: 139. 1981 (as *I. scabella*).

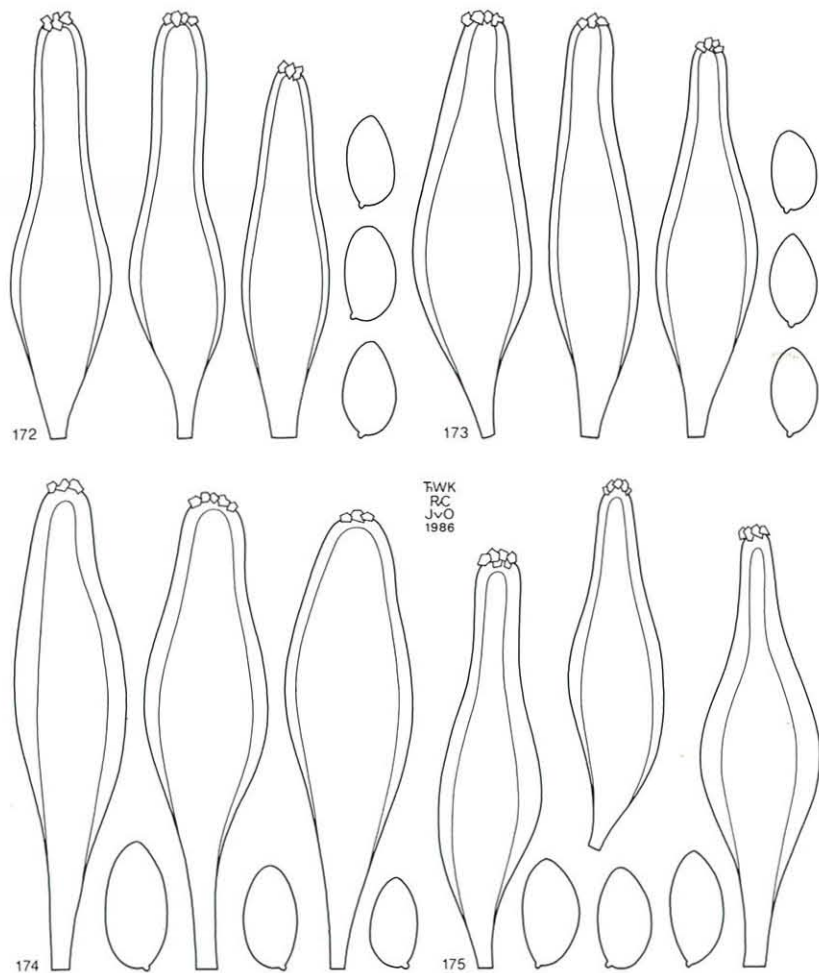
Pileus 7–38 mm, campanulato-convex, convex, plano-convex to applanate, with margin inflexed when young, soon straight, with or without umbo, ochraceous to ochraceous brown around centre [10 YR 5/6, 7.5 YR 5/4, 4/4], outwards ochraceous yellow to ochraceous [10 YR 5/6, 5/8, 6/6, 2.5 Y 6/6], woolly-felty when young, soon breaking up and becoming squarrose around disc, towards margin coarsely felty-fibrillose, not rimulose at margin; velipellis absent or indistinct, sometimes somewhat persisting and pileus then not recurvately squarrose. Lamellae, L = 20–35, l = 1–3, moderately crowded, 2–5 mm broad, not ventricose to subventricose, rather broadly adnate to almost free, yellow-brown [10 YR 5/4–5/6]; edge fimbriate to subflocculose, white. Stipe 20–59 x 2–5 mm, equal, clavate to subbulbous (8 mm), but never marginately bulbous, solid, at apex red-brown [2.5 YR 5/6], often mixed with lilac or purplish tinges, pinkish to orange or yellowish without any reddish tinge, pallescent and less reddish downwards, or yellow all over, with white tomentum at base, pruinose all over. Cortina not observed in young specimens. Context either purplish red or yellowish in apical part of stipe, whitish in pileus. Smell almost nihil, exceptionally as bitter almonds but only indistinctly so, when crushed subspermatic. Taste not distinct.

Spores (8.0–)8.5–12.0(–13.0) x 5.0–6.5(–7.0)  $\mu$ m, on average 8.7–11.3 x 5.5–6.3  $\mu$ m, Q = 1.5–2.0(–2.1),  $\bar{Q}$  = 1.6–1.9, smooth, (sub)amygdaliform, with conical apex. Pleurocystidia (54–)55–93(–95) x (10–)11–18(–22)  $\mu$ m, cylindrical, (slenderly) fusiform to (sub)lageniform, thick-walled, with up to 3.0  $\mu$ m thick, intensely yellow to greenish yellow wall, crystalliferous at apex, (very) frequent. Cheilocystidia similar to pleurocystidia or somewhat less slender, frequent. Paracystidia pyriform to clavate, thin-walled and colourless or with slightly thickened brownish walls, very frequent. Basidia 24–32 x 8–11  $\mu$ m, 4-spored, but a few 2-spored. Caulocystidia descending to base, resembling cheilocystidia but often less thick-walled and only pale yellow especially in lower half, mixed with cauloparacystidia.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil. Associated with *Picea*, *Pinus*, *Cedrus*, *Fagus*, *Quercus*, *Corylus*, *Carpinus*, *Betula*, and *Alnus*. Widespread in Europe, also occurring in the Mediterranean Region. Rare in the Netherlands. June–Nov., but April in the Mediterranean Region.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland: Baak, 15.X.1948, *Huijsman*; Doetinchem, 2.X.1949, *Huijsman* & 9.VIII.1953 *Huijsman*; prov. Zuid-Holland:

Oegstgeest, 29.VII.1956, *Bas* 1052, 16.VIII.1960, *Bas* 2019 & 28.VIII.1961, *Bas* 2380; Rockanje, 13.IX.1954, *Bas* 638; Wassenaar, 12.X.1982, *Kuyper* 2298; prov. Z e e l a n d, Axel, 23.X.1981, *Kuyper* 1993; prov. L i m b u r g, Gulpen, 12.X.1952, *Huijsman*. — A U S T R I A: Tirol: Pertisau, Dristenaental, 6.IX.1982, *Kuyper* 2187; Achenwald near Achenkirch, 6.IX.1982, *Kuyper* 2181 & 2183; Pertisau, Falzthurntal, 6.IX.1982, *Kuyper* 2190; Ischgl, Paznauntal, 15.VII.1960, *Maas Geesteranus* 13155;



Figs. 172–175. *Inocybe muricellata*. — Spores, pleurocystidia (172. from *Kuyper* 2187; 173. from holotype of *I. pholiotinoides*; 174. from holotype of *I. scabelliformis*; 175. from holotype of *I. muricellata*).

Steiermark, Weizendorf, St Johanner Au, 6.X.1978, *Bas* 7415. — B E L G I U M: prov. Namur, Avel-et-Auffe, Fond d'Auffe, 3.X.1982, *Kuyper* 2266; Houyet, 6.X.1982, *Kuyper* 2274. — F R A N C E: dpt. Doubs, Lougres, 29.IX.1955, *Huijsman*; dpt. Oise, Lamorlaye, 16.VIII.1954, *Romagnesi* 54.135 (authentic material of *I. pholiotinoides*, herb. Romagnesi). — G E R M A N Y: Eifel, Gerolstein, Papenkäule, 23.IX.1980, *Kuyper* 1468; Bavaria, Augsburg, Wittelsbacher Park, 1.VII.1982, *Kuyper* 2076; Augsburg, Siebentisch Park, 14.X.1981, *Stangl* (*M*). — I T A L Y: prov. Alto Adige: Trento, Desert, 13.VI.1898, *Bresadola* (holotype of *I. muricellata*, *S*); Trento, Parco Gocciadoro, IX.1900 (as *I. petiginosa*, *S*). — M O R O C C O: Middle Atlas, Azrou, 20.IV.1948, *Malençon* 1781 (holotype of *I. scabelliformis*, *MPU*); ibidem, 27.IV.1971, *Bas* 5558. — S W E D E N: Uppland, Uppsala, Carolinaparken, 8.VII.1948, *Lundell* (*Fungi exsiccati suecici* 2307, as *I. lutescens*, *PC*). — S W I T Z E R L A N D: Ducommun, 14.XI.1966, *Huijsman*; Vanel, 14.VIII.1960, *Huijsman*; Valengin, 14.VII.1959, *Huijsman*; Villaret, Rochefort, 8.IX.1965, *Huijsman*.

Notes: 1. *Inocybe muricellata* is a rather variable species both in macroscopical and microscopical respects, and it has seemed possible to subdivide this material into two taxa mainly differing in colour of stipe correlated with some microscopical characters. Collections which show a distinctly purplish red or lilac red apex of stipe generally possess smaller spores and cystidia. However, when more material was studied these microscopical characters were found to show too much overlap to be reliable for a formal subdivision. Specimens with only a faint pinkish or orange tinge at the stipe apex were also encountered, indicating that this character is more gradual too. Both variants do not seem to differ significantly in their ecology, although the variant with the reddish stipe seems to prefer somewhat more natural vegetation, but this character also proved insufficient for a formal subdivision.

The macroscopical structure of the pileipellis is dependent on the age of the specimens and the development of the velipellis. These phenotypical differences between strongly squarrose specimens and tomentose specimens are devoid of taxonomical importance.

2. In the collections that I made myself I never noted a smell of bitter almonds. It might therefore be possible that the mention of this smell in several collections is based on biased observations. This might be true for instance in the description by J. Lange (*Fl. agar. dan.* 3: 78. 1938) where a faint smell of bitter almonds is noted, although the description definitely refers to *I. muricellata*.

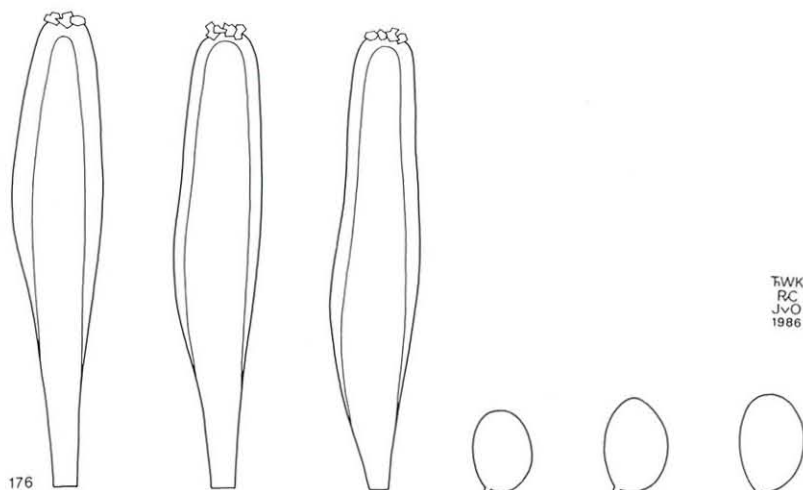
3. *Inocybe hirtella* Bres. differs in having a conspicuous smell of bitter almonds, being somewhat brighter yellow, and possessing smaller, slenderly clavate cystidia with less bright yellow walls. It never shows such conspicuous reddish tinges at the stipe apex.

#### 81. *Inocybe squamosa* Bres. — Fig. 176

*Inocybe squamosa* Bres. in *Atti Accad. Rovereto* III, 8: 129. 1902.

Pileus 10–15 mm, convex, then expanding, often umbonate, ochraceous to brownish ochraceous, almost smooth around centre, outwards densely fibrillose-squamulose, with concolorous squamules. Lamellae subdistant, sinuate, pale brown; edge subfocculose, whitish. Stipe 10–30 x 2–4 mm, subequal, yellowish, fibrillose. Context yellowish. Smell and taste indistinct.

Spores (8.5–)9.0–10.0 x 6.5–7.5  $\mu\text{m}$ , on average 9.4 x 6.9  $\mu\text{m}$ , Q = (1.2–)1.3–1.4(–1.5),



TWK  
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Fig. 176. *Inocybe squamosa*. — Spores, pleurocystidia (from holotype of *I. squamosa*).

$\bar{Q} = 1.4$ , smooth, amygdaliform, with indistinctly conical apex, remarkably broad. Pleurocystidia (64–)68–77(–78) x (14–)16–18(–21)  $\mu\text{m}$ , cylindrical, sometimes slenderly fusiform, thick-walled, with up to 2.0–2.5  $\mu\text{m}$  thick, pale to bright yellow wall, slightly crystalliferous at apex, not frequent. Cheilocystidia similar to pleurocystidia. Basidia 27–36 x 9–12  $\mu\text{m}$ , 4-spored. Caulocystidia descending to base, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Terrestrial. So far known only from the type locality. March.

COLLECTION EXAMINED. — P O R T U G A L: Setubal, III.1900, *Torrend* (holotype of *I. squamosa*, S).

Note: Closely related to *I. muricellata* Bres. from which it mainly differs in remarkably broad spores. More material of *I. squamosa* seems necessary to assess its relationship to mediterranean variants of *I. muricellata*. The macroscopical description has been copied from Bresadola (l.c.).

## 82. *Inocybe hirtelloides* Stangl & Veselský — Fig. 177

*Inocybe hirtelloides* Stangl & Veselský in Česká Mykol. 28: 211. 1974.

EXCLUDED. — *Inocybe hirtelloides* sensu Jacobsson & Stridvall in Göteborgs Svampklubb Arsskrift 1979: 14. 1979 (= *I. muricellata*).

SELECTED ICON. — Stangl & Veselský in Česká Mykol. 28: pl. 86, f. 5. 1974.

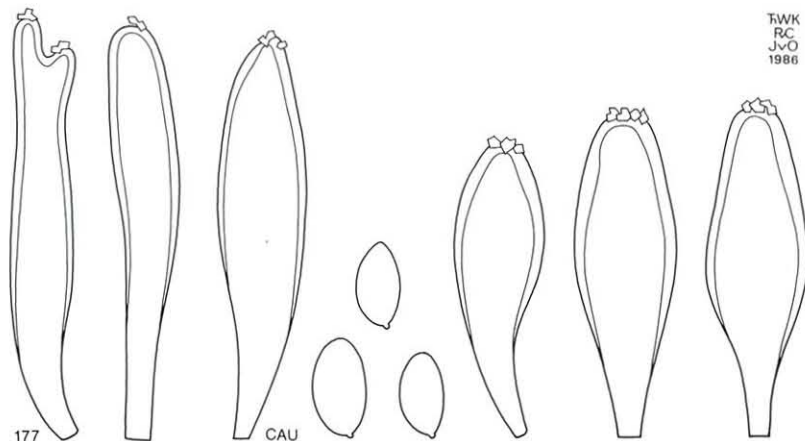
Pileus 10–25(–30) mm, conico-campanulate, soon expanding, finally plano-convex, umbonate, ochraceous-yellow, towards margin straw-yellow, smooth, subtly fibrillose, not becoming squamulose on age, even at margin not radially rimulose. Lamellae crowded, 3–4 mm broad, subventricose, narrowly adnate, when young pale greyish or yellowish-greyish, then ochraceous to brownish, sometimes with a faint olivaceous tinge; edge fimbriate, whitish. Stipe 10–25(–35) x 2–4 mm, equal to subbulbous, sometimes with an indistinctly marginate bulb, solid, pale yellow or wax-yellow, with whitish bulb, pruinose all over, but only indistinctly so in lower 1/3rd. Context whitish to pale yellowish. Smell faint, slightly acidulous, reminiscent of *Pelargonium*, never as bitter almonds.

Spores 8.0–10.5 x 5.0–5.5  $\mu\text{m}$ , on average 8.6–9.4 x 5.1–5.2  $\mu\text{m}$ ,  $Q = 1.5$ –1.9(–2.0),  $Q = 1.6$ –1.8, smooth, (sub)amygdaliform, sometimes with suprahilar depression, with conical apex. Pleurocystidia 42–55(–56) x (12–)13–18(–19)  $\mu\text{m}$ , (broadly) fusiform, to fusiform-clavate, thick-walled, with up to 2.0  $\mu\text{m}$  thick, almost colourless wall, crystalliferous at apex. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate, thin-walled, colourless. Basidia 26–31 x 7–9  $\mu\text{m}$ , 4-spored. Caulocystidia descending almost to base, distinctly different from cheilocystidia, cylindrical, 48–76 x 8–13(–15)  $\mu\text{m}$ , often somewhat irregular-flexuose, partly with bifid apex; only at apex of stipe also cheilocystidioid caulocystidia observed.

HABITAT & DISTRIBUTION. — Associated with *Tilia*. Known only from the type-locality. June–Aug.

COLLECTIONS EXAMINED. — G E R M A N Y: Bavaria, Augsburg, Wittelsbacher Park, 17.VI.1971, *Stangl* (holotype of *I. hirtelloides*, PRM), 28.VI.1978, 8.VII.1978, 15.VII.1979 & 14.VIII.1981, *Stangl* (M).

Note: The macroscopical description has been copied from *Stangl & Veselský* (l.c.). I have restricted the circumscription of this species to those specimens with rather short, colourless pleurocystidia and dissimilar caulocystidia. Several other



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Fig. 177. *Inocybe hirtelloides*. — Spores, pleurocystidia, caulocystidia (from holotype of *I. hirtelloides*).

collections, mentioned by Stangl & Veselský (l.c.) do not belong to this species but are better referred to *I. muricellata* Bres. on account of their lageniform cystidia with yellow wall and cheilocystidioid caulocystidia.

### 83. *Inocybe langei* R. Heim — Fig. 178

*Inocybe langei* R. Heim, Genre Inocybe: 335. 1931.

EXCLUDED. — *Inocybe langei* sensu J. Lange, Fl. agar. dan. 3: 78. 1938 (= *I. hirtella* var. *hirtella*).

SELECTED ICONES. — R. Heim, Genre Inocybe: pl. 16, f. 3. 1931. — Stangl in Beitr. Kenntn. Pilze Mitteleur. 1: pl. 3. 1984.

Pileus 18–31 mm, conico-convex, convex to applanate, not or only indistinctly umbonate, ochraceous to ochraceous yellow [10 YR 5/6, 6/6, sometimes more tending towards 7/6, especially in outer part], smooth to subtomentose around centre, outwards radially fibrillose but fibrils not diverging, at margin not rimulose, with age sometimes becoming minutely squamulose; velipellis absent or present but rather indistinct. Lamellae, L = 35–50, l = 1–3, crowded, 2–3 mm broad, not ventricose, rather broadly to narrowly adnate, greyish when young, then greyish buff to greyish brown [2.5 Y 6/2–6/3, but somewhat more greyish]; edge minutely fimbriate, whitish or concolorous. Stipe 14–30 x 3–5 mm, equal to submarginately bulbous, solid, almost whitish, with age with a faint yellowish or orange tinge, but not definitely reddish-tinged, pruinose all over, but only indistinctly so in lower 1/3rd. Context whitish in pileus and stipe. Smell indistinct to somewhat spermatic, especially when cut. Taste subspermatic.

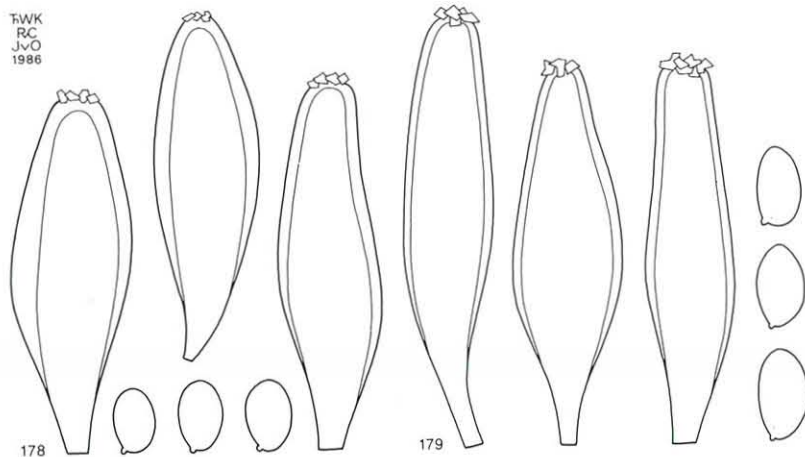


Fig. 178. *Inocybe langei*. — Spores, pleurocystidia (from *Kuyper 2191*).

Fig. 179. *Inocybe pelargonium*. — Spores, pleurocystidia (from *Kuyper 2086*).

Spores (6.0–)6.5–7.5(–8.0) x 4.0–5.0  $\mu$ m, on average 6.9–7.1 x 4.3–4.8  $\mu$ m, Q = 1.4–1.7(–1.8),  $\bar{Q}$  = 1.5–1.6, smooth, regular to subamygdaliform, with (almost) obtuse apex. Pleurocystidia (45–)46–67(–70) x (11–)13–19(–21)  $\mu$ m, slenderly clavate, subutriform or subfusiform, thick-walled, with up to 2.0  $\mu$ m thick, colourless wall, crystalliferous at apex. Cheilocystidia similar to pleurocystidia. Paracystidia clavate, thin-walled, colourless. Basidia 22–28 x 7–10  $\mu$ m, 4-spored. Caulocystidia descending (almost) to base, but scarce in lower 1/3rd of stipe, similar to cheilocystidia or somewhat more irregular, mixed with cauloparacystidia.

HABITAT & DISTRIBUTION. — Under frondose (and coniferous?) trees on calcareous soil. Associated with *Quercus*, *Salix*, *Alnus*, *Populus*, and possibly *Picea*. Widespread but rare in Europe, very rare in the Netherlands, hitherto known from only one locality. July–Sept.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Limburg, Linne, 9.VIII.1966 & 17.VII.1968, *Verschueren*, 17.VIII.1984, *Kuyper 2513*. — AUSTRIA: Tirol, Jenbach, 9.IX.1982, *Kuyper 2191*; Pöll, 11.IX.1967, *Huijsman*. — BELGIUM: prov. Limburg, Kanne, Overstbos, 28.VII.1981, *Kuyper 1645*. — DENMARK: Stavrbyskov, VIII.1937, *Lange* (C). — SWEDEN: Uppland, Uppsala, 15.VII.1938, *Lundell* (Fungi exsiccati suecici 921, PC).

Note: Easily recognised because of the combination of greyish lamellae and very small spores. Macroscopically it is not unlike *I. trechispora* (Berk.) P. Karst., which has, however, nodulose spores. *Inocybe ochroalba* Bruylants differs in having larger spores (on average more than 8.0  $\mu$ m long) and broader cystidia; *I. pelargonium* Kühner differs in having a different smell and whitish to cream lamellae. *Inocybe langei* has often been confused with *I. hirtella* Bres. var. *hirtella*, e.g. by J. Lange (Fl. agar. dan. 3: 78. 1938), but the latter species has a more squamulose pileus, whitish lamellae, a different smell and slightly larger spores. Spore measurements as given by the Danish author are, however, often somewhat too small and this might explain Lange's misinterpretation.

### 84. *Inocybe pelargonium* Kühner — Fig. 179

*Inocybe pelargonium* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 5. 1955.

*Inocybe claviger* Horak & Bas in Horak in Persoonia 11: 308. 1981.

SELECTED ICONES. — Stangl in Z. Pilzk. 37: pl. 2. 1971. — Alessio, Iconogr. mycol. 29: pl. 62, f. 2. 1980. — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 13, f. 1. 1985.

Pileus 15–40 mm, conico-convex, convex to plano-convex, without umbo or with low broad umbo, with margin inflexed when young, ochraceous yellow to ochraceous yellow-brown [7.5 YR 5/8, tending towards 4/6], smooth around disc, outwards sericeous-fibrillose, fibrils not or hardly diverging, but exceptionally subrimulose at margin, on age slightly breaking up and becoming innately squamulose, but only indistinctly so, subshiny, slightly greasy when moist; velipellis absent, exceptionally present but then indistinct. Lamellae, L = 40–60, l = 1–3, moderately crowded, 3–10 mm broad, ventricose or not, narrowly adnate to almost free, when young whitish to very pale cream, finally yellow-brown [10 YR 6/4, 2.5 Y 5/4]; edge almost even to indistinctly fimbriate, whitish or concolorous. Stipe 25–65 x 3–8 mm, often with a (sub)marginate bulb (8–11 mm), but exceptionally equal, solid, whitish to very pale yellowish, then pale ochraceous [2.5 Y 7/4], but white at bulb, pruinose all over. Cortina not observed. Context very pale yellowish in stipe, white in bulb. Smell spontaneously as leaves of *Pelargonium*, similar to that of *Cortinarius paleaceus*, but spermatic when cut. Taste indistinct.



Spores 6.5–10.0 x 4.0–5.5(–6.0)  $\mu\text{m}$ , on average 7.3–9.4 x 4.5–5.3  $\mu\text{m}$ ,  $Q = (1.4\text{--})1.5\text{--}1.9$ ,  $\bar{Q} = 1.6\text{--}1.8$ , smooth, regular to subamygdaliform, with indistinctly subconical apex. Pleurocystidia (39–)43–64(–70) x (11–)12–22  $\mu\text{m}$ , subutriform to (sub)fusiform, never tending to sublageniform, thick-walled, with up to 1.5–2.0  $\mu\text{m}$  thick, pale yellow, sometimes almost colourless wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 26–35 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia but in lower 1/3rd more irregular and less differentiated, but cauloparacystidia reaching base.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil. Associated with *Picea*, *Fagus*, *Quercus*, *Tilia*, and *Populus*. Widespread in Europe, also occurring in India. Not common in the Netherlands. May–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland: Beek-Bergh, 28.VII.1953, *Huijsman*; Doetinchem, 13.VI.1943, *Huijsman*; Steenderen, 17.VI.1953, *Huijsman*; Warnsveld, 17.VIII.1962, *Kits van Waveren*; IJsselmeerpolders, Roggebotzand, 21.V.1977, *Tjallingii-Beukers* & 9.X.1981, *Kuyper 1926*; prov. Zuid-Holland: Oegstgeest, 15.IX.1982, *Bas 7924*; Rockanje, 7.X.1980, *Kuyper 1518*; prov. Limburg, Gronsveld, 5.VIII.1981, *Kuyper 1667*. — AUSTRIA: Tirol, Innauwald near Jenbach, 9.IX.1982, *Kuyper 2200*. — BELGIUM: prov. Namur, Ave-et-Auffe, Le Roptai, 8.X.1982, *Kuyper 2284*. — FRANCE: Martignat, 27.VIII.1957, *Huijsman*; dpt. Doubs, Lougres, 14.VI.1956, *Huijsman*. — GERMANY: Eifel, Gerolstein, Papenkäule, 23.IX.1980, *Kuyper 1472*; Eifel, Gees, Salmweg, 6.VI.1981, *Tjallingii-Beukers*; Bavaria, Augsburg, Haunstetter Wald, 3.VIII.1982, *Kuyper 2086*. — INDIA: Punjab, Kulu-valley, Manali, 20.VIII.1964, *Bas 4187* (holotype of *I. claviger*, L.). — ITALY: prov. Alto Adige, Trentino, Passe di Vezzena, 30.IX.1982, *Bas 7966*. — NORWAY: Telemark, Bamble, Gømla, 6.VII.1985, *Weholt*. — SCOTLAND: co. Perthshire, Inver, The Hermitage, 26.IX.1983, *Kuyper 2440*. — SWITZERLAND: Bôle, 5.XI.1961 & 12.XI.1961, *Huijsman*; Schüpfeim, 21.IX.1953, *Huijsman*; Forêt Dames d'Othenettes, 1.IX.1966, *Huijsman*; Les Planches, 26.VIII.1959, *Huijsman*; Les Bayards, 14.IX.1959, *Huijsman*; Les Abandonnées, 12.VI.1961, *Huijsman*.

Notes: 1. *Inocybe claviger* Horak & Bas was said to differ from *I. pelargonium* in smaller spores and shorter pleurocystidia. Reinvestigation of the type showed the spores to be somewhat larger than indicated (viz. 7.5–8.5 x 4.5–5.0  $\mu\text{m}$ ). Although the pleurocystidia are on average somewhat smaller than in European collections, there is at least some overlap in this character, so that it cannot be used to separate between *I. claviger* and *I. pelargonium* either. For that reason *I. claviger* is reduced into synonymy of *I. pelargonium*.

2. The collection from Warnsveld represents albinistic specimens.

### 85. *Inocybe ochroalba* Bruylants — Figs. 180–183

*Inocybe ochroalba* Bruylants in Bull. trimest. Soc. mycol. Fr. 85: 345. ('1969') 1970.

*Inocybe subalbido-disca* Stangl & Veselský in Česká Mykol. 29: 66. 1975.

*Inocybe angulatosquamulosa* Stangl in Beitr. Kenntn. Pilze Mitteleur. 1: 95. 1984.

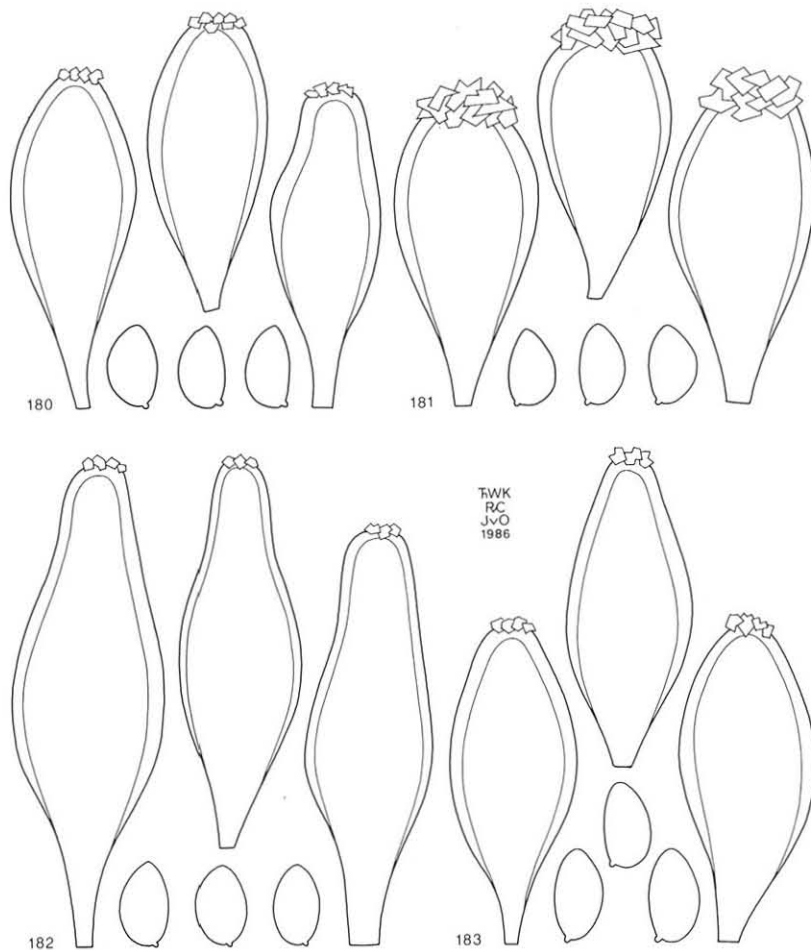
*Inocybe subhirtella* M. Bon in Docs. mycol. 14(53): 33. 1984.

*Inocybe albovelata* Reumaux in Docs mycol. 14(54–55): 13. 1984.

SELECTED ICONES. — Bruylants in Bull. trimest. Soc. mycol. Fr. 85: pl. s.n. 1970. — Stangl & Veselský in Česká Mykol. 29: pl. 87, f. 1. 1975 (as *I. subalbido-disca*). — Enderle & Stangl in Mitt. Ver. Naturw. Math. Ulm 31: 141. 1981 (as *I. subalbido-disca*). — Stangl in Beitr. Kenntn. Pilze Mitteleuropas 1: pl. 3. 1984 (as *I. angulatosquamulosa*).

Pileus 8–40 mm, conico-convex, convex, plano-convex to almost applanate, umbonate or

without umbo, with margin inflexed when young, soon straight, when young either whitish because of velipellis persisting around disc or without velipellis, underneath velipellis in centre ochraceous to ochraceous brown [10 YR 4/6, 5/4, 5/6], in outer half more ochraceous yellow [10 YR 7/6, 6/6, 2.5 Y 6/6, tending to 5/6], sericeous-smooth around centre or minutely appressedly to recurvately squamulose-subsquarrose around centre, reminiscent of



Figs. 180–183. *Inocybe ochroalba*. — Spores, pleurocystidia (180, from holotype of *I. albovelata*; 181, from holotype of *I. subalbido-disca*; 182, from isotype of *I. angulatosquamulosa*; 183, from holotype of *I. subhirtella*).

*I. squamata* or *I. margaritispora*, with tips of scales slightly darker brown, outwards radially fibrillose, with age becoming subsquamulose, with fibrils not diverging, at margin not rimulose, with velipellis sometimes extending slightly over lamellae and then with subappendingulate margin; velipellis slightly greasy and somewhat shiny. Lamellae, L = 30–50, l = 1–3, rather crowded, 1.5–6 mm broad, not ventricose to subventricose, narrowly adnate to almost free, greyish-yellowish buff when young [2.5 Y 7/2–7/4], finally yellow-brown with a faint olivaceous tinge [2.5 Y 5/4]; edge fimbriate, whitish or concolorous. Stipe 9–60 x 2–7 mm, equal to (sub)bulbous, but never marginately bulbous, solid, at first whitish, discolouring with age to pale ochraceous yellow [2.5 Y 7/4–7/6], rather often more orange-ochraceous in upper part [7.5 YR 7/6], pruinose all over, but sometimes only indistinctly so in lower 1/3rd. Cortina not observed in youngest specimens. Context yellowish in pileus, somewhat ochraceous-tinged in stipe. Smell when cut spermatic. Taste as smell.

Spores 7.5–10.0(–10.5) x 4.5–6.0  $\mu$ m, on average 8.1–9.4 x 4.8–5.7  $\mu$ m, Q = 1.4–1.8(–1.9),  $\bar{Q}$  = 1.5–1.8, smooth, subamygdaliform, with indistinct to rather distinct (sub)conical apex. Pleurocystidia 37–66(–67) x (13–)14–25(–26)  $\mu$ m, clavate to slenderly clavate, sometimes tending to subfusiform, thick-walled, with up to 2.5  $\mu$ m thick, colourless to pale yellow wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia pyriform to clavate, thin-walled, colourless, frequent. Basidia 26–37 x 7–10  $\mu$ m, 4-spored. Caulocystidia descending to base of stipe, similar to or somewhat more slender than cheilocystidia, especially in lower half of stipe somewhat irregular, mixed with cauloparacystidia all over.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees on calcareous soil. Associated with *Quercus*, *Fagus*, *Alnus*, *Picea*, and *Pinus*. Widespread in Europe, especially in the western part. Rather common in the Netherlands, mainly in the coastal dunes and the IJsselmeerpolders. April–May, Aug.–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland: Terschelling, 21.X.1982, *Kuyper* 1972, 22.X.1982, *Kuyper* 1979, 23.X.1982, *Kuyper* 1985 & 1990 & 27.X.1982, *Kuyper* 2322; Vlieland, 6.XI.1979, *Noordeloos* 1103; prov. Gelderland, Doetinchem, 27.X.1945, *Huijsman*; IJsselmeerpolders: Kinderbos, 20.XI.1982, *Jansen*; Abbertstrand, 30.IV.1983, *Tjallingii-Beukers*; Revebos, 1.VI.1985, *Tjallingii-Beukers*; Roggebotzand, 1.XI.1980, *Kuyper* 1564, 9.X.1981, *Kuyper* 1903, 1905, 1923, 1924, 1929, 1931 & 1932, 25.V.1983, *Noordeloos* 83.09; Spijk, 3.X.1981, *Kuyper* 1880; Visvijverbos, 28.VIII.1982, *Kuyper* 2132; prov. Utrecht: Driebergen, 25.VIII.1972, *Tjallingii-Beukers*; Veenendaal, 6.XI.1971, *de Kleuver* 71.098; prov. Noord-Holland: Bergen, 13.XI.1982, *Kuyper* 2335; Vogezenang, 24.X.1981, *Jansen*; prov. Zuid-Holland: Noordwijk, 15.X.1957, *Huijsman*; Rокanje, 7.X.1980, *Kuyper* 1517; Wassenaar, 19.X.1941, 6.IX.1942, *Huijsman*; prov. Zeeland: Haamstede, 29.X.1972, 1.XI.1972 & 6.XI.1972, *Huijsman*, 23.X.1982, *Kuyper* 2309; Goes, 3.XI.1984, *Kuyper* 2666; Braakman, 26.VIII.1981, *Kuyper* 1705. — BELGIUM: prov. Namur, Resteigne, Bois de Resteigne, 28.IX.1974, *Tjallingii-Beukers*. — ENGLAND: co. Surrey, Oxshott, 19.IX.1965 (K). — FRANCE: Martignat, 27.IX.1957, *Huijsman*; Semuy, 25.IX.1982, *Reumaux* (holotype of *I. albovelata*, herb. Reumaux); dpt. Somme, Cayeux-sur-Mer, bois de Brighton, 15.XI.1979, *Bon* (holotype of *I. subhirtella*, herb. Bon). — GERMANY: Niedersachsen, Melle, 23.VIII.1977, *Huijsman*; Bavaria, Augsburg, Wittelsbacher Park, 1.X.1983, *Stangl* 1408 (isotype of *I. angulatosquamulosa*, L); Unterfahlheim, 4.IX.1982, *Enderle*; Neubulach, 14.IX.1971, *Stangl* (as *I. subalbidodisca*, PRM); Oberhöfelfeld, 3.IX.1970, *Stangl* (holotype of *I. subalbidodisca*, PRM). — ITALY: prov. Alto Adige, Trentino, Alberghe di Margheri, 25.IX.1981, *Kuyper* 1843. — SCOTLAND: co. Perthshire, Inver, The Hermitage, 26.IX.1983, *Kuyper* 2441; Rannoch, Black Wood of Rannoch, 24.IX.1983, *Kuyper* 2428. — SWITZERLAND: Vanel, 22.XI.1958, *Huijsman*; Arosa, 26.VIII.1968, *Huijsman*.

Notes: 1. *Inocybe ochroalba* is very variable in its macroscopical habit due to the development of the velipellis. Specimens with a squamulose-subquarrose pileus and a distinct umbo look strikingly different from specimens with a sericeous-smooth pileus without umbo, but both variants are very similar in microscopical characters. This character difference is at least partly phenotypically determined, as both variants

are occasionally met in groups that seem to originate from one mycelium. For that reason these variants are not accorded any formal infraspecific status.

2. *Inocybe lanzei* R. Heim differs from *I. ochroalba* in possessing smaller spores with a more obtuse apex and more greyish lamellae. *Inocybe pelargonium* Kühner has a different smell, more slenderly fusiform cystidia and a stipe that often has a (sub)marginate bulb.

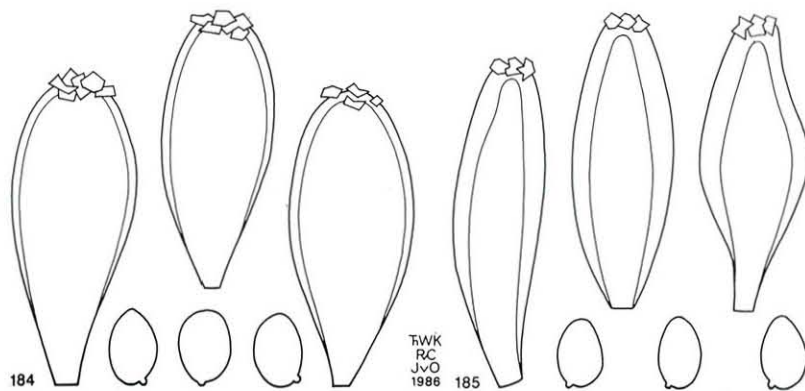
## 86. *Inocybe tenebrosa* Quél. — Figs. 184–185

*Inocybe tenebrosa* Quél. in C.R. Ass. franç. Av. Sci. (Blois 1884) 13: 279. 1885.

*Inocybe atripes* Atk. in Amer. J. Bot. 5: 210. 1918.

SELECTED ICONES. — Quél. in C.R. Ass. franç. Av. Sci. (Blois 1884) 13: pl. 8, f. 8. 1885. — R. Heim, Genre *Inocybe*: pl. 16, f. 4. 1931 (as *I. atripes*). — Stangl in Z. Pilzk. 37: pl. 1. 1971 (as *I. atripes*). — D. Reid in Fung. rar. Ic. col. 6: pl. 45a. 1972 (as *I. atripes*). — Alessio, Iconogr. mycol. 29: pl. 34. 1980 (as *I. atripes*). — Enderle & Stangl in Mitt. Ver. Naturw. Math. Ulm 31: 116. 1981 (as *I. atripes*). — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 1. f. 1. 1985 (as *I. atripes*).

Pileus 10–32 mm, conico-convex, convex to almost applanate, with or without umbo, with margin inflexed when young, soon straight, at centre brown to dark brown, in outer half brownish buff, ochraceous brown or brown, smooth around disc, becoming squamose or recurvately squarrose, outwards coarsely fibrillose to squamulose, not rimulose at margin; velipellis not observed. Lamellae, L = 35–50, l = 1–3, crowded, 1.5–4 mm broad, subventricose or not ventricose, narrowly adnate to almost free, yellowish-greyish or greyish buff, finally olive-yellow; edge fimbriate, concolorous or whitish. Stipe 17–52 x 2–6 mm, equal to subbulbous, solid, at first white, discolouring in lower half from base upwards to olivaceous blackish, pruinose all over, sometimes with raspberry-red mycelial tomentum at base. Cortina even in young specimens not observed. Context whitish, but dark brown to blackish brown in base of stipe. Smell spermatic. Taste slightly bitterish.



Figs. 184–185. *Inocybe tenebrosa*. — Spores, pleurocystidia (184, from *Bas* 3274; 185, from *Bas* 1163).

Spores 7.0–9.5(–10.0) × 4.5–6.0 μm, on average 7.8–9.2 × 4.7–5.6 μm, Q = 1.4–1.9,  $\bar{Q}$  = 1.5–1.7, smooth, subamygdaliform, with subconical apex. Pleurocystidia (35–)38–57(–66) × (10–)11–24(–25) μm, cylindrico-clavate, slenderly clavate to clavate, thick-walled, with up to 3.0 μm thick, (pale) yellow, but sometimes almost colourless wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, moderately frequent. Paracystidia pyriform to broadly clavate, thin-walled, colourless, frequent. Basidia 26–35 × 8–11 μm, 4-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia, but in lower half of stipe with dark brown, incrustated walls.

**HABITAT & DISTRIBUTION.** — Under frondose trees, in North America also under conifers. Associated with *Quercus*, *Corylus*, and *Carpinus*, in North America with *Thuja*. Widespread but uncommon in Europe, also occurring in North America. Rare in the Netherlands. July–Oct.

**COLLECTIONS EXAMINED.** — NETHERLANDS: prov. Gelderland, Neerijnen, 14.X.1980, *Kuyper 1532*; prov. Utrecht, 29.IX.1982, *Schreurs & Vellinga*; prov. Noord-Holland, Castricum, 10.VII.1952, *Maas Geesteranus 8908*; prov. Zuid-Holland, 's-Gravenhage, 20.VIII.1966, *Karman*; prov. Zeeland: Braakman, 26.VIII.1981, *Kuyper 1701*; Axel, 24.VIII.1981, *de Meijer 364*; prov. Noord-Brabant, Ginneken, 25.X.1964, *Jansen*. — CZECHOSLOVAKIA: Bohemia, Karlštejn, 3.IX.1960, *Bas 2069*. — ENGLAND: co. Bedfordshire, Sharnbrook Village, 13.X.1968, *Reid (K)*. — FRANCE: Var, Nans-les-Pins, 3.X.1960, *Huijsman*; dpt. Doubs, Lougres, 19.IX.1955, *Huijsman & 2.X.1956, Bas 1163*. — ITALY: prov. Alto Adige, Trento, Parco Gocciadoro, 20.IX.1981, *Kuyper 1855*. — SWITZERLAND: Planeyse, 5.IX.1965, *Huijsman*. — UNITED STATES: Michigan, Ogenaw Co., Ogenaw Wildlife, Sanctuary, 11.VII.1963, *Bas 3274* & 16.VII.1963, *Bas 3314*; New York, Ithaca, Triphammer Falls, 24.VI.1906, *Whetzel* (holotype of *I. atripes*, CUP).

Note: Specimens from North America are generally somewhat more slender than specimens from Europe, but they are virtually identical in microscopical respects. Atkinson (in Amer. J. Bot. 5: 211. 1918) introduced the epithet *atripes* instead of *tenebrosa*, because he had no knowledge of the cystidia in the latter species. Quélet's illustration does not, however, leave any doubt regarding its identity with *I. atripes*, and for that reason the older epithet *tenebrosa* must be reintroduced.

### 87. *Inocybe mycenoides* Kuyp., *spec. nov.* — Figs. 186–187

*Inocybe citrinifolia* Métrod in Bull. trimest. Soc. mycol. Fr. 72: 128. 1956. (inval., Art. 36.1.)

Habitat specierum *Mycenae*. Pileus 6–30 mm latus, hemisphaerico-convexus, sine umbone, ochraceo-luteus vel brunneo-aureus, radialiter fibrillosus, postremo minute squamuloso-squarrosus. Lamellae primo sulphureae, dein olivaceo-brunneae. Stipes 30–60 × 1.5–3 mm, cylindraceus, ochraceus vel rufulotinctus, ad basim pallescens, omnino pruinosis. Sporae (8.0–)8.5–10.5(–11.0) × 5.5–6.5 μm, Q = 1.5–1.8, laeves, subamygdaliformes, apice subconico. Pleurocystidia (31–)33–49(–50) × 10–16 μm, cylindracea vel fusiformia, crassiparietalia, pariete pallide lutea. Cheilocystidia pleurocystidiis similia. Caulocystidia descendunt ad basim, cheilocystidiis similia. Holotypus: *Th. W. Kuyper 2486*, 19.X.1983, estate Gunterstein, Breukelen, prov. Utrecht, Netherlands (L).

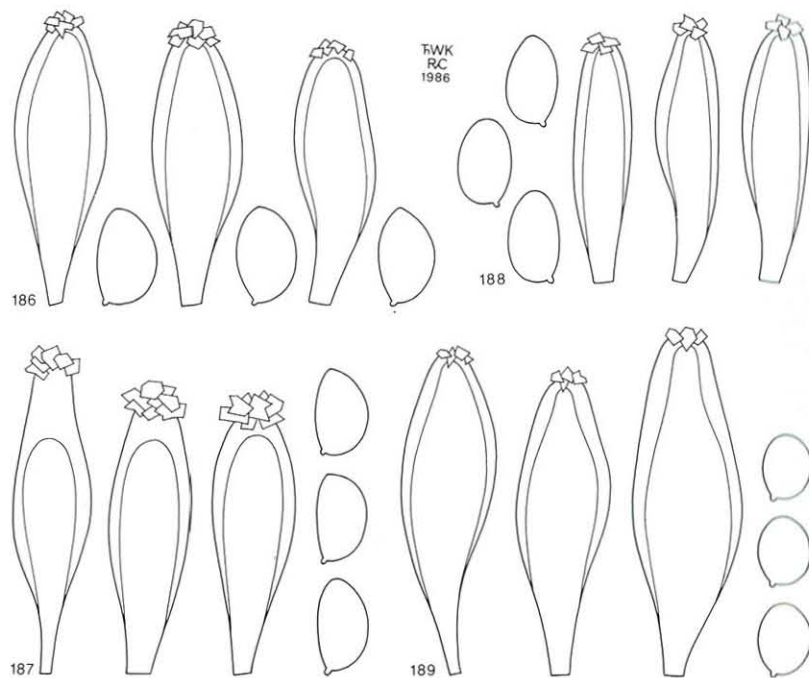
**Etymology:** mycenoides, resembling a *Mycena*, because of its habit.

Pileus 6–30 mm, hemispherical-convex, without umbo, sulphur-yellow, bright ochraceous to brownish golden [10 YR 6–7/8], coarsely radially fibrillose, but fibrils not diverging, at margin not rimulose, somewhat excoriating on age, and then squamulose-subsquarrose

around disc; velipellis not observed. Lamellae, L = 30, l = 1–3, crowded, 1.5–3 mm broad, not ventricose, adnate to almost free, when young sulphur-yellow, finally olivaceous brown [2.5 Y 4/4]; edge fimbriate, whitish. Stipe 30–60 × 1.5–3 mm, equal, somewhat flexuose, solid, ochraceous at apex [7.5 YR 6/6–6/8], sometimes with reddish tinges, pallescent downwards, whitish at base, pruinose all over. Context sordid orange ochraceous in apex of stipe. Smell when cut subspermiatic. Taste not recorded.

Spores (8.0–)8.5–10.5(–11.0) × 5.5–6.5 μm, on average 9.2–10.1 × 5.7–6.0 μm, Q = 1.5–1.8,  $\bar{Q}$  = 1.6–1.7, smooth, subamygdaliform, with subconical apex. Pleurocystidia (31–)33–49(–50) × 10–16 μm, cylindrical, slenderly cylindrico-clavate to subfusiform, thick-walled, with up to 2.5 μm thick, pale yellow wall, crystalliferous at apex, abundant. Cheilocystidia similar to pleurocystidia, abundant. Paracystidia clavate, thin-walled, colourless, moderately abundant. Basidia 23–29 × 7–9 μm, 4-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia or somewhat more clavate, mixed with cauloparacystidia.

**HABITAT & DISTRIBUTION.** — Under frondose and coniferous trees. Associated with *Tilia*, *Fagus*, and *Larix*. Very rare, known from the Netherlands and France. Oct.



Figs. 186–187. *Inocybe mycenoides*. — Spores, pleurocystidia (186. from Métrod 1186; 187. from holotype of *I. mycenoides*).

Fig. 188. *Inocybe brevicystis*. — Spores, pleurocystidia (from holotype of *I. brevicystis*).

Fig. 189. *Inocybe stangliana*. — Spores, pleurocystidia (from holotype of *I. stangliana*).

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Utrecht, Breukelen, 19.X.1983, *Kuyper 2486* (holotype of *I. mycenoides*, L.). — FRANCE: Bois de Sapois, 28.X.1940, *Métrod 1186* (as *I. citrinifolia*, herb. Métrod, PC); Forêt de la Faye, 9.X.1938, *Métrod 938* (as *I. citrinifolia*, herb. Métrod, PC).

Note: Recognisable because of its mycenoid habit, completely pruinose stipe and short, cylindrical to subfusiform cystidia. The collection from the Netherlands consisted unfortunately of one specimen only of which the lamellae were less yellow than Métrod described for his *I. citrinifolia*.

### 88. *Inocybe brevicystis* Métrod ex Kuyp., *spec. nov.* — Fig. 188

*Inocybe brevicystis* Métrod in Bull. trimest. Soc. mycol. Fr. 72: 126. 1956. (inval., Art. 36.1.)

Pileus (hemisphaerico-)convexus, indistincte umbonatus, sordide ochraceus, obscurior in centro, fibrillosus, margine rimuloso, in centro demum subsquarrosus. Lamellae ochraceae vel brunneae, margine fimbriata, albida. Stipes aequalis, pallide ochraceus, omnino pruinosis. Sporae 9.0–11.0 x (5.0–)5.5–6.5  $\mu$ m, Q = (1.5–)1.6–1.8, laeves, regulares, apice obtuso, non distincte conico. Pleurocystidia (31–)34–49(–51) x 9–14  $\mu$ m, cylindracea vel fusiformia, crassiparietalia, parietate incolori vel pallide lutea. Cheilocystidia pleurocystidiis similia. Caulocystidia descendencia ad basim, cheilocystidiis similia. Ab *I. mycenoides* differt habitu validiore, coloribus minus luteis, ab *I. ochroalba* differt cystidiis curtioribus angustioribusque, sporis cum apice subobtus. Holotypus: *G. Métrod 2400*, 3.X.1951, Château-Thierry, Saulchery, France (herb. Métrod, PC).

Etymology: brevicystis, with short cystidia.

Pileus 20–30 mm, campanulate-convex or hemispherical-convex, with or without umbo, sordid ochraceous yellow to ochraceous brown, somewhat darker at centre, smooth around disc, then subsquarrose with age, outwards radially fibrillose, at margin rimulose to rimose. Lamellae to 5 mm broad, ventricose, adnate, ochraceous, then brown; edge fimbriate, white. Stipe 20–30 x 3 mm, equal to slightly clavate, not bulbous, whitish, with age pale ochraceous, pruinose (almost) all over. Context whitish. Smell faint, subspermatric.

Sporae 9.0–11.0 x (5.0–)5.5–6.5  $\mu$ m, on average 9.6–10.0 x 5.6–6.1  $\mu$ m, Q = (1.5–)1.6–1.8, smooth, regular to subamygdaliform, with almost obtuse, exceptionally subconical apex. Pleurocystidia (31–)34–49(–51) x 9–14  $\mu$ m, cylindrical, slenderly clavate to subfusiform, thick-walled, with up to 2.0  $\mu$ m thick, almost colourless to yellowish wall, slightly crystalliferous at apex, not frequent. Cheilocystidia similar to pleurocystidia, frequent. Paracystidia broadly clavate, thin-walled, colourless, not frequent. Basidia 27–36 x 9–11  $\mu$ m, 4-spored. Caulocystidia descending from over half-way to base, rather irregular in lower half, similar to cheilocystidia in upper half.

HABITAT & DISTRIBUTION. — Under *Quercus*. Very rare in Europe, known from only two localities in France. Oct.

COLLECTIONS EXAMINED. — FRANCE: Saulchery, Château-Thierry, 3.X.1951, *Métrod 2400* (holotype of *I. brevicystis*, herb. Métrod, PC); Bois de Toges, 1.X.1980, *Reumaux*.

Notes: 1. The macroscopical description has been based on Métrod (in Bull. trimest. Soc. mycol. Fr. 72: 126. 1956) and Reumaux (in Docs mycol. 14(54–55): 5. 1984).

2. The rather short and narrow cystidia are indicative for *I. brevicystis*. *Inocybe mycenoides* Kuyp. possesses the same cystidia, but that species differs in having

a mycenoid habit and more yellow lamellae. *Inocybe ochroalba* Bruylants might show some macroscopical resemblance to *I. brevicystis*, but differs in cystidial characters and having a distinctly conical spore apex.

### 89. *Inocybe stangliana* Kuyp., *spec. nov.* — Fig. 189

Pileus plano-convexus, umbonatus, avellaneus, rufulo-tinctus, fibrillosus, versus marginem rimulosus. Lamellae subdistantes, 5 mm latae, anguste adnatae, citrinae. Stipes aequalis, sordide flavus, pruinosis paene ad basim sub lente. Odor leviter suavis. Sporae (5.5–)6.0–7.0 x 4.5–5.0(–5.5)  $\mu$ m, Q = (1.2–)1.3–1.4(–1.5), laeves, regulares vel subamygdaliformes, apice subobtus vel subconico. Pleurocystidia (41–)44–51(–53) x (14–)15–18  $\mu$ m, late fusiformia, nonnulla clavata, crassiparietalia, pariete incolori vel pallide lutea. Cheilocystidia pleurocystidiis similia. Caulocystidia descendencia ad basim, cheilocystidiis similia. Holotypus: *J. Stangl*, 17.VIII.1984, Siebentschwald, Augsburg, Bavaria, German Federal Republic (L, isotypus in M).

Etymology: dedicated to Mr J. Stangl (Augsburg) in honour of his outstanding contributions to the taxonomy of the genus.

Pileus 30 mm, plano-convex with rather conspicuous umbo, hazel-brown, mixed with faint reddish tinges, smooth around centre, outwards radially fibrillose, with fibrils slightly diverging and rimulose at margin. Lamellae subdistant, 5 mm broad, narrowly adnate, lemon-yellow; edge fimbriate, concolorous. Stipe 30 x 4 mm, equal or slightly broadened at apex, dirty yellowish, pruinose over greater part under lens. Context whitish, yellowish in pileus, somewhat more buff in stipe. Smell faint, reminiscent of fruit.

Sporae (5.5–)6.0–7.0 x 4.5–5.0(–5.5)  $\mu$ m, on average 6.4 x 4.8  $\mu$ m, Q = (1.2–)1.3–1.4(–1.5), Q = 1.3, smooth, regular to subamygdaliform, with subobtus to indistinctly subconical apex. Pleurocystidia (41–)44–51(–53) x (14–)15–18  $\mu$ m, broadly fusiform, sometimes more subutriform to clavate, thick-walled, with up to 2.0(–2.5)  $\mu$ m thick, almost colourless to pale yellow wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia clavate, thin-walled, colourless, abundant. Basidia 22–27 x 7–9  $\mu$ m, 4-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia and mixed with cauloparacystidia, but somewhat irregular and less thick-walled in lower 1/3rd of stipe.

HABITAT & DISTRIBUTION. — Under *Fagus*. Known only from the type locality. Aug.

COLLECTION EXAMINED. — GERMANY: Bavaria, Augsburg, Siebentschwald, 17.VIII.1984, *Stangl* (holotype of *I. stangliana*, L).

Note: I certainly do not advocate describing new species based on the type-collection solely. However, *I. stangliana* is so distinctive in both macro- and microscopical characters that there can hardly be any doubt regarding its specific autonomy.

### 90. *Inocybe roseipes* Malenç. — Fig. 190

*Inocybe roseipes* Malenç. in Mal. & Bert., Fl. Champ. sup. Maroc 1: 395. 1970.  
SELECTED ICON. — Mal. & Bert., Fl. Champ. sup. Maroc 1: pl. 15. 1970.

Pileus 20–40 mm, campanulate, then conical, indistinctly umbonate, sordid ochraceous, somewhat paler and more greyish around centre because of velipellis, smooth around centre,

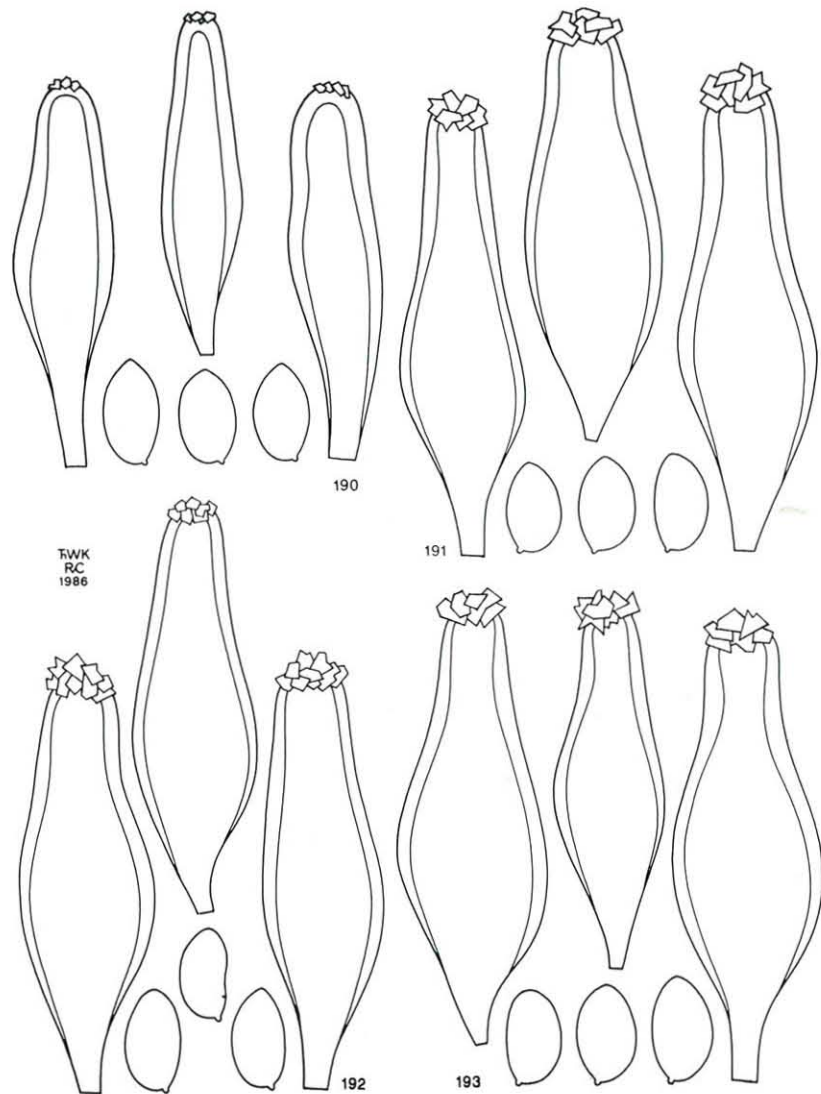


Fig. 190. *Inocybe roseipes*. — Spores, pleurocystidia (from holotype of *I. roseipes*).  
Figs. 191–193. *Inocybe splendens*. — Spores, pleurocystidia (191, from Kuyper 2215; 192, from holotype of *I. alluvionis*; 193, from Rubers 11.X.1981).

outwards radially fibrillose to lanate, at margin subrimulose. Lamellae moderately crowded, narrowly adnate, greyish, then sordid ochraceous with a faint olivaceous tinge. Stipe 35–55 x 5–8 mm, equal to somewhat broadened at base but without marginate bulb, solid, pinkish red at apex, pallescent downwards but pinkish tinges conspicuous over greater part, whitish at base, pruinose in upper part (but probably pruinose all over). Cortina not observed. Context whitish in pileus, pinkish in stipe. Smell faintly spermatic. Taste unknown.

Spores (8.5–)9.0–10.5 x (5.0–)5.5–6.5  $\mu$ m, on average 9.8 x 5.8  $\mu$ m, Q = 1.6–1.8,  $\bar{Q}$  = 1.7, smooth, (sub)amygdaliform, with distinctly conical apex. Pleurocystidia (53–)55–58(–62) x (12–)13–17  $\mu$ m, cylindrical to subfusiform, thick-walled, with up to 3.0  $\mu$ m thick, colourless wall, crystalliferous at apex, abundant. Cheilocystidia similar to pleurocystidia. Paracystidia clavate, thin-walled, colourless. Basidia 28–33 x 8–10  $\mu$ m, 4-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Under coniferous trees. Associated with *Pinus* and *Cedrus*. Known only from the Mediterranean Region (Morocco, Spain). April, Nov.

COLLECTION EXAMINED. — MOROCCO: Azrou, 13.XI.1944, Malençon 1541 (holotype of *I. roseipes*, MPU).

Note: The macroscopical description of this species has been copied from Malençon & Bertault (Fl. Champ. sup. Maroc 1: 393–396. 1970).

Macroscopically it resembles *I. sindonia* (Fr.) P. Karst., but it differs in having a conspicuous pinkish-reddish stipe, no cortina, and larger spores.

### 91. *Inocybe splendens* R. Heim

*Inocybe splendens* R. Heim, Genre *Inocybe*: 328. 1931.

*Inocybe terrifera* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 6. 1955.

*Inocybe phaeoleuca* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 5. 1955.

*Inocybe alluvionis* Stangl & Veselský in Česká Mykol. 30: 77. 1976.

*Inocybe castanea* Velen., Česká Houby: 375. 1920, non *I. castanea* Peck 1904.

#### KEY TO THE VARIETIES OF *I. SPLENDENS*

1. Basidiocarps robust, IS = (2–)3–7(–10); pileus yellowish buff, ochraceous brown to (dark) brown, often covered with a viscid velipellis with adhering earth. . . . . var. *splendens*, p. 216
1. Basidiocarps slender, IS = (6–)8–17(–20); pileus brown to blackish brown, velipellis absent or indistinct, without adhering earth. . . . . var. *phaeoleuca*, p. 217

Note: Although the extreme variants of *I. splendens*, *I. terrifera*, and *I. phaeoleuca* are very different, they are united here as there are no microscopical differences between these taxa, and the macroscopical differences are at least partly phenotypically determined. Besides, several locally adapted ecotypes have been found. Recognition on specific level would ultimately result in a rather large number of species, the majority of these with a local distribution, but such a taxonomy would hardly possess any predictive value. Considering the above, it appears unavoidable to accept only one species with two rather well-delimited varieties.

91.1. *I. splendens* var. *splendens* — Figs. 191–192

*Inocybe splendens* R. Heim — *Inocybe terrifera* Kühner — *Inocybe alluvionis* Stangl & Veselský

MISAPPLIED NAMES. — *Inocybe fulvida* sensu Schweers in Fungus 15: 2. 1944.

*Inocybe phaeoleuca* sensu Furrer-Ziogas in Schweiz. Z. Pilzk. 43: 21. 1965; sensu Stangl in Z. Pilzk. 37: 28. 1971.

SELECTED ICONES. — R. Heim, *Fenae Inocybe*: pl. 16, f. 1. 1931. — Furrer-Ziogas in Schweiz. Z. Pilzk. 43: pl. 1, f. 5–7. 1965 (as *I. phaeoleuca*). — Stangl in Z. Pilzk. 37: pl. 7. 1971 (as *I. phaeoleuca*). — Stangl & Veselský in Česká Mykol. 30: pl. 90, f. 5. 1976 (as *I. alluvionis*). — Alessio, Iconogr. mycol. 29: pl. 63. 1980 (as *I. terrifera*).

Pileus 23–78 mm, convex, soon spreading, plano-convex or applanate, with strongly inflexed margin when young, later with straight margin, with conspicuous but low broad umbo, sometimes without umbo, yellowish buff [2.5 Y 7/6], brownish ochraceous [10 YR 5/6, 6/6] to (dark) brown [10 YR 4/4, 4/6] around centre, on outer half often somewhat darker, especially in pale-coloured specimens, sericeous-fibrillose, with fibrils mostly not or hardly diverging, but sometimes radially rimulose-subrimose, slightly breaking up with age and then seemingly recurvately subsquamulose-subsquamosa; initially covered with a whitish, shiny, somewhat viscid velipellis with adhering earth, persisting around disc and with scattered patches near margin, exceptionally without velipellis and pileus then smooth and generally with rather darker colours especially around centre. Lamellae, L = 45–70, l = 1–3, crowded, 3–9 mm broad, (sub)ventricose, rather narrowly adnate to almost free, but sometimes more broadly adnate, sordid whitish when young, then greyish yellow [2.5 Y 6/4, 5/4], finally yellow-brown [2.5 Y 4/4], sometimes with an olivaceous tinge; edge fimbriate, whitish or concolorous, Stipe 21–95 x 4–13 mm, sometimes equal, but often submarginately to distinctly marginately bulbous, solid, whitish, discolouring to pale ochraceous yellow [2.5 Y 8/4–7/6] or pale brownish, especially in lower part, but with whitish bulb, in one collection with delicate violaceous tinges in lower half, in another collection discolouring to dark brown in lower half, pruinose (almost) all over, but often inconspicuously so on lower 1/3rd. Cortina not observed in young specimens. Context whitish in pileus, pale ochraceous yellow in stipe. Smell spontaneously as *Amanita phalloides*, but sometimes more reminiscent of leaves of *Pelargonium*, spermiatic when cut. Taste not distinct.

Spores 8.0–11.5(–12.0) x 5.0–6.5(–7.0)  $\mu$ m, on average 8.8–10.3 x 5.2–6.4  $\mu$ m, Q = 1.5–1.9,  $\bar{Q}$  = 1.6–1.8, smooth, (sub)amygdaliform, partly with suprahilar depression, with subconical apex. Pleurocystidia (49–)50–82 x 14–27(–29)  $\mu$ m, clavate, fusiform to utriform, never lageniform, thick-walled, with up to 3.0  $\mu$ m thick, almost colourless to pale yellowish wall, rather heavily crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia pyriform, thin-walled, colourless, frequent. Basidia 25–38 x 8–12  $\mu$ m, 4-spored. Caulocystidia descending (almost) to base of stipe, similar to cheilocystidia but scarce and rather irregular in lower half of stipe, mixed with cauloparacystidia throughout.

HABITAT & DISTRIBUTION. — Under frondose trees on calcareous sand and clay. Associated with *Fagus*, *Quercus*, *Tilia*, *Betula*, *Populus*, *Alnus*, and *Salix*. Widespread in Europe, especially in the western part. Not uncommon in the Netherlands on alluvial clay, but also in the calcareous coastal dunes. June–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland: Doetinchem, 17.X.1952, *Huijsman*; Steenderen, 22.X.1947, *Huijsman* & 10.X.1981, *Piepenbroek* 1250; Valburg, 3.XI.1938, *Schweers*, 5.X.1941, *Schweers* & 25.IX.1954, *Bas* 651; prov. Utrecht: Utrecht, 22.IX.1981, *Schreurs* 634, 29.IX.1982, *Vellinga* 477; prov. Zuid-Holland: Leiden, 27.VIII.1959, *Bas* 1739, 28.VII.1960, *Bas* 1976, 15.VIII.1962, *Bas* 2601, 31.VII.1981, *Kuyper* 1654 & 15.IX.1982, *Kuyper* 2215; Oegstgeest, 1.IX.1982, *Bas* 7905; Oostvoorne, 7.X.1980, *Kuyper* 1512, 1513, 1515 & 1516; Rotterdam, 17.IX.1960, *Bas* 2199; Voorschoten, 5.X.1980, *Kuyper* 1507, 23.VII.1981,

*Kuyper* 1628 & 20.IX.1981, *Bas* 7787; Wassenaar, 2.IX.1982, *Kuyper* 2140; prov. Zeeland: Clinge, 15.X.1981, *de Meijer* 460; Hulst, 21.IX.1981, *de Meijer* 400; Oostburg, 7.VII.1980, *de Meijer* 75. — AUSTRIA: Tirol, Jenbach, Innauwald, 9.IX.1982, *Kuyper* 2193. — FRANCE: Dpt Seine & Oise, Parc de Saint Germain, 31.X.1959, *Romagnesi* 59.262 (herb. Romagnesi). — GERMANY: Bavaria, Augsburg, Göggingen, 28.VI.1968, *Stangl* (holotype of *I. alluvionis*, PRM) & 3.VII.1968, *Stangl* (as *I. alluvionis*, PRM); Augsburg, Siebentisch Park, 12.IX.1983, *Stangl*. — ITALY: prov. Alto Adige, Trento, Sopramonte, 24.IX.1981, *Kuyper* 1821.

Notes: 1. The collection from France is characterised by the complete lack of pleurocystidia and the extreme scarcity of cheilocystidia. More material of this variant seems needed for a better evaluation of the relevance of this character state difference.

2. *Inocybe splendens* var. *splendens* is rather variable in outward aspect and in colour of the pileus. Specimens with a well-developed viscid velipellis are rather pale and bear conspicuous clods of earth, whereas specimens with a weakly developed, more innate velipellis are much darker (even to dark brown) and have a smooth pileus. The former type is especially encountered on clayey soils and seems somewhat more xerophytic. This type probably consists of several locally adapted ecotypes.

3. Considering the rather robust specimens as depicted by Furrer-Ziogas (in Schweiz. Z. Pilzk. 43: pl. 1, f. 5–7. 1965) and Stangl (in Z. Pilzk. 37: pl. 7. 1971), I am convinced that their specimens refer to var. *splendens*, and not to var. *phaeoleuca*. Furrer-Ziogas (l.c.) also depicted clods of earth which is another indication of his misapplication. His statement that *I. terrifera* and *I. phaeoleuca* are extremely close and may probably not deserve specific rank, is correct.

91.2. *I. splendens* var. *phaeoleuca* (Kühner) Kuyper, *comb. & stat. nov.* — Fig. 193

*Inocybe phaeoleuca* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 5. 1955 (basionym).

*Inocybe castanea* Velen., non *I. castanea* Peck

EXCLUDED. — *Inocybe phaeoleuca* sensu Furrer-Ziogas in Schweiz. Z. Pilzk. 43: 21. 1965 (= *I. splendens* var. *splendens*); sensu Stangl in Z. Pilzk. 37: 28. 1971 (= *I. splendens* var. *splendens*).

MISAPPLIED NAME. — *Inocybe brunnea* sensu Konr. & M., Ic. sel. Fung. 1: pl. 76. 1930.

SELECTED ICONES. — Konr. & M., Ic. sel. Fung. 1: pl. 76. 1930 (as *I. brunnea*). — Alessio, Iconogr. mycol. 29: pl. 66. 1980 (as *I. phaeoleuca*). — Mos. & Jülich, Farbatl. Basidiomyc.: pl. 14. f. 1. 1985 (as *I. phaeoleuca*).

Pileus 12–46 mm, conico-convex or campanulato-convex with strongly inflexed margin when young, soon spreading, becoming convex, plano-convex to applanate, not umbonate or with low broad umbo, very dark (reddish) brown to almost blackish brown around centre [5–7.5 YR 2/1, 2/2, 3/2, 3/3], at margin brown to dark brown [7.5 YR 3/3, 4/2–4], smooth around disc, outwards sericeous-fibrillose, with fibrils not or slightly diverging, sometimes rimulose at margin, with age slightly breaking up and then recurvately subsquamulose to even subsquarrose; velipellis absent or present, but then indistinct and causing slight greyish hue, without adhering clods of earth. Lamellae, L = 30–60, l = 1–3, somewhat crowded, 2–5 mm broad, (sub)ventricose, rather broadly to narrowly adnate, sometimes almost free, whitish when young, then pale ochraceous buff, finally ochraceous brown [2.5 Y 5/4], sometimes with an olivaceous tinge; edge fimbriate, whitish or concolorous. Stipe 21–59 x 2–7 mm, mostly equal, sometimes subbulbous but never marginately bulbous, solid, at first (almost) pure white (conspicuously contrasting with pileus), slightly discolouring with age to pale ochraceous [10 YR 8/6, or slightly paler], but in one collection discolouring in lower half to ochraceous brown [10 YR 5/6] and at base even dark brown [7.5 YR

4/4–3/4], pruinose all over but pruina sometimes difficult to see in lower 1/3rd. Cortina not observed in young specimens. Context whitish. Smell spontaneously faint, sometimes reminiscent of leaves of *Pelargonium* or as *Amanita phalloides*, but (sub)spermatric when cut. Taste indistinct.

Spores 8.0–11.5 x 5.0–6.5  $\mu\text{m}$ , on average 8.8–10.6 x 5.2–6.3  $\mu\text{m}$ ,  $Q = (1.4\text{--})1.5\text{--}1.9$ ,  $\bar{Q} = 1.6\text{--}1.8$ , smooth, (sub)amygdaliform, a few with indistinct suprahilar depression, with subconical apex. Pleurocystidia (49–) 50–74(–78) x 12–21(–22)  $\mu\text{m}$ , fusiform to utriform, sometimes slenderly clavate, exceptionally sublageniform, thick-walled, with up to 2.0(–2.5)  $\mu\text{m}$  thick, (almost) colourless wall, rather heavily crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia, rather frequent. Paracystidia spheropedunculate to pyriform, thin-walled, colourless, frequent. Basidia 24–30 x 8–11  $\mu\text{m}$ , 4-spored, a few 2-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia, but rather irregular in lower 1/4th of stipe and there less thick-walled, mixed with cauloparacystidia throughout.

HABITAT & DISTRIBUTION. — Under frondose trees, sometimes also under coniferous trees, on calcareous sand and loam. Associated with *Fagus*, *Quercus*, *Carpinus*, *Betula*, *Populus*, *Alnus*, *Salix cinerea*, *S. repens*, and *Pinus*. Widespread in Europe, also occurring in North America, rather uncommon in the Netherlands. June–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Friesland, Terschelling, 18.X.1981, *Kuyper 1967*; prov. Gelderland: Doetinchem, 28.IX.1952 & 27.VI.1953, *Huijsman*; Buren, 8.VII.1981, 11.X.1981 & 5.IX.1982, *Rubers*; prov. Noord-Holland: Castricum, 2.XI.1984, *Kuyper 2671*; Schoorl, 12.VI.1984, *Kaag*; prov. Zuid-Holland, Oostvoorne, 4.XI.1981, *Kuyper 2015*; prov. Zeeland, Haamstede, 6.XI.1972, *Huijsman*. — BELGIUM: prov. Namur, Avel-et-Auffe, Le Roptai, 2.X.1984, *Kuyper 2619*; Dourbes, Tiène-au-Pauquis, 1.X.1984, *Kuyper 2610 & 2614*; Nismes, 30.IX.1984, *Kuyper 2602*. — CZECHOSLOVAKIA: Bohemia, Karlštejn, VII.1916, Velenovský (holotype of *I. castanea*, PRC); Jiloviště, V.1919, Velenovský (as PRC, *I. castanea*). — FRANCE: Dpt Aisne, Oigny en Valois, Forêt de Retz, 9.VII.1974, *Romagnesi 74.66* (herb. Romagnesi). — GERMANY: Bavaria, Augsburg, Siebentisch Park, 2.VIII.1982, *Kuyper 2082*; Augsburg, Witeltsbacher Park, 5.VIII.1982, *Kuyper 2118*. — HUNGARY: Sződ, 13.IX.1981, *Kuyper 1778*. — SWITZERLAND: Bôle, 5.XI.1961, *Huijsman*; Forêt Dames d'Othenetten, 1.IX.1966, *Huijsman*; Vaumarcus, 7.IX.1960, *Huijsman*; Planeyse, 5.IX.1965, *Huijsman*.

## 92. *Inocybe vaccina* Kühner — Fig. 194

*Inocybe vaccina* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 7.1955.

SELECTED ICONES. — Stangl & Veselský in Česká Mykol. 30: pl. 90, f. 3. 1976. — Alessio, Iconogr. mycol. 29: pl. 68. 1980.

Pileus 7–30 mm, plano-convex, with obtuse umbo, bright orange-brown to fulvous orange [Seguy 202–203, at centre 191–193], radially fibrillose, becoming minutely squamulose with age, at margin rimulose; velipellis present, somewhat persisting around centre. Lamellae,  $L = 40\text{--}45$ ,  $l = 1\text{--}3$ , moderately crowded, to 4 mm broad, subventricose, adnate, whitish, then yellowish, finally rusty orange-brown; edge fimbriate, whitish. Stipe 12–29 x 2–4 mm, somewhat clavate downwards, but without bulb, solid, pale orange flesh-coloured [Seguy 215, 246, 247, 194], especially with age, indistinctly pruinose for the greater part. Context whitish. Smell indistinct.

Spores 8.5–10.0 x 5.0–6.0  $\mu\text{m}$ , on average 8.9–9.3 x 5.2–5.6  $\mu\text{m}$ ,  $Q = 1.6\text{--}1.8$ ,  $\bar{Q} = 1.7$ , smooth, regular to subamygdaliform, partly with a suprahilar depression, with (sub) conical apex. Pleurocystidia (50–)55–66(–72) x 13–19(–21)  $\mu\text{m}$ , cylindrical to fusiform, sometimes subutriform, thick-walled, with up to 2.5(–3.0)  $\mu\text{m}$  thick, almost colourless to slightly yellowish-tinged wall, crystalliferous at apex, rather frequent. Cheilocystidia similar to pleurocystidia,

rather frequent. Paracystidia clavate, thin-walled, colourless, frequent. Basidia 24–31 x 8–10  $\mu\text{m}$ , 4-spored. Caulocystidia descending almost to base of stipe, similar to cheilocystidia, but just above base rather irregular, mixed with cauloparacystidia almost throughout.

HABITAT & DISTRIBUTION. — Under frondose and coniferous trees. Associated with *Quercus* and *Picea*. Apparently very rare in Europe. Known from one locality in the Netherlands. May, Sept.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Noord-Holland, Bakkum, 29.V.1983, *van de Bergh*. — SWITZERLAND: St Aubin, 27.X.1967, *Huijsman*; Unterägeri, Zugerberg, 8.IX.1976, *Tjallingii-Beukers*; Kanton Vaud, Pont-de-Nant sur Bex, 6.IX.1984, *Kuyper 2521*.

Note: Easily recognised because of conspicuous bright orange tinges in pileus. *Inocybe tjallingiorum* Kuyp. has a brown pileus, an orange-brown stipe and spores with an almost obtuse apex.

## 93. *Inocybe glabrescens* Velen. — Fig. 195

*Inocybe glabrescens* Velen., České Houby: 373. 1920.

*Inocybe metrodii* Stangl & Veselský in Česká Mykol. 33: 220. 1979.

SELECTED ICONES. — Velen., České Houby: pl. 61, f. 4. 1920. — Stangl & Veselský in Česká Mykol. 33: 221. 1979 (as *I. metrodii*).

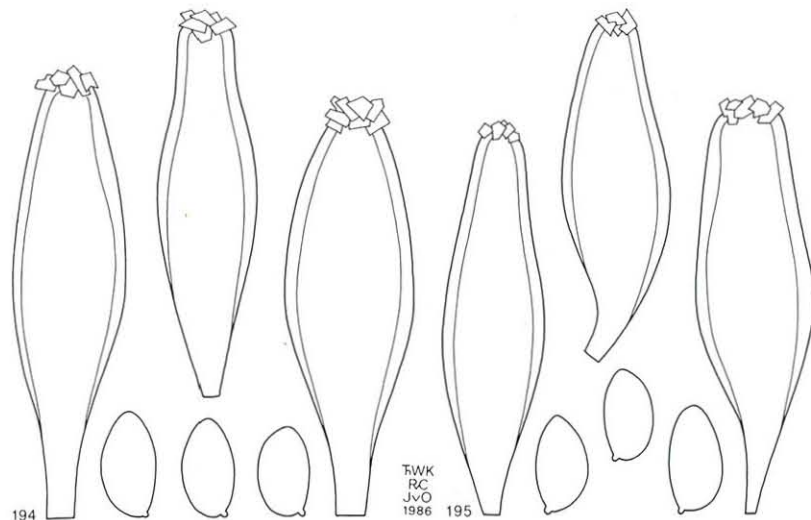


Fig. 194. *Inocybe vaccina*. — Spores, pleurocystidia (from Van de Bergh).

Fig. 195. *Inocybe glabrescens*. — Spores, pleurocystidia (from holotype of *I. metrodii*).

Pileus 20–50(–60) mm, conico-convex, convex to plano-convex, with low, broad umbo or with conspicuous umbo, (dark) brown, somewhat paler towards margin, smooth around centre, outwards radially fibrillose, at margin radially rimose; velipellis indistinct. Lamellae moderately crowded, 4–6 mm broad, narrowly adnate, whitish, then yellowish or brownish; edge fimbriate, white. Stipe 30–60 x 2–6(–8) mm, equal, not or hardly thickened at base, solid, whitish, discolouring with age to yellowish, pruinose throughout but most conspicuously so in upper half. Cortina not observed in young specimens. Context whitish in pileus, yellowish in stipe. Smell indistinct. Taste not recorded.

Spores 8.0–10.0 x 5.0–6.0(–6.5)  $\mu\text{m}$ , on average 9.2 x 5.8  $\mu\text{m}$ ,  $Q = 1.5\text{--}1.9$ ,  $\bar{Q} = 1.6\text{--}1.8$ , smooth, subamygdaliform, with subconical apex. Pleurocystidia (47–)48–64(–67) x 14–18  $\mu\text{m}$ , slenderly fusiform, subutriform or indistinctly sublageniform, thick-walled, with up to 2.0(–2.5)  $\mu\text{m}$  thick, (almost) colourless wall, at apex crystalliferous. Cheilocystidia similar to pleurocystidia. Paracystidia clavate, thin-walled, colourless. Basidia 25–30 x 9–10  $\mu\text{m}$ , 4-spored. Caulocystidia descending to base of stipe, similar to cheilocystidia.

HABITAT & DISTRIBUTION. — Under conifers at road-side. Very rare in Central Europe. July–Oct.

COLLECTIONS EXAMINED. — C Z E C H O S L O V A K I A: Bohemia, Mnichovice, VIII.1915, *Velenovský* (lectotype of *I. glabrescens*, design. mihi, PRC). — G E R M A N Y: Landsberg, Kaltenberg, 20.X.1973, *Stangl* (holotype of *I. metrodii*, PRM).

Notes: 1. The macroscopical description has for the greater part been copied from Stangl & Veselský (in *Česká Mykol.* 33: 220. 1979). Except in macroscopical habit (presence of a conspicuous umbo) there are not much differences between the types of *I. glabrescens* and *I. metrodii*. The protologue of *I. metrodii* mentions an association with *Pinus*, whereas the German translation suggests an association with *Picea*. See also comments under *I. abietis* Kühner (p. 221).

2. *Inocybe glabrescens* differs from *I. vaccina* Kühner in less bright colours and more distinctly radially rimose margin of pileus. *Inocybe splendens* R. Heim var. *phaeoleuca* (Kühner) Kuyp. has a much darker pileus and is hardly or not radially rimulose at margin.

## EXCLUDED SPECIES AND NOMINA DUBIA

**abietis.** — *Inocybe abietis* Kühner in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 3. 1955.

I did not succeed in obtaining the type on loan. Neither did I see collections completely conforming to Kühner's description. Judging from the protologue *I. abietis* comes close to *I. glabrescens* Velen. For the time being the identity of the species must remain doubtful.

**aemula.** — *Agaricus aemulus* Britz. in Ber. naturw. Ver. Augsburg 28: 155. 1885. — *Inocybe aemula* (Britz.) Sacc., Syll. Fung. 5: 785. 1887.

Type non-existing. The description is too short as to allow a reasonable guess as to its identity. Stangl & Bresinsky (in *Z. Mykol.* 47: 238. 1981) suggested that it might be a form of *I. dulcamara* (Pers.) Kumm., but this seems unlikely in view of the smooth pileus.

**albido-incarnata.** — *Agaricus albido-incarnatus* Britz. in Bot. Zbl. 54(15–17): 67. 1893. — *Inocybe albido-incarnata* (Britz.) Sacc., Syll. Fung. 11: 53. 1895. — *Ripartites albido-incarnatus* (Britz.) Métrod in Rev. Mycol. 11: 76. 1946.

Type non-existing. The species belongs in the genus *Ripartites* as *R. albido-incarnatus* (Britz.) Métrod.

**annulata.** — *Inocybe annulata* Velen., *České Houby*: 371. 1920.

Lectotype (design. Kuyp. in *Persoonia* 12: 378. 1985): Czechoslovakia, Bohemia, Mnichovice, VII.1919, *Velenovský* (PRC). This collection represents *Agrocybe erebia* (Fr.: Fr.) Kühner.

**apicrea.** — *Agaricus apicreus* Fr., *Epicr.*: 188. 1838. — *Inocybe apicrea* (Fr.) Roze in Bull. Soc. bot. Fr. 23: 113. 1876. — *Flammula apicrea* (Fr.) Gillet, *Hyménomycètes*: 119. 1876. — *Pholiota apicrea* (Fr.) Mos. in *Gams, Blätter- und Bauchpilze*, 1. Aufl.: 195. 1953 (inval., Art. 33.2).

Type non-existent. The species comes close to (or is identical with) *Pholiota alnicola* (Fr.) Sing.

**asinina.** — *Agaricus asininus* Kalchbr. in Fr., *Hymenomyc. eur.*: 230. 1874. — *Inocybe asinina* (Kalchbr.) Kalchbr., *lc. sel. Hymenomyc. Hung.*: 38. 1875.

I failed to locate the type. Judging from Kalchbrenner's illustration (pl. 22, f. 1) it seems likely that this species does not belong to the genus *Inocybe*.

**autumnalis.** — *Inocybe autumnalis* Velen., *České Houby*: 372. 1920. — *Agrocybe autumnalis* (Velen.) Kuyp. in *Persoonia* 12: 378. 1985.

Holotype: Czechoslovakia, Kosor, X.1919, *Velenovský* (PRC). The holotype represents an autonomous species in the genus *Agrocybe*, as *A. autumnalis* (Velen.) Kuyp.

**avellana.** — *Inocybe avellana* Kumm., *Führ. Pilzk.*: 79. 1871, non *I. avellana* Y. Kobay. 1952.

Type non-existent. The description is too short to allow a reasonable determination.



**avenacea.** — *Inocybe avenacea* Velen., České Houby: 387. 1920.

Holotype: Czechoslovakia, Bohemia, Mnichovice, VII.1918 (PRC). The species belongs to *Lepiota* sect. *Lepiota*, where it keys out near *L. clypeolaria* (Bull.: Fr.) Kumm. The bad state does not permit a reliable identification.

**basicitrata.** — *Inocybe basicitrata* J. Schaeff. in Ber. bayer. bot. Ges. 27: 208. 1947 (inval., Art. 36.1).

I have not studied authentic material. The description is too scanty to allow a reliable determination.

**birra.** — *Agaricus birrus* Fr., Epicr.: 324. 1838. — *Inocybe birra* (Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 469. 1879. — *Hebeloma birrum* (Fr.) Sacc., Syll. Fung. 5: 794. 1887.

Type non-existent. The species belongs to the genus *Hebeloma* (Fr.) Kumm.

**bresadoliana.** — *Inocybe bresadoliana* M. Bon in Docs mycol. 12(48): 44. ('1982') 1983; nom. nov. for *I. fuscidula* Bres. 1930, non *I. fuscidula* Velen. 1920.

I failed to obtain type material. Its identity must remain dubious for the time being. Judging from Bresadola's description (Iconogr. mycol. 15: pl. 735. 1930) it comes close to *I. abjecta* (P. Karst.) Sacc. or *I. nitidiuscula* (Britz.) Sacc.

**brevipes.** — *Inocybe tigrina* f. *brevipes* R. Heim, Genre Inocybe: 232. 1931.

Type non-existent. Judging from the description it seems only an insignificant variant of *I. flocculosa* (Berk. →) Sacc.

**bulbillosa.** — *Inocybe deglubens* var. *bulbillosa* R. Heim, Genre Inocybe: 206. 1931.

Type non-existent. The description and illustration are not sufficiently clear to allow a determination.

**caesariata.** — *Agaricus caesariatus* Fr., Epicr.: 176. 1838. — *Inocybe caesariata* (Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 459. 1879.

Type non-existent. *Inocybe caesariata* has been variously interpreted. The protologue refers to a species with a rimose pileus and a completely pruinose stipe. In my opinion this description suggests a nodulose-spored species, e.g. *I. trechispora* (Berk.) P. Karst. or *I. praetervisa* Quél. Later, however, Fries (Ic. sel. Hymenomyc. 2: 8, pl. 109, f. 3. 1877) described and depicted a variety of *A. caesariatus* that he called var. *fibrillosus*. This taxon is a member of subgen. *Mallocybe* Kuyp., and was incorrectly taken as the type of *I. caesariata* by Heim (Genre Inocybe: 167. 1931), and this interpretation of *I. caesariata* as a member of subgen. *Mallocybe* unfortunately has since then become dominant in the mycological literature.

**caespitosa.** — *Inocybe caespitosa* Velen., České Houby: 917. 1922.

Holotype: Czechoslovakia, Bohemia, near Mnichovice, IX.1920, *Velenovský* (PRC). This is a species of *Psathyrella* sect. *Spadiceae* (Morg.) Kits van Wav., most likely *P. spadicea* (Schaeff. → Kumm.) Sing.

**carbonaria.** — *Agaricus carbonarius* Fr., Observ. mycol. 2: 33. 1818. — *Agaricus carbonarius* Fr.: Fr., Syst. mycol. 1: 252. 1821. — *Inocybe carbonaria* (Fr.: Fr.) Roze in Bull. Soc. bot. Fr. 23: 113. 1876, non *I. carbonaria* Velen. 1920. — *Flammula carbonaria* (Fr.: Fr.) Kumm.,

Führ. Pilzk.: 82. 1871. — *Pholiota carbonaria* (Fr.: Fr.) Sing. in Lilloa 22: 517. ('1949') 1951, non *P. carbonaria* A. H. Smith 1944.

Type non-existent. It represents a taxon of *Pholiota* and it must be called *P. highlandensis* (Peck) A. H. Smith & Hesler.

**carpta.** — *Agaricus carptus* Scop., Fl. carniol. 2: 449. 1772. — *Inocybe carpta* (Scop.) Kumm., Führ. Pilzk.: 79. 1871.

Type non-existent. The protologue is too short for a reasonable interpretation. *Inocybe carpta* has been diversely interpreted, viz. as a smooth-spored species by Heim (Genre Inocybe: 169. 1931) and as a nodulose-spored species by Bresadola (Iconogr. mycol. 16: pl. 756. 1930). The interpretation of *I. carpta* sensu R. Heim is unclear to me. The species has not been reported ever since.

**castanopsis.** — *Inocybe castanopsis* Hruby in Hedwigia 70: 276. 1930.

No type-material was found at BRNO. The description is too short to allow a reasonable determination.

**catalaunica.** — *Inocybe catalaunica* Sing. in Collect. bot. 1: 245. 1947.

No type-material of *I. catalaunica* could be obtained and the identity of this species must, consequently, remain doubtful.

**cincinnata.** — *Agaricus cincinnatus* Fr.: Fr., Syst. mycol. 1: 256. 1821 (nom. nov. for *A. cristatus* Scop. 1772, non *A. cristatus* Bolt. 1788: Fr.), non *A. cincinnatus* Fr. 1838. — *Inocybe cincinnata* (Fr.: Fr.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 179. 1872, non *I. cincinnata* (Fr. →) Nuësch in Jahrb. St Gall. naturwiss. Ges. 55: 292. 1918.

In my interpretation of the ICBN, nomina nova as avowed substitutes must be typified according to Art. 7.9, and not according to Art. 7.17. As *Agaricus cincinnatus* Fr. 1821 was a name change for *A. cristatus* Scop., it must be typified with the type of the latter species. The type of this species does not exist, and the description is too short to allow for a clear interpretation. Consequently, *I. cincinnata* (Fr.: Fr.) Quél. must remain a nomen dubium. However, Fries (Epicr.: 172. 1838) soon excluded the original type from *A. cincinnatus* (*A. cristatus* Scop. was now recognised as a synonym of *A. lacerus*) and under the provisions of Art. 48.1 *A. cincinnatus* Fr. 1838 must be considered an illegitimate homonym. When transferred to the genus *Inocybe*, as was done by Nuësch (in Jahrb. St Gall. naturwiss. Ges. 55: 292. 1918), it remains an illegitimate homonym of *I. cincinnata* (Fr.: Fr.) Quél.

The correct name for *A. cincinnatus* Fr. 1838 and *I. cincinnata* (Fr. →) Nuësch is *I. phaecomis* (Pers.) Kuyp. var. *phaecomis* (see p. 271).

**claviceps.** — *Agaricus claviceps* Fr., Monogr. Hymenomyc. Sueciae 2: 346. 1863. — *Inocybe claviceps* (Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 469. 1879. — *Hebeloma claviceps* (Fr.) Gillet, Hyménomycètes: 523. 1876.

Type non-existent. The species is a member of the genus *Hebeloma* (Fr.) Kumm.

**collivaga.** — *Inocybe collivaga* Velen., České Houby: 381. 1920.

No type-material was found at PRC nor at PRM. Consequently the name must remain a nomen dubium.

**conissans.** — *Agaricus conissans* Fr., Epicr.: 187. 1838. — *Inocybe conissans* (Fr.) Roze

in Bull. Soc. bot. Fr. 23: 113. 1876. — *Pholiota conissans* (Fr.) Kuyper & Tjall. in Persoonia 13: 81. 1986.

Type non-existent. The species belongs to the genus *Pholiota* (Fr.) Kumm.

**conspersa.** — *Agaricus conspersus* Pers., Ic. Descr. Fung. 2: 50. 1800. — *Agaricus conspersus* Pers.: Fr., Syst. mycol. 1: 260. 1821. — *Inocybe conspersa* (Pers.: Fr.) Roze in Bull. Soc. bot. Fr. 23: 113. 1876. — *Tubaria conspersa* (Pers.: Fr.) Fay. in Ann. Sci. nat. Bot., sér. VII, 9: 355. 1889.

Type non-existent. The species belongs to the genus *Tubaria* (W. G. Sm.) Gillet.

**corcontica.** — *Inocybe corcontica* Velen., České Houby: 370. 1920.

Holotype: Czechoslovakia, Krkonoše, VII.1918, *Velenovský* (PRC). The holotype represents *Hypholoma lateritium* (Schaeff.: Fr.) Kumm. (= *H. sublateritium* (Fr.) Quél.).

**cristata.** — *Agaricus cristatus* Scop., Fl. carniol. 2: 449. 1772, non *A. cristatus* Bolt. 1788: Fr. — *Inocybe cristata* (Scop. →) J. Schroet. in Cohn, Krypt.-Fl. Schlesien III, 1: 587. 1889 (illegitimate, superfluous for *I. cincinnata* (Fr.: Fr.) Quél.).

Type non-existent. The original description is too short for a reasonable guess as to its identity. It has repeatedly been synonymised with *I. lacera* (Fr.: Fr.) Kumm., e.g. by Fries (Epicr.: 172. 1838), Schroeter (in Cohn, Krypt.-Fl. Schlesien III, 1: 587. 1889), and Nuësch (in Jahrb. St Gall. naturw. Ges. 55: 292. 1918). See also comments under *cincinnata*.

**cucullata.** — *Inocybe cucullata* C. E. Mart. in Bull. Soc. bot. Genève 7: 139. 1892–1894.

I did not succeed in obtaining type-material of this insufficiently described species. The name must therefore be considered a nomen dubium.

**debilipes.** — *Inocybe debilipes* P. Karst. in Bidr. Känned. Finl. Natur Folk 48: 211. 1889 (illegitimate, superfluous for *I. scabella* (Fr. 1838 →) Kumm., = *Hebeloma scabellum* (Fr. → Kumm.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 476. 1879).

Type non-existent. See comments under *scabella*.

**deglubens.** — *Agaricus deglubens* Fr., Epicr.: 173. 1838. — *Inocybe deglubens* (Fr.) Gillet, Hyménomycètes: 516. 1876.

Type non-existent. The protologue is reminiscent of *I. flocculosa* (Berk. →) Sacc., but *I. deglubens* differs in having a brown-pruinose apex of stipe, a character otherwise unknown in the genus. Although it may have been possible that this brown pruina is only caused by clusters of spores adhering to the stipe-apex, I consider it better to regard the name *I. deglubens* as a nomen dubium till the time that specimens conforming to the Friesian protologue are encountered.

**descissa.** — *Agaricus descissus* Fr., Epicr.: 174. 1838 (illegitimate, superfluous for *A. auricomus* Batsch 1783). — *Inocybe descissa* (Fr.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 181. 1872 (illegitimate, superfluous for *A. auricomus* Batsch 1783).

As *Agaricus auricomus* was included in *A. descissus*, the name is clearly illegitimate, although it is not typified with the type of *A. auricomus* (Art. 7.11). Judging from the protologue *Agaricus descissus* may be identical with *I. phaeodisca* var. *geophylloides* Kühner.

**destricta.** — *Agaricus rimosus* var. *destrictus* Fr., Epicr.: 174. 1838. — *Agaricus destrictus*

(Fr.) Fr., Monogr. Hymenomyc. Sueciae 1: 343. 1857. — *Inocybe destricta* (Fr.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 181. 1872.

Type non-existent. The description is too short to allow a reasonable determination. The epithet *destricta* has been used for several species, e.g. for *I. adaequata* (see p. 93) and *I. pseudodestricta* (see p. 309).

**dollfusii.** — *Inocybe eutheles* var. *dollfusii* Sing. in Notul. syst. Sect. cryptog. Inst. bot. Acad. Sci. URSS 4(10–12): 16. 1938.

I failed to locate the type of this variety that was described from Iceland. Its identity remains doubtful to me.

**echinata.** — *Agaricus echinatus* Fr.: Fr., Syst. mycol. 1: 286. 1821. — *Inocybe echinata* (Fr.: Fr.) Sacc., Syll. Fung. 5: 773. 1887. — *Melanophyllum echinatum* (Fr.: Fr.) Sing. in Lilloa 22: 436. (\*1949\*) 1951.

Type not located; *Agaricus echinatus* Fr.: Fr. is typified by me with an illustration by Roth (Catal. bot. 2: pl. 9, f. 1. 1800, sub nom. *A. echinatus* Gunn.). The species belongs to the genus *Melanophyllum* Velen., where its correct name is *M. haematospermum* (Pers.: Fr.) Kriese.

**eriocephala.** — *Agaricus eriocephalus* Lam. & DC., Fl. franç., 3e éd., 2: 174. 1805. — *Agaricus strigiceps* var. *eriocephalus* (Lam. & DC) Fr.: Fr., Syst. mycol. 1: 271. 1821. — *Inocybe eriocephala* (Lam. & DC.) Sacc., Syll. Fung. 5: 791. 1887.

Type non-existent. Iconotype: Bull., Herb. France: pl. 576, f. 1. 1792 (as *Agaricus gnaphaliocéphale*). The species belongs to the genus *Ripartites* P. Karst., but it seems uncertain whether it is specifically distinct from *R. strigiceps* (Fr.: Fr.) P. Karst.

**eutheles.** — *Agaricus eutheles* B. & Br. in Ann. Mag. nat. Hist., ser. III, 15: 5. 1865. — *Inocybe eutheles* (B. & Br.) Sacc., Syll. Fung. 5: 776. 1887.

Type not located, neither found at K nor at NY. However, Massee (in Ann. Bot. 18: 476. 1904) indicated that he had studied the type, but his notes from the type-collection and the protologue are insufficient to permit an identification of the species. The name has been used by Kühner (in Bull. Soc. Nat. Oyonnax 9(Suppl.): 21. 1955) for *I. sindonia* (Fr.) P. Karst., but this is evidently a misapplication as *A. eutheles* was reported to have too short and broad pleurocystidia and was gathered in July.

**farcta.** — *Agaricus farctus* Britz. in Bot. Zbl. 54(15–17): 67. 1893. — *Inocybe farcta* (Britz.) Sacc., Syll. Fung. 11: 53. 1895.

Type non-existent. The species belongs to the genus *Ripartites* P. Karst.

**fastibilis.** — *Agaricus fastibilis* Pers., Syn. meth. Fung.: 326. 1801. — *Agaricus fastibilis* Pers.: Fr., Syst. mycol. 1: 249. 1821. — *Inocybe fastibilis* (Pers.: Fr.) Roze in Bull. Soc. bot. Fr. 23: 113. 1876. — *Hebeloma fastibile* (Pers.: Fr.) Kumm., Führ. Pilzk.: 80. 1871.

Type non-existent. *Agaricus fastibilis* belongs to the genus *Hebeloma* (Fr.) Kumm.

**favorabilis.** — *Agaricus favorabilis* Britz. in Bot. Zbl. 54(15–17): 66. 1893. — *Inocybe favorabilis* (Britz.) Sacc., Syll. Fung. 11: 53. 1895.

Type non-existent. It is impossible to interpret the protologue.

**fibrosa.** — *Inocybe fibrosa* Velen., Novit. mycol.: 121. 1939, non *I. fibrosa* (Sow.) Gillet 1876.

No type was found at PRC nor at PRM. Judging from the description it seems unlikely that Velenovský's species belongs to *Inocybe*.

**fibrosolacerata.** — *Agaricus fibrosolaceratus* Britz. in Bot. Zbl. 68: 111. 1896. — *Inocybe fibrosolacerata* (Britz.) Sacc. & Syd. in Sacc., Syll. Fung. 14: 133. 1899.

Type non-existent. The species belongs to sect. *Rimosae* (Fr.) Sacc., but it seems impossible to give a more exact determination.

**firma.** — *Agaricus firmus* Pers., Ic. Descr. Fung. 1: 15. 1798. — *Inocybe firma* (Pers.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 468. 1879. — *Hebeloma firmum* (Pers.) Sacc., Syll. Fung. 5: 793. 1887.

Type non-existent. *Agaricus firmus* belongs to the genus *Hebeloma* (Fr.) Kummer.

**frumentacea.** — *Agaricus frumentaceus* Lam. & DC., Fl. franç., 3e éd., 2: 187. 1805. — *Inocybe frumentacea* (Lam. & DC.) Bres., Fungi trident. 2: 87. 1900.

Type non-existent. Iconotype: Bull., Herb. France: pl. 571, f. 1. 1792 (as *Agaricus frumentacé*). The iconotype does not represent a species of *Inocybe*, but probably represents a species of *Tricholoma* (Fr.) Staude. Bresadola misapplied the name *I. frumentacea* for *I. adaequata* (Britz.) Sacc.

**fulva.** — *Agaricus geophilus* var. *fulvus* Pat., Tab. anal. Fung. 6: 40. 1886. — *Inocybe geophylla* var. *fulva* (Pat.) Sacc., Syll. Fung. 5: 785. 1887.

No type-collection was present at FH. Judging from the description and illustration (pl. 544) by Patouillard, the name might well refer to *I. obscurobadia* (J. Favre) Grund & Stuntz.

**fuscus.** — *Agaricus fuscus* Batsch, Elench. Fung., Cont. 2: 13. 1789. — *Inocybe fuscus* (Batsch) Roze in Bull. Soc. bot. Fr. 23: 113. 1876. — *Pholiota fuscus* (Batsch) Sing. in Lilloa 22: 516. ('1949') 1951.

Type non-existent. It is an autonomous species in the genus *Pholiota* (Fr.) Kumm.

**fuscidula.** — *Inocybe fuscidula* Bres., Iconogr. mycol. 15: pl. 735. 1930, non *I. fuscidula* Velen. 1920.

See comments under *bresadoliana*.

**gintliana.** — *Inocybe gintliana* Velen., České Houby: 385. 1920.

Holotype: Czechoslovakia, Roblín, VII.1916, *Velenovský* (PRC). My type-study indicates that *I. gintliana* belongs to the genus *Cortinarius* Fr.

**glutinosa.** — *Agaricus glutinosus* Lindgren in Bot. Not. 1845: 199. 1845 (not seen), non *A. glutinosus* Schaeff. 1774: Fr. — *Inocybe glutinosa* (Lindgren →) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 467. 1879. — *Hebeloma glutinosum* (Lindgren → P. Karst.) Qué. in Bull. Soc. Amis Sci. nat. Rouen, sér. II, 15: 157. ('1879') 1880.

Type not located. The species probably belongs to the genus *Hebeloma* (Fr.) Kumm.

**graminicola.** — *Agaricus graminicola* Nees, Syst. Pilze Schwämme: 202. 1817. — *Agaricus*

*graminicola* Nees: Fr., Syst. mycol. 1: 262. 1821. — *Inocybe graminicola* (Nees: Fr.) Roze in Bull. Soc. bot. Fr. 23: 113. 1876.

Type not located. The description by Nees seems to suggest *Crinipellis scabellus* (A. & S.: Fr.) Kuyp. (see p. 000).

**griseola.** — *Inocybe corydalina* f. *griseola* R. Heim, Genre *Inocybe*: 289. 1931.

Type non-existent. The (very short) description could apply to *I. corydalina* Qué. var. *corydalina* as well as to *I. haemacta* (B. & Cooke) Sacc.

**heterogenea.** — *Agaricus heterogeneus* Britz. in Ber. naturw. Ver. Augsburg 30: 19. 1890. — *Inocybe heterogenea* (Britz.) Sacc., Syll. Fung. 11: 54. 1895.

Type non-existent. The description does not allow an identification.

**hettematica.** — *Agaricus hettematicus* Britz. in Ber. naturw. Ver. Augsburg 30: 19. 1890. — *Inocybe hettematica* (Britz.) Sacc. & Trott. in Sacc., Syll. Fung. 21: 164. 1912.

Type non-existent. The interpretation of the protologue seems impossible.

**holophaea.** — *Agaricus mesophaeus* var. *holophaeus* Fr., Hymenomyc. eur.: 240. 1874. — *Inocybe holophaea* (Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 470. 1879. — *Hebeloma mesophaeum* var. *holophaeum* (Fr.) Sacc., Syll. Fung. 5: 795. 1887.

Type non-existent. Evidently a member of the genus *Hebeloma* (Fr.) Kumm.

**hygrophorus.** — *Inocybe hygrophorus* Kühner in Bull. trimest. Soc. mycol. Fr. 71: 169. ('1955') 1956.

I did not succeed in obtaining the type on loan. *Inocybe hygrophorus* is in its macroscopical characters not unlike *I. flavella* P. Karst., but differs in having broadly clavate cheilocystidia. This latter character is reminiscent of *I. maculata* Boud., but that species is generally much darker. It could well be a yellow variant of *I. maculata*, but for the time being I regard the identity of *I. hygrophorus* as doubtful, as I did never come across specimens that conformed well to Kühner's description.

**ignobilis.** — *Agaricus ignobilis* Britz. in Ber. naturw. Ver. Augsburg 30: 23. 1890, non *A. ignobilis* Berk. 1842. — *Inocybe ignobilis* (Britz. →) Sacc., Syll. Fung. 11: 54. 1895, non *I. ignobilis* (Berk.) Cooke in Grevillea 19: 104. 1891.

Type non-existent. The interpretation of *A. ignobilis* Britz. seems impossible.

**imbecilis.** — *Agaricus imbecilis* Passerini in Nuov. Giorn. bot. ital. 4: 76. 1872. — *Inocybe imbecilis* (Passerini) Sacc., Syll. Fung. 5: 790. 1887.

I failed to locate the type. On account of the guttulating lamellae I suppose that *A. imbecilis* belongs to the genus *Hebeloma* instead of *Inocybe*.

**inconcinna.** — *Inocybe inconcinna* P. Karst. in Meddn Soc. Fauna Flora fenn. 16: 99. 1890.

Type non-existent. The protologue is insufficiently clear to allow a certain identification and the name is best regarded a nomen dubium. It seems unlikely that *I. inconcinna* sensu R. Heim (Genre *Inocybe*: 248. 1931), sensu Métrod (in Schweiz. Z. Pilzk. 31: 151. 1953), and sensu Alessio (Iconogr. mycol. 29: 195. 1980) refer to Karsten's taxon. The identity of these taxa remains unclear to me too.

**incrassata.** — *Inocybe velenovskyi* f. *incrassata* Hruby in Hedwigia 70: 281. 1930.

Holotype: Czechoslovakia, Moravia, Brno, Mönchsberg, VIII.1927, Hruby (BRNO). The holotype showed the following characters: spores 8.5–10.5 x 5.0–6.0  $\mu\text{m}$ , Q = 1.6–1.8, minutely punctate (not truly verruculose), partly even smooth, rather pale brown; cheilocystidia cylindrical, often somewhat flexuose. On account of these characters *I. velenovskyi* f. *incrassata* belongs to the complex of *Hebeloma mesophaeum* (Pers.) Quél.

**indissimilis.** — *Agaricus indissimilis* Britz. in Ber. naturw. Ver. Augsburg 27: 157. 1883.

— *Inocybe indissimilis* (Britz.) Sacc., Syll. Fung. 5: 778. 1887.

Type non-existent. The interpretation is unclear, it could be *I. fraudans* (Britz.) Sacc. *Inocybe indissimilis* sensu R. Heim (Genre *Inocybe*: 291. 1931) is a misapplication.

**insequens.** — *Agaricus insequens* Britz., Dermini Südbayern: 5. 1882. — *Inocybe insequens*

(Britz.) Sacc., Syll. Fung. 5: 785. 1887.

Type non-existent. An interpretation of this taxon seems impossible.

**insignior.** — *Inocybe brunnea* f. *insignior* Sing. in Collect. bot. 1: 245. 1947.

I did not succeed in obtaining type-material and its identity must therefore remain unclear.

**laevispora.** — *Inocybe laevispora* Hruby in Hedwigia 70: 278. 1930. — Fig. 196.

Holotype: Czechoslovakia, Moravia, Brno, Mönchsberg, IX.1926, Hruby (BRNO). The type is in a rather bad state. I noted the following microscopical characters: spores 6.5–8.0(–8.5) x 4.5–5.5  $\mu\text{m}$ , Q = 1.4–1.6, smooth, colourless in  $\text{NH}_4\text{OH}$ , inamyloid; cheilocystidia not observed. On account of these characters *I. laevispora* is excluded from *Inocybe*, although I am not certain to what genus it actually belongs.

**laricina.** — *Inocybe friesii* f. *laricina* R. Heim, Genre *Inocybe*: 330. 1931.

An invalid name for *I. friesii* f. *friesii* (Art. 26.1).

**lenta.** — *Agaricus lentus* Pers., Syn. meth. Fung.: 287. 1801. — *Agaricus lentus* Pers.: Fr., Syst. mycol. 1: 253. 1821. — *Inocybe lenta* (Pers.: Fr.) Roze in Bull. Soc. bot. Fr. 23: 113. 1876. — *Pholiota lenta* (Pers.: Fr.) Sing. in Lilloa 22: 516. ('1949') 1951.

Type non-existent. It is a good species in the genus *Pholiota* (Fr.) Kumm., as *P. lenta* (Pers.: Fr.) Sing.

**leucopus.** — *Inocybe leucopus* Velen., České Houby: 373. 1920.

No type-collection was found at PRC nor at PRM. I cannot interpret this species with certainty and I consider it therefore a nomen dubium.

**lobata.** — *Inocybe fastigiata* var. *lobata* R. Heim, Genre *Inocybe*: 189. 1931. — *Inocybe fastigiata* subsp. *lobata* (R. Heim) Dermek & Veselský in Česká Mykol. 31: 192. 1977.

Type non-existent. Judging from the description *I. fastigiata* var. *lobata* probably refers to *I. arenicola* (R. Heim) M. Bon var. *arenicola*, although a synonymy with *I. rimosa* (Bull.: Fr.) Kumm. cannot be excluded completely.

**longicystis.** — *Inocybe longicystis* Velen., České Houby: 380. 1920, non *I. longicystis* Atk. 1918.

See comments under *I. velenovskyi* Kühner.

**lubrica.** — *Agaricus lubricus* Pers., Syn. meth. Fung.: 307. 1801. — *Agaricus lubricus* Pers.: Fr., Syst. mycol. 1: 252. 1821. — *Inocybe lubrica* (Pers.: Fr.) Roze in Bull. Soc. bot. Fr. 23: 113. 1876. — *Pholiota lubrica* (Pers.: Fr.) Sing. in Lilloa 22: 516. ('1949') 1951.

Type non-existent. It is a good species in the genus *Pholiota* (Fr.) Kumm., as *P. lubrica* (Pers.: Fr.) Sing.

**lucifuga.** — *Agaricus lucifugus* Fr., Observ. mycol. 2: 50. 1818. — *Agaricus lucifugus* Fr.: Fr., Syst. mycol. 1: 258. 1821. — *Inocybe lucifuga* (Fr.: Fr.) Kumm., Führ. Pilzk.: 79. 1871.

Type non-existent. The interpretation of this species has been rather controversial, although most mycologists tend to regard it nowadays as a yellowish variant of *I. flocculosa* (Berk. → ) Sacc. var. *flocculosa*. This interpretation is, however, rather unlikely as Fries (Observ. mycol. 2: 50. 1818) described *A. lucifugus* with an almost whitish pileus with reddish or cinnamon-brown hairs and patches. The latter character is rather aberrant for an *Inocybe*, and for that reason it is doubtful whether *A. lucifugus* really belongs to the genus *Inocybe*. The name is best regarded as a nomen dubium.

**lutescens.** — *Inocybe lutescens* Velen., České Houby: 375. 1920.

No type-collection was found at PRC nor at PRM. Velenovský's description suggests an unmistakable species with a brown smooth pileus, yellow stipe and lamellae, and a strong smell of Peruvian balsam. However, this species has never been reported after its first description. Modern descriptions of *I. lutescens* do not completely conform to the protologue, and in most cases refer to *I. flocculosa* var. *crocifolia* (Herink) Kuyp. Other smooth-spored species of subgen. *Inocybe* with yellow stipe and/or lamellae, e.g. *I. xantholeuca* Kuyp. and *I. luteipes* J. Favre, have occasionally been misapplied for *I. lutescens*. For the time being it seems better to regard the name *I. lutescens* as a nomen dubium.

**macrospora.** — *Inocybe descissa* var. *macrospora* R. Heim, Genre *Inocybe*: 235. 1931. — *Inocybe macrospora* (R. Heim) Alessio, Iconogr. mycol. 29: 239. 1980 (inval., Art. 33.2), non *I. macrospora* Y. Kobay. 1971.

Type non-existent. The description is too short to allow a reliable determination.

**macrospora.** — *Inocybe fastigiata* var. *macrospora* Bres. in Sacc., Fl. ital. crypt. I, 15: 732. 1916.

I failed to locate the type. The very short description could refer to *I. arenicola* (R. Heim) M. Bon or to *I. rimosa* (Bull.: Fr.) Kumm.

**major.** — *Inocybe langei* var. *major* Sing. in Anns mycol. 34: 432. 1936.

I did not succeed in obtaining the type and for that reason the name must be considered a nomen dubium.

**mamillaris.** — *Agaricus mamillaris* Passerini in Nuov. Giorn. bot. ital. 4: 76. 1872. — *Inocybe mamillaris* (Passerini) Sacc., Syll. Fung. 5: 785. 1887.

I failed to locate the type. It certainly belongs to *Inocybe* but the description does not allow a certain identification.

**masoviensis.** — *Inocybe masoviensis* Rudnicka-Jeziarska in Acta mycol. 3: 184. 1967.

I did not succeed in obtaining the type for study. The protologue is insufficiently clear for a determination of its identity. I regard the name therefore as a nomen dubium.

**mesophaea.** — *Agaricus fastibilis* var. *mesophaeus* Pers., Mycol. eur. 3: 173. 1828. — *Agaricus mesophaeus* (Pers.) Fr., Epicr.: 179. 1838. — *Inocybe mesophaea* (Pers.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 470. 1879. — *Inocybe versipellis* var. *mesophaea* (Pers.) S. Petersen, Danske Agaricaceer: 337. 1911. — *Hebeloma mesophaeum* (Pers.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 128. 1872.

Type not found at L. The species belongs to the genus *Hebeloma* (Fr.) Kumm., as *H. mesophaeum* (Pers.) Quél.

**minuta.** — *Inocybe minuta* P. Karst. in Acta Soc. Fauna Flora fenn. 27: 3. 1906.

Type not found at H. Judging from the description it seems unlikely that the species belongs to the genus *Inocybe* as currently circumscribed.

**mitrata.** — *Agaricus mitratus* Fr., Ic. sel. Hymenomyc. 2: 11. 1878, non *A. mitratus* Hoffm. 1789. — *Inocybe mitrata* (Fr. → ) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 468. 1879. — *Hebeloma mitratum* (Fr. → P. Karst.) Sacc., Syll. Fung. 5: 793. 1887.

Type non-existent. Judging from the description and illustration as provided by Fries (Ic. sel. Hymenomyc. 2: 11, pl. 112, f. 2. 1878) it probably belongs in the genus *Hebeloma* (Fr.) Kumm., but a rediscovery is necessary to assess its relationships.

**mucronata.** — *Inocybe mucronata* R. Heim, Genre Inocybe: 272. 1931.

Type non-existent. Judging from the description and illustration as provided by Heim (Genre Inocybe: 272, pl. 21, f. 6. 1931) it seems closely related to *I. lacera* var. *helobia* Kuyp. on account of the reddish brown pileus with prominent very dark papilla and (sub)clavate, often mucronate pleurocystidia. It differs from the latter taxon in having wider spores. For the time being I regard the identity of *I. mucronata* as doubtful.

**mussiva.** — *Agaricus mussivus* Fr., Epicr.: 178. 1838. — *Inocybe mussiva* (Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 466. 1879. — *Hebeloma mussivum* (Fr.) Sacc., Syll. Fung. 5: 792. 1887.

Type non-existent. The identity of this species seems unknown. It could belong to the genus *Hebeloma* (Fr.) Kumm., but it might as well be a synonym of *Cortinarius percomis* Fr.

**obscura.** — *Agaricus obscurus* Pers., Syn. meth. Fung.: 347. 1801, non *A. obscurus* Schaeff. 1774. — *Inocybe obscura* (Pers. → ) Gillet, Hyménomycètes: 515. 1876.

Type non-existent. The protologue is rather short and no mention is made of any violaceous tinges at the stipe. The name is best regarded as a nomen dubium. It has generally been misapplied for *I. phaeocomis* var. *major* (S. Petersen) Kuyp.

**obscura.** — *Inocybe geophila* var. *obscura* Barbier in Bull. trimest. Soc. mycol. Fr. 20: 126. 1904.

Type not located. The description does not allow a certain determination.

**ochraceoviolascens.** — *Agaricus ochraceoviolascens* Britz. in Bot. Zbl. 71: 52. 1897. — *Inocybe ochraceoviolascens* (Britz.) Sacc. & Syd. in Sacc., Syll. Fung. 14: 134. 1899.

Type non-existent. *Inocybe ochraceoviolascens* seems to come close to *I. pusio* P. Karst., *I. griseolilacina* J. Lange and *I. huijsmanii* Kuyp., but in the absence of authentic material the name is better considered a nomen dubium.

**odora.** — *Inocybe odora* Velen., Novit. mycol.: 121. 1939.

Holotype: Czechoslovakia, Myslin, 20.X.1939, *Velenovský* (PRM). My type study indicates that the species belongs to the genus *Cortinarius* Fr.

**olgae.** — *Inocybe olgae* Velen., České Houby: 371. 1920.

Holotype: Czechoslovakia, Bohemia, Bohnice near Praha, X. 1917, *Zverinova* (PRC). The type of *I. olgae* represents *Pholiota lenta* (Pers.: Fr.) Sing.

**pachycreas.** — *Inocybe pachycreas* R. Heim & Romagn. in Bull. trimest. Soc. mycol. Fr. 47: 250. 1931.

Type non-existent. The description does not seem to relate to a species of *Inocybe* proper. According to Romagnesi (pers. comm.) the species belongs to the genus *Agrocybe* Fay.

**pallida.** — *Inocybe geophylla* f. *pallida* R. Heim, Genre Inocybe: 141. 1931 (inval., Art. 32.1).

Authentic material not located. Judging from the illustration as given by Heim (Genre Inocybe: pl. 2, f. 3. 1931) this taxon is probably a variant of *I. whitei* (B. & Br.) Sacc. f. *whitei*.

**pedicellata.** — *Inocybe pedicellata* Velen., České Houby: 385. 1920.

Type not found at PRM. *Inocybe pedicellata* is a member of sect. *Rimosae* (Fr.) Sacc., probably synonymous with *I. rimosae* (Bull.: Fr.) Kumm., although *I. maculata* Boud. cannot completely be excluded.

**perpusilla.** — *Inocybe perpusilla* Velen., České Houby: 388. 1920.

Holotype: Czechoslovakia, Karlík, VII.1916, *Velenovský* (PRM). The few fragments of the holotype indicate that *I. perpusilla* does not belong to the genus *Inocybe*; it could well represent a species of *Ramicola* Velen.

**phaeocephala.** — *Agaricus phaeocephalus* Bull., Herb. France: pl. 555, f. 1. 1792 (inval., Art. 32.1., cf. Art. 42. Note 2). — *Agaricus phaeocephalus* Pers., Syn. meth. Fung.: 302. 1801. — *Agaricus phaeocephalus* Pers.: Fr., Syst. mycol. 1: 46. 1821. — *Inocybe phaeocephala* (Pers.: Fr.) Sacc., Syll. Fung. 5: 774. 1887.

Type non-existent. Iconotype: Bull., Herb. France: pl. 555, f. 1. 1792. The species as depicted by Bulliard does not represent an *Inocybe*, but probably belongs to the genus *Tricholoma* (Fr.) Staude. *Inocybe phaeocephala* sensu Bres. (Iconogr. mycol. 15: pl. 737. 1930) could well refer to *I. splendens* var. *phaeoleuca* (Kühner) Kuyp., but I did not study authentic material from Bresadola's herbarium.

**pollicaris.** — *Inocybe pollicaris* P. Karst. in Meddn Soc. Fauna Flora fenn. 9: 68. 1882.

Type not found at H. Judging from the description the species does not belong to the genus *Inocybe* but represents a species of *Melanophyllum* Velen.

**poujolii.** — *Inocybe poujolii* R. Heim, Genre Inocybe: 221. 1931.

Type non-existent. The description is too imprecise to allow an exact identification. The name must therefore remain doubtful.

**praepostera.** — *Agaricus praeposterus* Britz., *Dermini Südbayern*: 5. 1882. — *Inocybe praepostera* (Britz.) Sacc., *Syll. Fung.* 5: 776. 1887.

Type non-existent. It is impossible to interpret this name.

**pseudograta.** — *Inocybe pseudograta* Alessio, *Cryptog., Mycol.* 4: 59. 1983.

I did not succeed in obtaining the holotype for study. For the time being I regard the name as a nomen dubium.

**pseudoscabella.** — *Agaricus pseudoscabellus* Britz., *Hymenomyces Südbayern*: 7. 1891. — *Inocybe pseudoscabella* (Britz.) Sacc., *Syll. Fung.* 11: 53. 1895.

Type non-existent. I cannot interpret this species.

**punctata.** — *Agaricus punctatus* Fr.: Fr., *Elench. Fung.* 1: 30. 1828. — *Inocybe punctata* (Fr.: Fr.) P. Karst. in *Bidr. Känned. Finl. Natur Folk* 32: 469. 1879. — *Hebeloma punctatum* (Fr.: Fr.) Kumm., *Führ. Pilzk.*: 80. 1871.

Type non-existent. *Agaricus punctatus* seems to be a member of the genus *Hebeloma* (Fr.) Kumm.

**pyriodora.** — *Agaricus pyriodorus* Pers., *Syn. meth. Fung.*: 300. 1801. — *Agaricus pyriodorus* Pers.: Fr., *Syst. mycol.* 1: 255. 1821. — *Inocybe pyriodora* (Pers.: Fr.) Kumm., *Führ. Pilzk.*: 79. 1871.

Type not found in herb. Persoon (L). The original description by Persoon (*Syn. meth. Fung.*: 300. 1801) seems to suggest *I. bongardii* (Weinm.) Quéf. on account of pileal covering and colour of the lamellae. The name, however, has generally been applied for a species of subg. *Inocybe* with broad, somewhat amygdaliform spores with an apical papilla and fusiform pleurocystidia, described here as *I. fraudans* (Britz.) Sacc. (see p. 78). As the name has been widely and persistently used for a taxon not including its type, the name *I. pyriodora* may be rejected under Art. 69.1.

To make matters more complex it might be added that there is one collection in the herbarium Persoon (L 910.255.185) labeled *Agaricus pyriodorus* and that this collection represents *I. sindonia* (Fr.) P. Karst. (see p. 340)!

**rasiana.** — *Inocybe rasiana* Sacc. & Trotter., *Funghi dell'avellinese*: 12. 1920 (not seen).

I failed to locate the type. The description as given by Trotter (in Sacc., *Syll. Fung.* 23: 235. 1925) makes clear that this species must be excluded from the genus *Inocybe*, although I am ignorant as to its exact position.

**reflexa.** — *Inocybe reflexa* Gillet, *Hyménomycètes, 2e Index*: 13. 1898. — *Inocybe geophylla* var. *reflexa* (Gillet) Boud.,  *Ic. mycol.* 4: 62. 1906.

Type non-existent. The original description by Gillet is rather vague and might refer to either *I. geophylla* (Fr.: Fr.) Kumm. var. *geophylla* or to *I. phaedisca* var. *geophylloides* Kühner. In the absence of authentic material the name is best regarded as a nomen dubium. The illustration as provided by Boudier (*Ic. mycol.* 4: pl. 124. 1906, sub nom. *I. geophylla* var. *reflexa*) almost certainly refers to *I. phaedisca* var. *geophylloides*.

**rosella.** — *Inocybe rosella* Velen., *České Houby*: 387. 1920.

No type was found at PRC nor at PRM. From the description it is clear that *I. rosella* is not a member of the genus *Inocybe*.

**rubens.** — *Inocybe obscura* var. *rubens* R. Heim, *Genre Inocybe*: 260. 1931. — *Inocybe rubens* (R. Heim) Huijsman in *Bull. Soc. Nat. Oyonnax* 7: 73. 1953 (inval., Art. 33.2).

Type non-existent. It seems likely that this species is heterogeneous and that two different species are illustrated in Heim, *Genre Inocybe*: pl. 21, f. 4 and pl. 23, f. 3 respectively. The accompanying descriptions are, however, insufficiently clear for a reliable guess as to their identity. It could be possible that Heim's form 'a' represents *I. furfurea* Kühner, and form 'b' *I. nitidiuscula* (Britz.) Sacc.

**rubrolaesa.** — *Inocybe rubrolaesa* Gillet, *Hyménomycètes, 2e Index*: 13. 1898.

Type non-existent. The description is too brief to allow an opinion on its systematic position, but it seems likely that the species does not belong to the genus *Inocybe*.

**rufa.** — *Agaricus obscurus* var. *rufus* Pat., *Tab. anal. Fung.* 6: 20. 1886. — *Inocybe obscura* var. *rufa* (Pat.) Sacc., *Syll. Fung.* 5: 770. 1887. — *Inocybe rufa* (Pat.) Sart. & M., *Syn. Genre Inocybe*: 205. 1922 (inval., Art. 34.1).

No type seems to exist at FH. Iconotype: Pat., *Tab. anal. Fung.* 6: pl. 543. 1886. An unambiguous interpretation of this type plate seems hardly possible but this illustration might well refer either to *I. pusio* P. Karst. or to *I. amethystina* Kuyper.

**rufolutea.** — *Inocybe rufolutea* J. Favre in *Ergebn. wiss. Unters. schweiz. NatParks, N.F.* 5: 201. 1955. — Fig. 197.

Holotype: Switzerland, Kanton Graubünden, near Fuorn, Val Nügli, alt. 2450 m, 15.VIII.1950, Favre (G). I noted the following microscopical characters: spores 9.5–11.5(–12.0) x 6.0–6.5(–7.0)  $\mu\text{m}$ , Q = (1.5–)1.6–1.7(–1.9), smooth, subamygdaliform, with conical apex, colourless, thin-walled; pleurocystidia (49–)53–62(–66) x (15–)17–22  $\mu\text{m}$ , (broadly) subfusiform, thick-walled, with up to 4.0  $\mu\text{m}$  thick, pale yellow wall, crystalliferous at apex, frequent. Cheilocystidia similar to pleurocystidia. Paracystidia (broadly) clavate, thin-walled, colourless. Basidia 23–30 x 8–11  $\mu\text{m}$ , 4-spored. Caulocystidia descending to about 1/4th of stipe, similar to cheilocystidia, below with an intermediate zone of slightly differentiated caulocystidioid hairs.

As explained on p. 10 I do not want to recognise (semi-)albinistic taxa as autonomous taxa but prefer to treat them as minor variants within a species. I have not been able to determine the species to which this variant should be attached and treat the name therefore as a nomen dubium.

**scabella.** — *Agaricus scabellus* A. & S., *Consp. Fung.*: 189. 1805. — *Agaricus scabellus* A. & S.: Fr., *Syst. mycol.* 1: 259. 1821, non *A. scabellus* Fr. 1838.

*Agaricus scabellus* Fr., *Epicr.*: 177. 1838, non *A. scabellus* A. & S. 1805: Fr. — *Inocybe scabella* (Fr.  $\rightarrow$ ) Kumm., *Führ. Pilzk.*: 79. 1871. — *Hebeloma scabellum* (Fr.  $\rightarrow$  Kumm.) P. Karst. in *Bidr. Känned. Finl. Natur Folk* 32: 476. 1879.

Type of *A. scabellus* A. & S. non-existent. Iconotype: A. & S., *Consp. Fung.*: pl. 9, f. 6. 1805. This illustration is perfectly clear and represents the species up to now known as *Crinipellis stipitarius* (Fr.: Fr.) Pat., but this latter name has now to be replaced by the name *Crinipellis scabellus* (A. & S.: Fr.) Kuyper, *comb. nov.* (basionym *Agaricus scabellus* A. & S., *Consp. Fung.*: 189. 1805).

However, Fries came soon to realise that he had earlier misapplied the epithet *scabellus* for a species of *Inocybe*, and subsequently he transferred Albertini & Schweinitz's species to *A. stipitarius*, and created a new name *A. scabellus* that is a later homonym (Art. 48.1). This name became legitimate when it was transferred to the genus *Inocybe* by Kummer (art. 72. Note 1). The name change *Inocybe debilipes* for *I. scabella* (Fr.  $\rightarrow$ ) Kumm., as

was done by Karsten (in Bidr. Känned. Finl. Natur Folk 48: 211. 1889) is for that reason superfluous (Art. 63.1).

*Inocybe scabella* (Fr. →) Kumm. has been diversely interpreted and been used for at least three different species, viz. *I. muricellata* (*I. scabella* sensu Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 29. 1955), *I. nitidiuscula* (*I. scabella* sensu Bres., Iconogr. mycol. 15: pl. 721, f. 1. 1930), and *I. trechispora* (*I. scabella* sensu R. Heim, Genre Inocybe: 319. 1931). The original description by Fries (Epicr.: 177. 1838) is insufficient for an unambiguous judgement as to its identity, and the name *I. scabella* is therefore best regarded as a nomen dubium.

**scabra.** — *Agaricus scaber* O. F. Müll., Fl. dan. 14: 7. 1780. — *Agaricus scaber* O. F. Müll.: Fr., Syst. mycol. 1: 255. 1821. — *Inocybe scabra* (O. F. Müll.: Fr.) Kumm., Führ. Pilzk.: 79. 1871.

Type non-existent. The protologue by Müller states that the lamellae are white, and for that reason the species must be excluded from the genus *Inocybe*. *Inocybe scabra* sensu Bres. (Iconogr. mycol. 15: pl. 726, f. 2. 1930) and sensu J. Lange (Fl. agar. dan. 3: pl. 111G. 1938) refer to *I. corydalina* var. *erinaceomorpha* (Stangl & Veselský) Kuyper. (see p. 84).

**scamba.** — *Agaricus scambus* Fr., Observ. mycol. 2: 45. 1818. — *Agaricus scambus* Fr.: Fr., Syst. mycol. 1: 504. 1821. — *Inocybe scamba* (Fr.: Fr.) P. Karst. in Meddn Soc. Fauna Flora fenn. 16: 100. 1890. — *Pholiota scamba* (Fr.: Fr.) A. H. Smith & Hesl., N. Amer. Spec. Pholiota: 302. 1968.

Type non-existent. It is a good species in the genus *Pholiota* (Fr.) Kumm.

**sinuosa.** — *Agaricus sinuosus* Fr., Epicr.: 178. 1838. — *Inocybe sinuosa* (Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 466. 1879. — *Hebeloma sinuosum* (Fr.) Quéf. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 345. 1873.

Type non-existent. The species belongs to the genus *Hebeloma* (Fr.) Kumm.

**siparia.** — *Agaricus siparius* Fr.: Fr., Syst. mycol. 1: 261. 1821. — *Inocybe siparia* (Fr.: Fr.) Roze in Bull. Soc. bot. Fr. 23: 113. 1876. — *Flammulaster siparius* (Fr.: Fr.) Watl. in Notes Roy. bot. Gdn Edinb. 28: 67. 1967.

Type non-existent. The species is now regarded as a member of the genus *Flammulaster* Earle.

**solida.** — *Inocybe solida* Velen., Novit. mycol.: 119. 1939.

No type was found at PRC nor at PRM. The description is insufficient for a clear determination of its identity.

**squamigera.** — *Agaricus squamiger* Britz. in Ber. naturw. Ver. Augsburg 28: 153. 1885. — *Inocybe squamigera* (Britz.) Sacc., Syll. Fung. 5: 763. 1887.

Type non-existent. The description is too short to allow a reliable determination.

**strigiceps.** — *Agaricus strigiceps* Fr.: Fr., Syst. mycol. 1: 270. 1821. — *Inocybe strigiceps* (Fr.: Fr.) Sacc., Syll. Fung. 5: 791. 1887, non *I. strigiceps* Horak 1980. — *Ripartites strigiceps* (Fr.: Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 478. 1879.

Type non-existent. The species is generally regarded as belonging in the genus *Ripartites* P. Karst.

**subaemula.** — *Agaricus subaemulus* Britz., Hymenomyc. Südbayern: 7. 1891. — *Inocybe subaemula* (Britz.) Sacc., Syll. Fung. 11: 53. 1895.

Type non-existent. The description is too vague to allow a reliable determination.

**subignobilis.** — *Agaricus subignobilis* Britz., Hymenomyc. Südbayern: 7. 1891. — *Inocybe subignobilis* (Britz.) Sacc., Syll. Fung. 11: 53. 1895.

Type non-existent. The protologue is too unclear to be interpretable.

**subinsequens.** — *Agaricus subinsequens* Britz., Dermis Südbayern: 5. 1882. — *Inocybe subinsequens* (Britz.) Sacc., Syll. Fung. 5: 785. 1887.

Type non-existent. It seems impossible to interpret the protologue.

**submicrospora.** — *Inocybe submicrospora* Velen., Novit. mycol. nov.: 61. 1947.

Type not found at PRC nor at PRM. The protologue indicates that the species must be excluded from *Inocybe*.

**subnudipes.** — *Inocybe subnudipes* Kühner in Bull. Soc. Nat. Oyonnax 9(Suppl.): 6. 1955.

I did not succeed in obtaining the type on loan. Neither did I come across specimens completely conforming to Kühner's protologue. Judging from the description *I. subnudipes* has its affinities near *I. albovelutipes* Stangl and *I. monochroa* J. Favre. For the time being the identity of Kühner's species remains dubious.

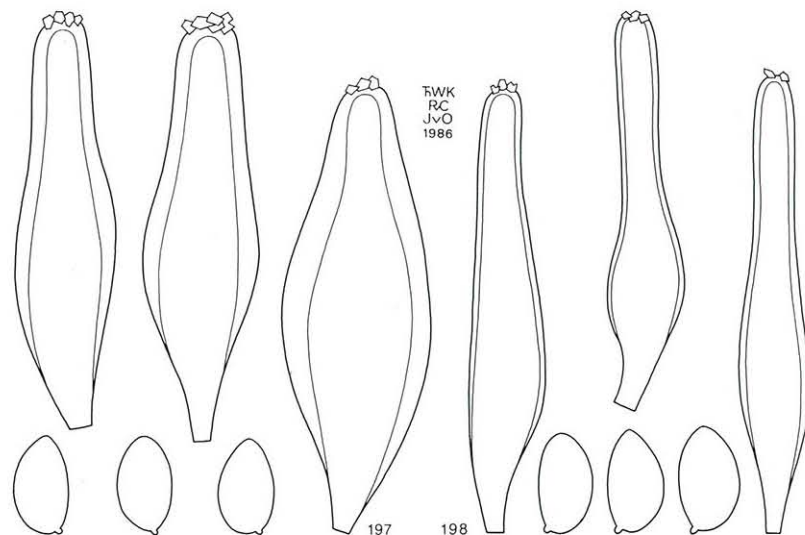


Fig. 197. *Inocybe rufolutea*. — Spores, pleurocystidia (from holotype of *I. rufolutea*).  
Fig. 198. *Inocybe tristis*. — Spores, pleurocystidia (from holotype of *I. tristis*).

**subpelargonium.** — *Inocybe subpelargonium* Beller in Docs mycol. 12(46): 32. 1982.

I did not succeed in obtaining the type on loan. The description is insufficiently clear to allow a reliable interpretation.

**subpusio.** — *Inocybe obscura* var. *subpusio* Sing. in Collect. bot. 1: 232. 1947.

No type-material of this taxon could be obtained on loan and the name must therefore be regarded a nomen dubium.

**substraminea.** — *Inocybe substraminea* Alessio, Iconogr. mycol. 29: 270. 1980.

I did not succeed in obtaining the holotype on loan. The description and illustration (Iconogr. mycol. 29: 270, pl. 69. 1980) suggest a species near *I. queletii* Maire & Konr., from which it differs in having a straw-yellow pileus and autumnal appearance. I have never come across collections that agree completely with the protologue.

**testacea.** — *Agaricus testaceus* Fr., Epicr.: 178. 1838 (nom. superfl. for *A. subtestaceus* Batsch 1789), non A. testaceus Scop. 1772. — *Hebeloma testaceum* (Fr. →) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 250. 1872. — *Inocybe testacea* (Fr. →) Quél. P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 468. 1879.

Type non-existent. The species seems a good member in the genus *Hebeloma* (Fr.) Kumm., but the epithet 'testaceum' is illegitimate, being based on a superfluous name change for *Agaricus subtestaceus* Batsch. For that reason the following new combination is necessary: *Hebeloma subtestaceum* (Batsch) Kuyp., *comb. nov.* (basonym *Agaricus subtestaceus* Batsch, Elench. Fung., Cont. 2: 39. 1789).

**tigrina.** — *Inocybe tigrina* R. Heim, Genre Inocybe: 230. 1931.

Type non-existent. The interpretation of *I. tigrina* is somewhat doubtful. According to Kühner (in Bull. Soc. Nat. Oyonnax 9 (Suppl.): 52. 1955) the species comes close to (or is even identical with) *I. flocculosa* (Berk. →) Sacc. var. *flocculosa*, and this interpretation seems consistent with Heim's description and illustration (Genre Inocybe: pl. 19, f. 6. 1931). However, I studied a collection of a species that has been determined as *I. tigrina* by Heim (Netherlands, prov. Gelderland, Gorssel, 18.XI.1951, *Reuvecamp*, PC, L) and that collection turned out to represent *I. sindonia* (Fr.) P. Karst. The application of the epithet 'tigrina' seems therefore doubtful and the name is best regarded a nomen dubium.

**tomentella.** — *Agaricus tomentellus* Fr., Epicr.: 176. 1838 (superfluous for *A. tomentosus* Jungh. 1830: Fr.). — *Inocybe tomentella* (Fr.) Sacc., Syll. Fung. 5: 783. 1887 (superfluous for *I. tomentosa* (Jungh.: Fr.) Quél. 1888).

See comments under *tomentosa*.

**tomentosa.** — *Agaricus tomentosus* Jungh. in Linnaea 5: 403. 1830. — *Agaricus tomentosus* Jungh.: Fr., Syst. mycol. 3 (Index): 45. 1832. — *Inocybe tomentosa* (Jungh.: Fr.) Quél., Fl. mycol.: 106. 1888, non *I. tomentosa* Ell. & Ev. 1889.

Type non-existent. Iconotype: Jungh. in Linnaea 5: pl. 6, f. 7. 1830. The illustration is very difficult to interpret, although it almost certainly refers to a species of *Inocybe*. The name is best regarded as a nomen dubium.

**treneri.** — *Inocybe treneri* Bres. in Stud. trent. 7: 4. 1926.

I failed to obtain authentic material of this fairly distinctive taxon. For the time being I regard it as a nomen dubium.

**tricholoma.** — *Agaricus tricholoma* A. & S., Consp. Fung.: 188. 1805. — *Agaricus tricholoma* A. & S.: Fr., Syst. mycol. 1: 270. 1821. — *Inocybe tricholoma* (A. & S.: Fr.) Sacc., Syll. Fung. 5: 790. 1887. — *Ripartites tricholoma* (A. & S.: Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 477. 1879.

Type non-existent. *Agaricus tricholoma* is the type-species of the genus *Ripartites* P. Karst.

**trinii.** — *Agaricus trinii* Weinm., Hymenomyc. Gastromyc. Imp. ross. observ.: 194. 1836. — *Inocybe trinii* (Weinm.) Sacc., Syll. Fung. 5: 781. 1887.

Type non-existent. The protologue is difficult to interpret, and could refer to either *I. fraudans* (Britz.) Sacc. or *I. bresadolae* Mass. *Inocybe trinii* has been diversely interpreted and the name has been used for at least three different species, viz. *I. trinii* sensu Rick., Blätterp.: 105. 1911 (= *I. whitei* (B. & Br.) Sacc. f. *whitei*), *I. trinii* sensu Bres., Iconogr. mycol. 15: pl 747. 1930 (= *I. godeyi* Gillet), and *Astrosporina trinii* sensu Rea, Brit. Basidiomyc.: 211. 1922 (= *I. bresadolae* Mass.). It seems therefore prudent to regard the name *I. trinii* as a nomen dubium.

**tristis.** — *Inocybe tristis* Hruby in Hedwigia 70: 280. 1930, non *I. tristis* Mal. & Bert. 1970. — Fig. 198.

Holotype: Czechoslovakia, Moravia, Brno, XII.1929, *Hruby* (BRNO, isotype K, E). The type-collection is in a rather bad state, being overgrown by a mould, and could only be studied with difficulty. I noted the following characters: spores (9.5–)10.0–11.0(–11.5) x (5.5–)6.0–6.5 μm, Q = 1.6–1.8, smooth, subamygdaliform, with somewhat conical apex; pleurocystidia (71–)73–83 x 10–14(–17) μm, cylindrical, sometimes slenderly fusiform, thick-walled, with up to (2.0–)2.5 μm thick, rather bright yellow wall; paracystidia thin-walled, hyaline(?); caulocystidia present in a very narrow apical zone (less than 2 mm), similar to pleurocystidia.

The microscopical characters seem to suggest *I. phaeocomis* (Pers.) Kuyp. var. *phaeocomis* but in the macroscopical description no mention is made of violaceous tinges of the stipe. It may, however, only be a late autumnal variant of this taxon. The name is best regarded as doubtful.

**turfosa.** — *Inocybe turfosa* Velen., Novit. mycol.: 120. 1939.

No type-material was found at PRC nor at PRM. Judging from the description the species comes close to *I. lacera* (Fr.: Fr.) Kumm. sensu lato but it is aberrant because of its black-spotted edge of lamella.

**umbonata.** — *Inocybe umbonata* Quél. in Bull. Soc. bot. Fr. 23: 330. ('1876') 1877, non *I. umbonata* Petch 1917.

Type non-existent. Type-description: Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 141. 1872, sub nom. *Stropharia inuncta*. This description makes clear that *Inocybe umbonata* must be excluded from the genus *Inocybe*.

**vatricosa.** — *Agaricus vatricosus* Fr., Observ. mycol. 2: 46. 1818. — *Agaricus vatricosus* Fr.: Fr., Syst. mycol. 1: 259. 1821. — *Inocybe vatricosa* (Fr.: Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 465. 1879.

Type non-existent. The protologue seems to refer to a species with a completely pruinose stipe and the description is reminiscent of *I. umbratica* Quél. The name *I. vatricosa* has been misapplied by Heim (Genre Inocybe: 136. 1931) for a species with smooth spores, growing on wood, that almost certainly must be excluded from the genus *Inocybe*.



**velenovskiyi.** — *Inocybe velenovskiyi* Boursier & Kühner in Bull. trimest. Soc. mycol. Fr. 44: 179. 1928; nom. nov. for *I. longicystis* Velen. 1920, non *I. longicystis* Atk. 1918, non *I. velenovskiyi* Hruby 1930.

No type was found at PRC nor at PRM and the name must be considered a nomen dubium.

**velenovskiyi.** — *Inocybe velenovskiyi* Hruby in Hedwigia 70: 281. 1930, non *I. velenovskiyi* Boursier & Kühner 1928. — Fig. 199.

Lectotype (design. mihi): Czechoslovakia, Moravia, Brno, Mönchsberg, IX.1927, Hruby (BRNO). I noted the following microscopical characters of the lectotype: spores 8.5–10.5 x 5.0–6.0  $\mu\text{m}$ , Q = 1.6–1.7, minutely punctate, partly even (almost) smooth; cheilocystidia cylindrical-filiform, somewhat flexuose, 34–47 x 4–6  $\mu\text{m}$ , thin-walled, colourless; pleurocystidia absent. These characters clearly establish the synonymy of *I. velenovskiyi* Hruby with *Hebeloma mesophaeum* (Pers.) Quél.

**versipellis.** — *Agaricus versipellis* Fr., Epicr.: 179. 1838. — *Inocybe versipellis* (Fr.) P. Karst. in Bidr. Känned. Finl. Natur Folk 32: 470. 1879. — *Hebeloma versipelle* (Fr.) Gillet, Hyménomycètes: 524. 1876.

Type non-existent. The species is a member of the genus *Hebeloma* (Fr.) Kumm.

**violaceofusca.** — *Agaricus violaceofuscus* Cooke & Mass. in Grevillea 18: 52. 1890. — *Inocybe violaceofusca* (Cooke & Mass.) Sacc., Syll. Fung. 9: 96. 1891. — *Cortinarius violaceofuscus* (Cooke & Mass.) Mass. in Ann. Bot. 18: 501. 1904 — Fig. 200.

Holotype: England, Forest of Dean, 1887 (K). The holotype showed the following characters: spores 8.5–10.0 x 4.5–5.5  $\mu\text{m}$ , Q = 1.8–2.0(–2.1), verruculose; cheilocystidia absent. The species belongs to the genus *Cortinarius* Fr.

**violascens.** — *Inocybe violascens* Quél. in C. R. Ass. franç. Av. Sci. (Grenoble 1885) 14: 497. 1886.

Holotype non-existent. Iconotype: Quél. in C. R. Ass. franç. Av. Sci. 14: pl. 12, f. 6. 1886. The interpretation of the type-plate is rather ambiguous as it could well represent *I. geophylla* var. *lilacina* (Peck) Gillet, but the possibility that it represents a species of *Cortinarius* Fr. cannot be excluded either. Consequently the name must be regarded as doubtful.

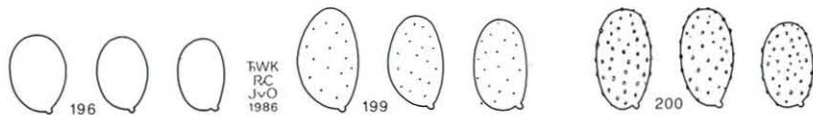


Fig. 196. *Inocybe laevispora*. — Spores (from holotype of *I. laevispora*).

Fig. 199. *Inocybe velenovskiyi*. — Spores (from lectotype of *I. velenovskiyi*).

Fig. 200. *Inocybe violaceofusca*. — Spores (from holotype of *I. violaceofusca*).

**viscidula.** — *Inocybe viscidula* R. Heim, Genre Inocybe: 132. 1931.

Type non-existent. I cannot interpret this species. I have seen a collection made by Heim and labeled *I. viscidula* (Mexico, Jajtepec, 3.VIII.1956, PC) but this collection represents *I. leptocystis* Atk. A synonymy of *I. viscidula* with *I. leptocystis* seems unlikely as Heim indicated for his species thick-walled pleurocystidia.

**zangherii.** — *Inocybe zangherii* Bres., Iconogr. mycol. 15: pl. 743, f. 2. 1930.

I failed to locate authentic material. The species seems to come close to *I. geophylla* (Fr.) Kumm. var. *geophylla* on account of its smooth pileus. New collections are necessary to judge about its status.

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