The genus Inonotus
a synopsis

by

Leif Ryvarden

Fungiflora

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Nomenclatural novelties proposed in this volume:

New species

New combinations:

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Abstract

100 species of *Inonotus* are described and in parts illustrated by drawings of microscopical characters. Keys to all species are provided and a list of the nomenclatural status of all names published in *Inonotus* is given. 10 new *Inonotus* species are described and 6 new combinations in the genus are proposed.

Content

Introduction

Scope
This book is not a monograph in the strict sense since it is not entirely based on studies of type specimens, although for most species this is the case. For some species, such as a number of those described by E. Corner in his late books, the types have been unavailable since his collection, now in the Edinburgh herbarium, is not curated properly. The types of some Russian species have also proved difficult to obtain.

Taxonomy
The genus is here conceived in a very wide manner since the purpose of the book has mainly been to provide a tool for identification of species, more than a to give a taxonomic treatment including subgroups and intergenetic relationships. This must be done by DNA sequencing and this is still lacking for the majority of species. A first attempt to do this has been done by Wagner & Fischer (2002) who included 21 species of the 101 described here, in their analysis. They could demonstrate that the genus in a wide sense as used here, is a polyphyletic group, and that the 21 species came out in 4 different genera which in parts also included species of *Phellinus* s. lato.
Thus, there is no doubt that *Inonotus* as defined here is an artificial genus, with several evolutionary lines connecting to *Phellinus*. However, of practical reasons, the two genera are kept separate for the time being, to make determinations easier.

Type species
As the future may see even more splitting of the genus as conceived here, it may be useful to give a survey of the genera for which *Inonotus* species have been used as types. The genera are listed according to year of publication.
P = Polyporus

P. obliquus Pers.:Fr. – *Phaeoporus* Schroet., Krypt. Fl. Schles. 3:489, 1888.
P. circinatus Ellis & Everh. – *Mucronoporus* J. Mycol. 5:28, 1889.
P. splitbergeri Mont. – *Flaviporellus* Murrill, Bull. Torrey Bot. Cl. 32:485, 1905.
P. radiatus Sowerby:Fr. - *Mensularia*, Lazaro Rev. Acad. Madrid 14:736, 1916.

P. andersonii Ellis & Everh. – *Xanthoporia* Murrill, Mycologia 8:56, 1916.
P. indicus Massee – *Aurificaria* D. A. Reid, Kew Bull. 17:278, 1963.
P. subiculosus Peck – *Inonotopsis* Parmasto, Folia Crypt. Estonica 2:12, 1973.
P. rheades Pers. – *Inocutis* Fiass & Niemelä, Karstenia 24:24, 1984.
P. dryadeus Pers.:Fr. – *Pseudoinonotus* T. Wagner & M. Fischer, Mycol. Res. 105:781, 2001.

Distribution
The distribution given here is by definition given in vague terms for many species and will by all probability later be proven to be far too restricted. There are still vast areas in the tropics where nobody ever has collected properly and not only that, since the basidiocarps in *Inonotus* are often short-lived, you have to be there in the right time. The data used here are partly from my own collections, partly taken from borrowed material and partly for the literature and does not at all intend to be perfect. Many countries still do not have a proper survey of their biodiversity, fungi included, so there is still long way to go before we see the whole distribution for most of the species.

Substrate
For some species we have fairly reliable information about their substrate as they seemingly are more or less restricted to a single tree species or a single genus of hosts. This is especially the fact for many of the temperate species because in the temperate zone, the number of tree-species is rather limited and easier to recognize when a basidiocarp is collected. When the number of different tree-species decreases, which is the case as we go northwards, the number of trees for each species will increase. This situation will favour specialization and selection of phenotypes that are adapted or predisposed for early invasion on a weakened or dying host. In such a case there will always be an enormous number of possible hosts within a reasonable distance of a spore-producing basidiocarp. The chances for not finding a suitable host for such a specialized species are very small indeed.
The situation is opposite in a tropical rainforest where the number of tree species easily can be up to 40 or 60 on a hectare. This situation will favour an opportunistic life strategy since chances for of finding the same tree are very small and a highly specialized species will soon be confronted with extinction. Thus, most tropical polypores have a wide range of hosts. However, it should be added that we may have overlooked any more restricted host-species relationships in a tropical jungle, since it is practically impossible for a collector to name any of the dead trees he see on the forest floor.

INONOTUS P. Karsten,
Medd. Soc. Fauna Fl. Fenn. 5:39, 1880.
Basidiocarps annual, resupinate, effused-reflexed, sessile, or rarely laterally stipitate, tissue yellowish to reddish-brown, darkening in KOH; pileus surface hirsute, hispid, tomentose, or glabrous, yellowish to reddish-brown, often darkened and rimose in age; context brown, soft-fibrous to tough-corky; hyphal system monomitic; hyphae simple-septate, in most species ranging from thin-walled and almost hyaline to thick-walled and brownish in KOH, much branched, setal hyphae present in context or trama of some species; hymenial setae present in most species, usually hymenial or subhymenial in origin, subulate to ventricose, pointed, pale to dark brown in KOH; basidia clavate to broadly ellipsoid, 4-sterigmate, simple-septate at the base; basidiospores cylindrical, ellipsoid to ovoid or subglobose, hyaline or golden to reddish brown, smooth, negative or dextrinoid in Melzer's reagent; causing a white rot of living and dead conifers and hardwoods.

Type species: *Polyporus hispidus* Bull.:Fr.
Remarks. The genus is usually easy to recognize by its brown, annual basidiocarps with a fibrous to soft or fragile consistency. The generative hyphae are generally wider than those of the related genus *Phellinus* that is characterized by its woody, perennial basidiocarps and dimitic hyphal system.

Key to species

CONDENSED KEY

1. Basidiocarp resupinate to nodulose **2**
1. Basidiocarp distinctly pileate or effused reflexed **3**

2. Hymenial setae absent ..... **Key A**
2. Hymenial setae present ..... **Key B**

3. Species from Australia and/or New Zealand ..... **Key C**
3. Species from other continents or countries **4**

4. Setal hyphae present in dissepiments ..... **Key D**
4. Setal hyphae absent in dissepiments **5**

5. On coniferous wood ..... **Key E**
5. On hardwoods **6**

6. Granular core present in context ..... **Key F**
6. Granular core absent from context **7**

7. Hymenial setae absent **8**
7. Hymenial setae present **9**

8. Basidiocarp with a black cuticle or a black line below a thin tomentum . **Key G**
8. Basidiocarps without a black cuticle or black line in context ..... **Key H**

9. Hymenial setae hooked ..... **Key I**
9. Hymenial setae straight ..... **Key J**

Main Key

KEY A

Basidiocarps resupinate to nodulose, hymenial setae absent

1. Setal hyphae presen **2**
1. Setal hyphae absent **6**

2. Basidiospores globose **3**
2. Basidiospores ellipsoid **4**

3. Basidiospores 6-7 µm in diameter, in East Africa ..... **I. pegleri**
3. Basidiospores 4.5-5 µm in diameter, Central America, ... **I. marginatus**

4. Basidiospores 9.5-12 µm long, Japan .....**I. boninense**
4. Basidiospores 7-8, 5 µm long, ...**5**

5. Pores xx, on *Salix* in China ..... **I. pruinosus**
5. Pores 6-8 per mm, spores hyaline, known from Australia .. **I. setuloso-croceus**

6. Species on coniferous wood, pores 1-3 per mm, basidiocarps cottony .....
..... **I. subiculosus**
6. Species on hardwoods, pores, 2-6 per mm, basidiocarps dense **7**

7. Basidiospores rusty brown, pores 2-4 per mm, South American species .....
.....**I. venezuelicus**
7. Basidiospores hyaline to pale yellow, pores 4-6 per mm, Asian species..... **8**

8. Basidiospores globose, 7-8 pores per mm ..... **I costaricensis**
8. Basidiospores ellipsoid, pores 2-6 per mm **9**

9. Subiculum with a black line next to substrate, basidiospores ellipsoid, 4-5 µm wide, known only from Malaysia .....**I. truncatisporus**
9. Subiculum without black line next to the substrate, basidiospores narrowly ellipsoid, 2.5-3.5 µm wide, known only from China..... **I. exiliformis**

KEY B
Basidiocarps resupinate to nodulose, hymenial setae present

1. Basidiocarps developing inside tree-cavities or under bark of dead trees..... **2**
1. Basidiocarps developing on trunks and stumps..... **6**

2. Basidiocarps inside tree-cavities..... **3**
2. Basidiocarps under bark of dead trees **4**

3. Pores angular, 3-4 per mm, basidiospores hyaline to pale yellowish, chlamydosporic basidiocarps absent, in Central Asia on *Populus* ..... **I. iliensis**
3. Pores 8-10 per mm, basidiospores pale brown, in Europe, often on *Quercus*, black chlamydosporic basidiocarps present around opening of cavity .....
..... **I. nidus-pici**

4. Pores 1-5 per mm, basidiospores 5.5-8 x 4.5 µm, usually on *Quercus*, rarely on *Caraya* ..... **I. andersonii**
4. Pores 5-6 per mm, basidiospores 7-10 µm long, on *Betula* and *Ulmus* **5**

5. Setal hyphae absent, normally on *Betula*, rarely on other hardwoods .... **I. obliquus**
5. Setal hyphae present, on *Ulmus* ..... **I. ulmicola**

6. Setal hyphae absent..... **7**
6. Setal hyphae present **10**

7. Basidiospores 4-7 µm long, hyaline to pale yellow **8**
7. Basidiospores 9-11 x 6-8 µm, rusty brown, on *Nothofagus* in South America ... . **I. crustosus**

8. Basidiocarps nodulose, boreal to temperate species, on *Fagus* 9
8. Basidiocarps resupinate, on hardwood in Malaysia, pores 6-9 per mm .... **I. perchocolatus**

9. European species, basidiospores oblong ellipsoid 5-6 x 3-3.5 µm.. **I. nodulosus**
9. Japanese species, basidiospores sub ellipsoid 4.5-5 x 4-4.5 µm..... **I japonicus**

10. Pores 5-7 per mm, basidiospores 10-13 x 8-12 µm, tropical America .... **I. micantissimus**
10. Pores 3-5 per mm, basidiospores smaller **11**

11. Pores tiny, 6-8 per mm, ... **I. setuloso-croceus**
11. Pores larger **12**

12. Pores irregular to daedaleoid, 1-3 per mm, setae 25-60 µm long, known only from Taiwan, ... **I. chihshanyenus**
12. Pores round to angular, 3-5 per mm, setae 12-30 µm long, known from the temperate zone **13**

13. Basidiocarps widely effused, basidiospores 5-7 µm long, North America..... ..... **I. glomeratus**
13. Basidiocarps small, resupinate to semi nodulose, basidiospores 4.5- 5.5 µm long, Europe on *Fagus* ..... **I. hastifer**

KEY C
Basidiocarps pileate, species from Australia and New Zealand.

1. Setal hyphae present in dissepiments..... **2**
1. Setal hyphae absent from dissepiments **4**

2. Basidiocarps resupinate, pores 6-8 per mm ..... **I. setuloso-croceus**
2. Basidiocarps pileate, pores 1-4 per mm..... **3**

3. Basidiocarps sessile, imbricate, pileus glabrous to tomentose, pores 2-4 per mm .....**I. rodwayii**
3. Basidiocarps semistipitate, pileus hispid, pores 1-3 per mm..... **I. albertinii**

4. Granular core present in context **5**
4. Granular core absent in context **6**

5. Basidiospores 7.5-10 x 5.5-7 µm, hymenial setae present, but rare ....**I. chondromyelus**
5. Basidiospores 5-6 x 4-5 µm, hymenial setae absent .....**I. ungulatus**

6. Setae absent, basidiospores shorter than 6.5 µm..... **7**
6. Setae present, basidiospores longer than 6.5 µm **8**

7. Basidiospores rusty brown, pores 5-7 per mm ..... **I. lloydii**
7. Basidiospores hyaline, pores 2-4 per mm ..... **I. pirisporus**

8. Basidiospores rusty brown, on *Nothofagus* .....**I. nothofagi**
8. Basidiospores hyaline, on other hardwoods **9**

9. Pileus with a thin crust, context brown to cinnamon, setae 12-28 µm long ....**I. victoriensis**
9. Pileus finely tomentose, context pale ochraceous, setae 30-70 µm long .... **I. luteocontextus**

KEY D
Basidiocarps pileate, setal hyphae present in dissepiments and/or trama

1. Basidiospores longer than 9 µm..... **2**
1. Basidiospores shorter than 9 µm **5**

2. Spores hyaline **3**
2. Spores coloured **4**

3. Spores 7-8 µm wide ..... **I. pacificus**
3. Spores 4.8-6 µm wide ..... **I. navisporus**

4. On *Quercus* in United States, basidiocarps sessile to ungulate ...**I. quercustris**
4. On buried roots in Malaysia, basidiocarp fan shaped to semistipitate .....
..... **I. duostratosus**

5. Chlamydospores present in context or on pileus .....**I. rickii**
5. Chlamydospores absent from basidiocarps **6**

6. Short setal hyphae or tramal setae present in the bottom of the tubes, ...
basidiospores cylindrical ..... **I. gracilis**
6. Setal hyphae long and embedded in trama, basidiospores ellipsoid **7**

7. Basidiospores 6-9 µm long **8**
7. Basidiospores up to 6 µm long **12**

8. Pores 1-3 per mm, Australian species..... **9**
8. Pores, 3-5 per mm, African – American species **10**

9. Upper surface dull and smooth, hymenial setae abundant, basidiospores pale
rusty brown .....**I. rodwayii**
9. Upper surface hispid, hymenial setae absent or very rare, basidiospores pale
yellow ..... **I. albertinii**

10. Context more or less homogenous, setal hyphae only in trama **11**
10. Context duplex with a thin black line, setal hyphae in trama, upper context
and pileus tomentum, at least close to the base, African species..**I. ochroporus**

11. Basidiospores oblong ellipsoid, 4-5.5 µm wide, wide spread...**I. patouillardii**
11. Basidiospores broadly ellipsoid, 5.5-7 µm wide, known only from Hawaii Islands .....**I. hemmesii**

12. Hymenial setae absent, basidiocarps dimidiate, central American species .... **I. dentiporus**
12. Hymenial setae present, basidiocarps effused reflexed to imbricate and broadly attached **13**

13. Basidiospores 3.2-4.1 µm wide, setal hyphae absent from context, pores 5-7 per mm, Chinese species .....**I. indurescens**
13. Basidiospores 4-5.5 µm wide, pores 3-5 per mm, American and Indian species **14**

14. Basidiocarps resupinate to effused reflexed, North America .....**I. glomeratus**
14. Basidiocarps distinctly pileate, neotropical species..... **I. pseudoglomeratus**

KEY E
Basidiocarps pileate, setal hyphae absent in dissepiments, growing on coniferous wood

1. Hymenial setae absent, on *Juniperus*..... **I. juniperinus**
1. Hymenial setae present, on different hosts **2**

2. Setae straight **3**
2. Setae hooked **4**

3. Basidiospores 6.5-8 x 5-6 µm, pale rusty brown, setae 20-40 µm long Asian species .....**I. vallatus**
3. Basidiospores 5-6 x 3-4 µm, hyaline, setae 50-70 µm long .....**I. tomentosus**

4. Setae 25-40 µm long, basidiospores 6-8 x 5-7 µm, rarely on conifers .... **I. dryadeus**
4. Setae 50-80 µm long, basidiospores 5-6.5 x 3-4 µm, always on conifers **5**

5. Basidiocarps usually imbricate on trunks, more rarely fan shaped and developed from the roots, tubes 5-10 mm deep, consistency fragile, usually on *Picea*, boreal species .....**I. leporinus**
5. Basidiocarps usually semi stipitate to fan shaped, single or in small groups from roots or stumps, often triquetrous, woody hard, tubes 2-5 per mm deep, usually on *Pinus*, temperate continental species ..... **I. triqueter**

KEY F

Basidiocarps pileate, setal hyphae absent in dissepiments, growing on hardwood, granular core present at base of basidiocarp

1. Basidiospores hyaline to pale yellow **2**
1. Basidiospores rusty brown **4**

2. Pileus glabrous, cracked with age, known only from Australia **3**
2. Pileus hispid to tomentose, known only from the Northern hemisphere **6**

3. Pileus without black cuticle ..... **I. chondromyelus**
3. Pileus with thin black cuticle, basidiospores ellipsoid, 5-6 x 4-5 µm, pores 4-5 per mm ..... **I. ungulatus**

4. Asian species on *Prunus* spp., basidiocarps rarely more than 1.5 x 2.5 x 1 cm, context up to 2 mm thick ..... **I. mikadoi**
4. Widespread species on other hosts, basidiocarps large, context up to 2 cm thick **5**

5. Boreal species, pileus persistently hispid and brown, basidiospores 5-6 x 3.5-4 µm, circumpolar, boreal-continental species, on *Populus* ..... **I. rheades**
5. Pileus hispid, becoming glabrous and black, basidiospores 7-9.5 x 5-7 µm, subtropical-temperate species, on *Tamarix* ..... **I. tamaricis**

6. Basidiospores 7-10 µm long, upper surface becoming black and scaly, on *Proposes* and *Acacia* in Southern United States ..... **I. texanus**
6. Basidiospores 6-8 µm long, upper surface ochraceous to rusty brown, glabrous, on *Quercus*, *Populus* and other hardwoods, North Temperate Zone **7**

7. Upper surface hispid to tomentose becoming glabrous, pores angular to round, 1-2 per mm, tubes up to 8 cm deep, context hyphae agglutinated, usually on *Populus*, Kazakhstan ..... **I. levis**
7. Upper surface tomentose to glabrous pores regular and round 2-3 per mm, tubes up to 3 cm deep, context hyphae loosely interwoven, usually on *Quercus*, widespread in the temperate zone ..... **I. dryophilus**

KEY G

Basidiocarps pileate, setal hyphae and hymenial setae absent, growing on hardwood, granular core absent at base of basidiocarp, black cuticle present on pileus or below a thin layer of tomentum

1. Basidiospores 5-7 µm long **2**
1. Basidiospores up to 5 (5.5) µm long **5**

2. Basidiospores ellipsoid, 6-7 x 3-4 µm ..... **I. flammans**
2. Basidiospores broadly ellipsoid, 5-7 x 4.5-6 µm **3**

3. African-Asian species ..... **I. euphoriae**
3. American species **4**

4. Pores 4-6 per mm, basidiospores pale golden brown ..... **I. serranus**
4. Pores 3-4 per mm, basidiospores rusty to umber brown ..... **I. jamaicensis**

5. Pores angular, 2-4 per mm, basidiospores 2.5-3 µm wide ..... **I. shorae**
5. Pores round, 4-8 per mm, basidiospores 3.5-4.5 µm wide **6**

6. Pores 7-8 per mm, American species ..... **I. luteoumbrinus**
6. Pores 4-6 per mm, Asian species ..... **I. poncei**

Key H

Basidiocarps pileate, setal hyphae absent in dissepiments, growing on hardwood, granular core absent at base of basidiocarp, hymenial setae absent, black cuticle absent from pileus

1. Basidiospores longer than 6 µm **2**
1. Basidiospores shorter than 6 µm **12**

2. Basidiocarps flabellate to semistipitate, tropical species **3**
2. Basidiocarp sessile, temperate to tropical species **5**

3. Basidiospores almost globose, Asian species **4**
3. Basidiospores ellipsoid, South American species ..... **Coltricia duportii**

4. Pores 5-7 per mm, basidiospores 7-10 µm in diameter ..... **I. sideroides**
4. Pores 8-10 per mm, basidiospores 6-7 µm in diameter ..... **I. novoguinensis**

5. Basidiospores subcylindrical 6.5-8 x 3- 4 µm, Chinese species .....**I. fushanus**
5. Basidiospores different **6**

6. Upper surface glabrous to finely velutinate **7**
6. Upper surface hispid to coarsely scrupose..... **10**

7. On palms in Africa, pores 1-2 per mm..... **I. palmicola**
7. On different hosts, pores smaller **8**

8. Pores 4-5 per mm, Central American species ..... **I. neotropicus**
8. Pores 2-4 per mm, Asian - African species **9**

9. Basidiospores 8-11 x 6.5-8 µm, known from *Salix* and *Populus* in Algeria .....
.....**I. plorans**
9. Basidiospores 6.5-7.5 x 4-5.5 µm, East Asian species .....**I. clemensiae**

10. Basidiospores 8-11 x 6.5-8 µm, pores 1-3 per mm, usually on *Quercus*, wide-spread .....**I. hispidus**
10. Basidiospores and pores smaller **11**

11. Upper surface hispid, basidiospores 5-6.5 µm wide, Central Asian species on *Tamarix* spp. ..... **I. subhispidus**
11. Upper surface hirsute to tomentose, basidiospores 4.5-5 µm wide, alpine African species on *Phillipia (*Ericaceae*)* ..... **I. afromontanus**

12. Basidiospores hyaline to pale yellow **13**
12. Basidiospores brown **19**

13. Setigerous elements present on the pileus, North American species .**I. munzii**
13. Setigerous elements absent on the pileus **14**

14. Pores 2-4 per mm, individual pores even larger **15**
14. Pores 4-10 per mm **17**

15. Australian species, basidiocarps sessile, basidiospores piriform..**I. pirisporus**
15. African-American species, basidiocarps often substipitate or dimidiate, on burnt wood or on dead wood **16**

16. Basidiocarps robust, lateral to centrally stipitate, up to 3 cm thick at base, pileus dark brown basidiospores dextrinoid, pores round to angular .... **Coltricia fragilissima**
16. Basidiocarps small and dimidiate, up to 1.5 mm thick at base, basidiospores non-dextrinoid, pores angular and in parts radially elongated ..... **I. dentatus**

17. Australian species, basidiospores dextrinoid ..... **I. australiensis**
17. American –Asian species, basidiospores non-dextrinoid **18**

18. Basidiocarp tiny, rarely above 3 mm wide, basidiospores 4.5-6 µm long, American species .....**I. pusillus**
18. Basidiocarps robust, up to 10 cm wide, often semistipitate and hard, basidiospores globose 5-6 µm in diameter, temperate Asian species .....**I. scaurus**

19. Pores 4-10 per mm **20**
19. Pores 2-4 per mm, individual pores even larger **23**

20. Australian species, not red with KOH, basidiospores subglobose ..... **I. lloydii**
20. American species, red with KOH, basidiospores oblong ellipsoid **21**

21. Pores 10-12 per mm, ... **I. minutoporus**
21. Pores 3-6 per mm **22**

22. Tropical species, no contorted hyphae on pileus ..... **I. splitbergeri**
22. Temperate species, 5-6 per mm, contorted hyphae projecting on the pileus ....**I. porrectus**

23. American species ..... **I. ludovicianus**
23. Asian species **24**

24. Indian species, on different hardwoods, pileus glabrous .....**I. tenuicarnus**
24. Japanese species on *Prunus*, pileus radially strigose, scrupose or warted ....**I. mikadoi**

KEY I
Basidiocarps pileate, setal hyphae absent in dissepiments, growing on hardwood, granular core absent at base of basidiocarp, **setigerous elements present on pileus and/or hymenial setae hooked**

1. Setigerous elements on pileus..... **2**
1. Setigerous elements absent from pileus **3**

2. Setae hooked, widespread in the temperate zone..... **I. cuticularis**
2. Setae straight, western North America .....**I. farlowii**

3. Setae hooked **4**
3. Setae straight **11**

4. Basidiospores 5-8 µm in longest dimension **5**
4. Basidiospores shorter than 6 µm in longest dimension **7**

5. Pileus hispid, basidiospores yellow to rusty brown, subcylindrical, 6-7.5 x 4-5 µm wide, known only from Jamaica ..... **I. fulvomelleus**
5. Pileus rugose to scrupose, basidiospores hyaline, ellipsoid to sub-globose widespread on *Quercus* **6**

6. Wide spread in the temperate zone, setae 22-40 µm long, basidiospores 6-7.5 µm long ..... **I. dryadeus**
6. Known only from the Indian subcontinent, setae 10-25 µm, basidiospores 4.5-5.5 µm long .....**I. brevisporus**

7. Basidiospores rusty brown, pileus villose to hispid, tropical America .... **I. fimbriatus**
7. Basidiospores hyaline to golden yellow, pileus glabrous to finely tomentose.. **8**

8. Pores 3-5 per mm **9**
8. Pores 5-9 per mm **10**

9. Setae usually 30-50 µm long and curved, on *Platanus* in Western USA..... ..... **I. arizonicus**
9. Setae 15-30 µm long and hooked, widespread in the temperate zone, often on *Alnus,* but known from numerous other hardwoods .....**I. radiatus**

10. Basidiospores 3-4 x 3-3.5 µm, pores 5-7 per mm, Nepal .....**I. hamusetulosus**
10. Basidiospores 4-4.5 x 3-3.5 µm, pores 7-9 per mm, North America ....**I. crocitinctus**

KEY J

Basidiocarps pileate, setal hyphae absent in dissepiments, growing on hardwood, granular core absent at base of basidiocarp, hymenial setae straight

1. Basidiospores cylindrical, 5-6.5 x 2 µm .....**I. flavidus**
1. Basidiospores ellipsoid to subglobose **2**

2. Pores 2-3 per mm, basidiospores 8-11 µm long..... **I. hispidus**
2. Pores 3-7 per mm, basidiospores shorter than 8 µm **3**

3. Pores 5-7 per mm, basidiospores rusty to umber brown **4**
3. Pores 3-5 per mm, basidiospores hyaline to pale yellow **7**

4. Basidiospores 4-5 µm long, pore surface yellow..... **I. pseudoradiatus**
4. Basidiospores longer than 5 µm, pore surface cinnamon to deep brown **5**

5. Australian species on *Nothofagus*, ...**I. nothofagi**
5. Asian-American species..... **6**

6. Basidiospores 6-7.5 long, Asian species .....**I. diverticulosa**
6. Basidiospores 5-6.5 long, American species .....**I. pertenuis**

7. Spores 7-8.5 µm long, a thin black zone below a fine tomentum or on the pileus, Australian species **8**
7. Spores shorter, black zone absent from pileus, from other parts of the world...**9**

8. Setae 50-70 µm long, context light-coloured, ... **I. luteocontextus**
8. Setae 12-30 µm long, context brown .....**I. victoriensis**

9. Basidiospores 3.5-4 x 2-2.5 µm, Taiwan species..... **I. formosanus**
9. Basidiospores longer **10**

10. Basidiocarps small and nodulose, hymenial setae 15-25 µm long, European temperate species, usually on *Fagus* ..... **I. nodulosus**
10. Basidiocarp distinctly pileate, hymenial setae 20-40 µm long, tropical species **11**

11. Species from South America, upper surface adpressed velutinate **12**
11. Species from Borneo, upper surface strigose-villose ..... **I. agathidis**

12. Pore surface yellow, red with KOH, hymenial setae slender, 4-7 µm wide .... **I. xanthoporus**

12. Pore surface brown, black with KOH, hymenial setae stout, 10-14 µm wide .. ..**I. pseudoradiatus**

DESCRIPTION OF SPECIES

IMPORTANT
The reader should be aware that some characters shared by all species are not repeated in the description of each species. This is the case with the following: All basidiospores are smooth, and all generative hyphae have simple septa. Hymenial setae and setal hyphae are all dark brown and smooth.
Any reaction in Melzer´s reagent is only reported when positive, i.e. dextrinoid or amyloid.

Inonotus adnatus Ryvarden, Fig. 1
Synopsis Fung. 15:70, 2002.
Basidiocarps annual, resupinate, up to 4 cm in diameter, strongly adnate, probably tough when fresh, hard and dense when dry, pore surface ochraceous, dull, margin thin to absent, pores round to angular, 7-9 per mm, not visible to the naked eye, tubes brown, up to 3 mm deep, context cinnamon, very thin, virtually absent in parts.
Hyphal system generative hyphae thin to thick-walled, golden to rusty brown, 3-5 µm wide.
Setal hyphae abundantly present, acute, thick-walled, up to 150 µm long, 10-25 µm wide, embedded in trama and not projecting.
Hymenial setae present, ventricose to more rarely clavate, thick-walled, 20-45 x 7-16 µm
Basidia not seen.
Basidiospores globose, slightly thick-walled, pale yellow, 7-8 µm in diameter.
Substrata. On unknown dead hardwood.
Distribution. Known only from the type locality in Costa Rica.
Remarks. This species is easily separated from other resupinate species in the area by the combination of large globose basidiospores and presence of both hymenial setae and setal hyphae. The collection was dry when collected, thus, the pore surface when fresh will probably be darker than described here.

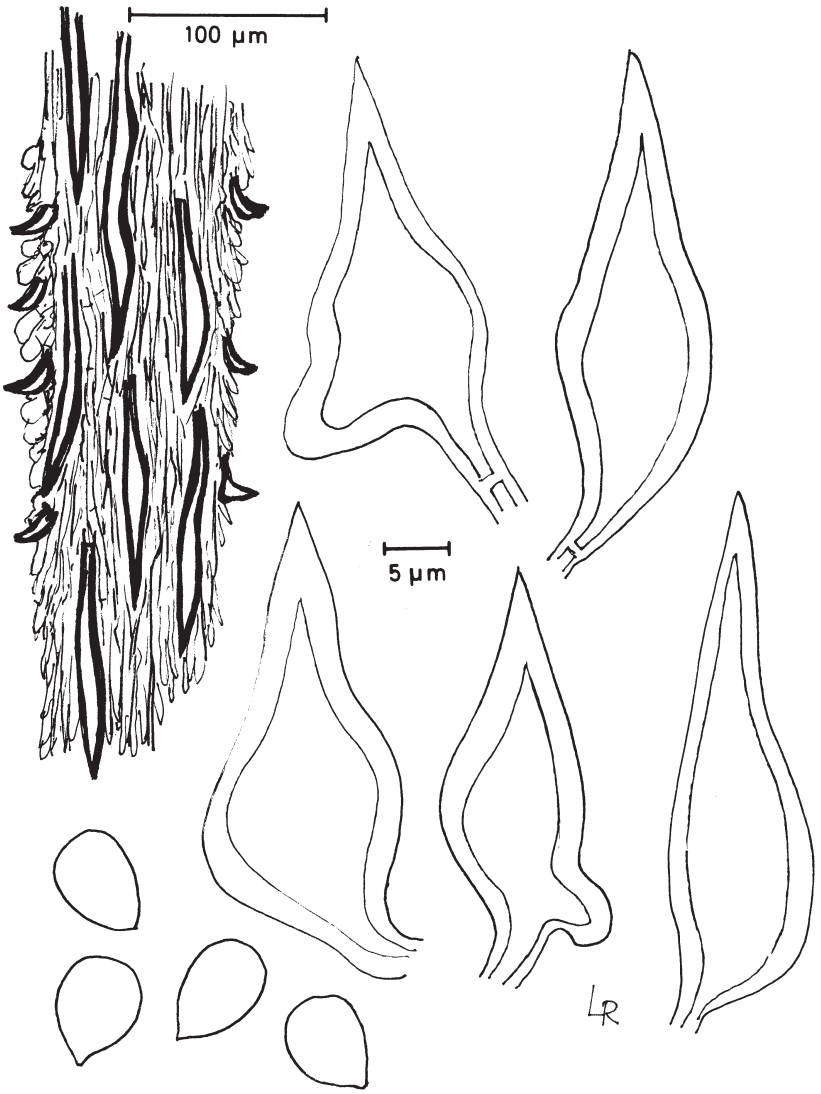

Fig. 1. Inonotus adnatus A) Section of tube, B) setae, C) basidiospores. From the holotype.

Inonotus afromontanus Ryvarden,
Kew Bulletin 54: 802, 1999.
Basidiocarp annual, effused reflexed, individual pilei up to 1.5 cm wide, 3 cm long, often fused with adjacent pilei to more compound shelf-like structures, up to 2 cm thick measured vertically, soft when fresh, slightly contracting and brittle when dry, upper surface first hirsute to scrupose and reddish brown, later becoming glabrous and black in zones, pores surface reddish brown, pores thin-walled and angular 2-3 per mm, tubes concolorous to 1 cm deep, context up to 8 mm thick, dark rusty brown and homogeneous.
Hyphal system monomitic, generative hyphae pale yellow to rusty brown, thick-walled, 2-4 µm in diameter.
Setal hyphae and **hymenial setae** absent.
Basidia clavate, 12-15 x 4-6 µm with four sterigmata.
Basidiospores ellipsoid, rusty brown, thick-walled, 7.5-8 x 4.5-5 µm.
Substrata. Known only from *Philippia* spp. (Ericaceae).
Distribution. Known only from the type locality in Inyanga Nat. Park in Zimbabwe. However, as the host genus is widespread in East African mountains, the species will probably also be found in other localities.
Remarks. The species belongs in the *I. hispidus* group because of the fairly large spores and lack of setal elements. However, the spores are smaller than those of *I. hispidu*s, besides that the basidiocarps are minute compared with the commonly massive basidiocarps of *I. hispidus* which also stay hispid to strigose.

Inonotus agathidis Corner,
Beiheft Nova Hedw. 101:52, 1991.
Basidiocarps annual, sessile, applanate, dimidiate to semicircular, up to 18 cm in diameter, up to 4 cm thick at the base, upper surface dark rusty brown, azonate, strigose-villose with tufted hyphae, more adpressed and smooth towards the margin, pore surface concolorous with upper surface, pore angular, 3-4 per mm, tubes to 5 mm deep, context up to 2 cm thick, fibrous and dark rusty brown.
Hyphal system monomitic, generative hyphae in the context and tomentum wide and sparingly septate, 6-20 µm wide, in the dissepiments, trama and along the margin more narrow and 4-8 µm wide and rusty to yellowish brown.
Setal hyphae none.
Hymenial setae subcylindrical to ventricose, acute, 25-40 x 6-10 µm often with a subhymenial elongated root.
Basidia 26-30 x 8-10 µm with 4 sterigmata.
Basidiospores ellipsoid, hyaline to pale yellow, thin-walled, 5-7 x 4-5.5 µm.
Substrata. *Agathis* spp (family in here).
Distribution. Known only from high elevations in Borneo (Malaysia).

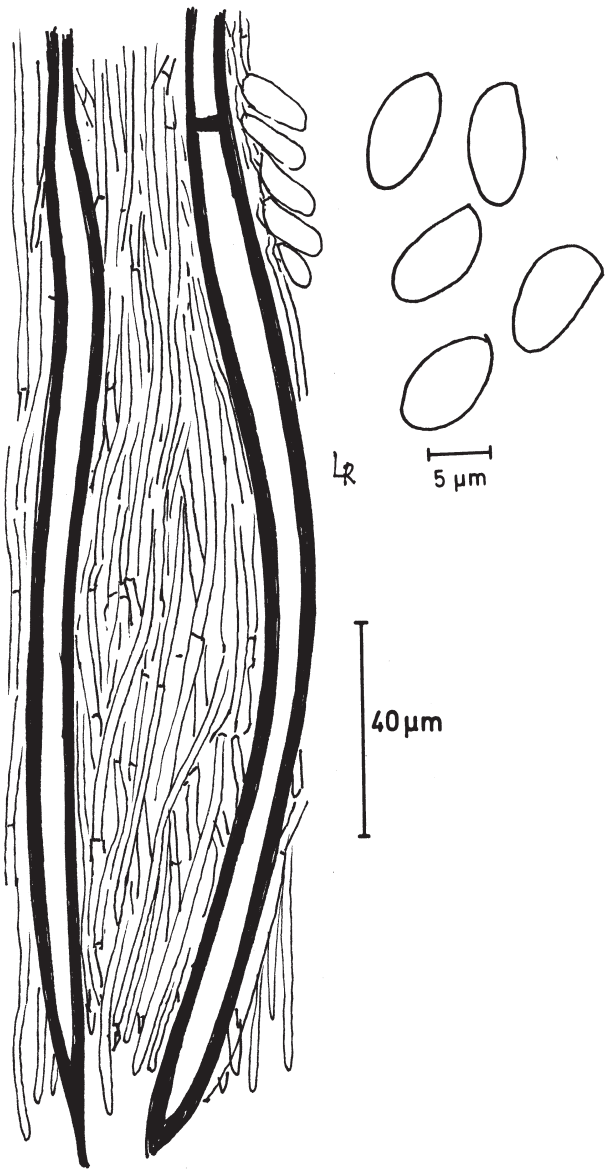

Fig. 2. *Inonotus albertinii*, section of tubes with setal hyphae and basidiospores. From the holotype.

Remarks. The species seems to be in an isolated position with its large basidiocarps, presence of setae and small, hyaline to pale yellow spores.

Inonotus albertinii (Lloyd) P.K. P. K. Buchanan & Ryvarden, Fig. 2
Mycotaxon 31:12, 1988. - *Polyporus albertinii* Lloyd, Lloyd mycol. Writ. 3: 160, 1912. - *Inonotus hispidans* G. Cunn., New Zeal. Dep. Sci. Ind. Res. Bull. 164: 263, 1965.
Basidiocarp annual, solitary, dimidiate to semistipitate with a short tapering, central, lateral to slightly eccentric stipe, soft when fresh, corky to brittle when dry, up to 17 cm in diameter or wide, 2.5 cm thick at the central part or base, upper surface deep rusty brown to umber, first hispid to villose often in tufts, by age adpressed and crested or radiate, finally with a papery surface but no cortex below the tomentum, stipe short and expanding, up to 4 cm long, 3 cm in diameter, tomentose to soft and concolorous with pileus, pore surface deep rusty brown, pores angular 1-3 per mm, up to 15 mm deep, context rusty brown, up to 10 mm deep, fibrillose with upper hyphae bending into the villose to hispid tomentum.
Hyphal system monomitic, generative hyphae pale yellow to rusty brown, up to 12 µm wide in sections, often collapsed in microscopic preparations, sparingly branched.
Setal hyphae present, rare in the context, abundant in the trama and the dissepiments, pointed, straight to partly pointing into and slightly above the hymenium, 8-12 x 120-140 µm.
Hymenial setae rare, apparently absent in some specimens, ventricose, 12-15 x 5-7 µm.
Basidia not seen.
Basidiospores ellipsoid, abundantly present, pale yellow brown, slightly thick-walled, 7-9 x 4.5-5.5(6) µm.
Substrata. From roots of dead and living *Eucalyptus* .
Distribution. Eastern part of Australia.
Remarks. The species is characterized by the dimidiate to semistipitate basidiocarp, the hispid pileus, the numerous setal hyphae and the distribution. *I. duostratosus* from Malaysia is undoubtedly the closest relative, separated mainly by its larger spores (9-12 x 7-9 µm). *I. sideroides* has similar basidiocarps, but much smaller pores and more globose basidiospores.

Inonotus albomarginatus Corner,
Beiheft Nova Hedw. 101:54, 1991.
Basidiocarps annual, sessile, applanate,, dimidiate, up 10 cm wide and long, up to 2.5 cm thick at the base, upper surface smooth to subtuberculate with small warts, matted, fawn brown becoming blackish from the base as the upper hyphae

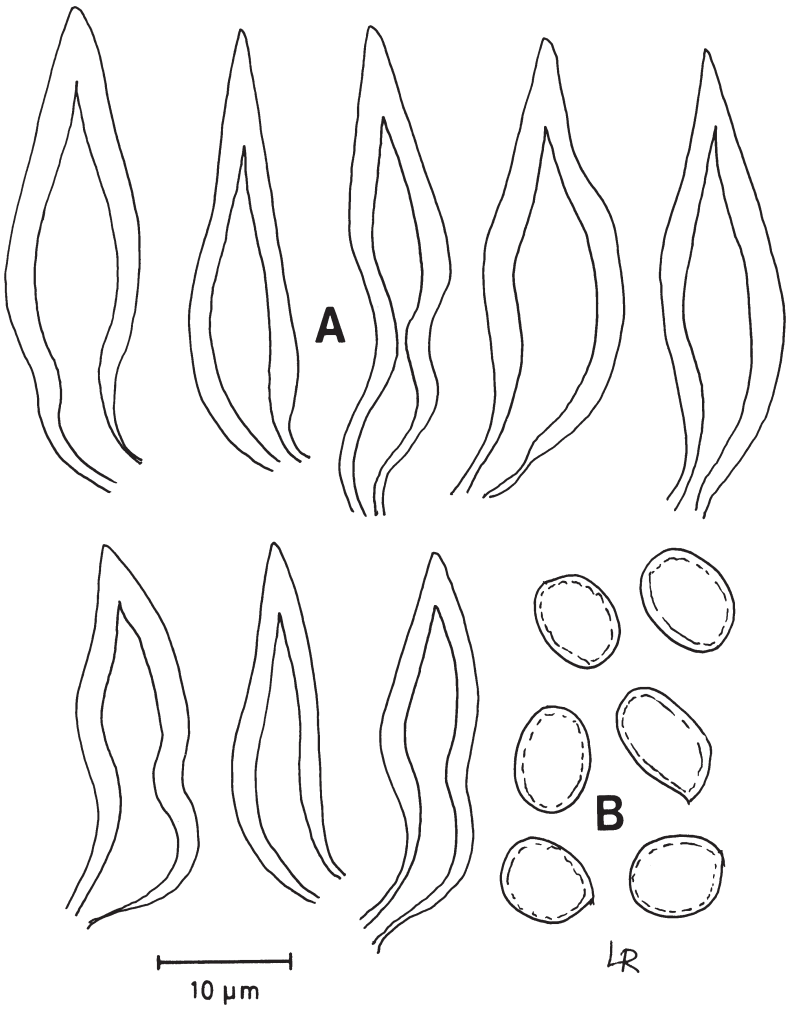

Fig. 3. *Inonotus andersonii*, hymenial setae and basidiospores, Parmasto 101 847, Primorsk, Russia.

starts to agglutinate, margin light coloured, white to cream white in actively growing specimens, pore surface fuscous brown, pores subangular, 3-5 per mm, tubes to 2 cm deep, friable and brittle, context light cinnamon to dark rusty brown, up to 2 cm at the base, homogenous and with a thin cuticle developing from the base.
Hyphal system monomitic, generative hyphae monomitic with simple septa. 2-6 µm wide, pale brown to hyaline at the margin.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores ellipsoid, hyaline, thin-walled, 4-5 x 3-3.5 µm.
Substrata. Unknown hardwood.
Distribution. Malaysia.
Remarks. The species is identical with *I. tenuicarnus* from India except for smaller and hyaline basidiospores (5-7 x 3.5-4 µm and being rusty brown in *I. tenuicarnus*).

Inonotus andersonii (Ellis et Everhart) Cerny, Fig. 3
Ceska Mycol. l7:l, 1963. - *Mucronoporus andersonii* Ell. et Everh., Jour. Mycol. 6:79, l890- *Xanthochrous krawtzewii* Pil., Bull. Soc. Mycol. Fr. 49:273, 1934.
Basidiocarps annual, resupinate, widely effused, up to 50 cm or more, hard and brittle when dry, developing under outer layers of sapwood or under bark and rupturing the bark, margin fertile in specimens studied, pore surface bright yellowish-brown to dark dull brown, often very rough and with peg-like outgrowths, becoming cracked, the pores circular to angular, very variable in size, ranging from l-6 per mm, with thick, entire dissepiments that usually become thin and deeply lacerate, context yellowish-brown to dark reddish-brown, azonate, firm, up to l mm thick, tube layer concolorous with the context or sometimes shining yellow-brown, up to l cm thick but often with peg-like extensions up to 2 cm long.
Hyphal system monomitic and generative hyphae mostly pale yellowish-brown to darker brown in KOH solution, thin- to moderately thick-walled, with occasional branching, 2.5-5 µm in diam,
Setal hyphae rare to frequent, thick-walled, 3-6 µm in diam, tramal hyphae pale yellowish to darker brown, thin- to thick-walled, 3-6 µm diam.
Hymenial setae frequent, scarcely projecting or imbedded in the hymenial layer, subulate to ventricose, 20-45 x 8-11 µm.
Basidia clavate, l7-20 x 5-6 µm.
Basidiospores broadly ellipsoid, yellowish, thick-walled, 5.5-8 x 4-5 µm.
Substrata. Mainly on *Quercus,* but also on *Carya*.
Distribution. Eastern U.S. and Gulf Coast Regions, also in South-western U.S.

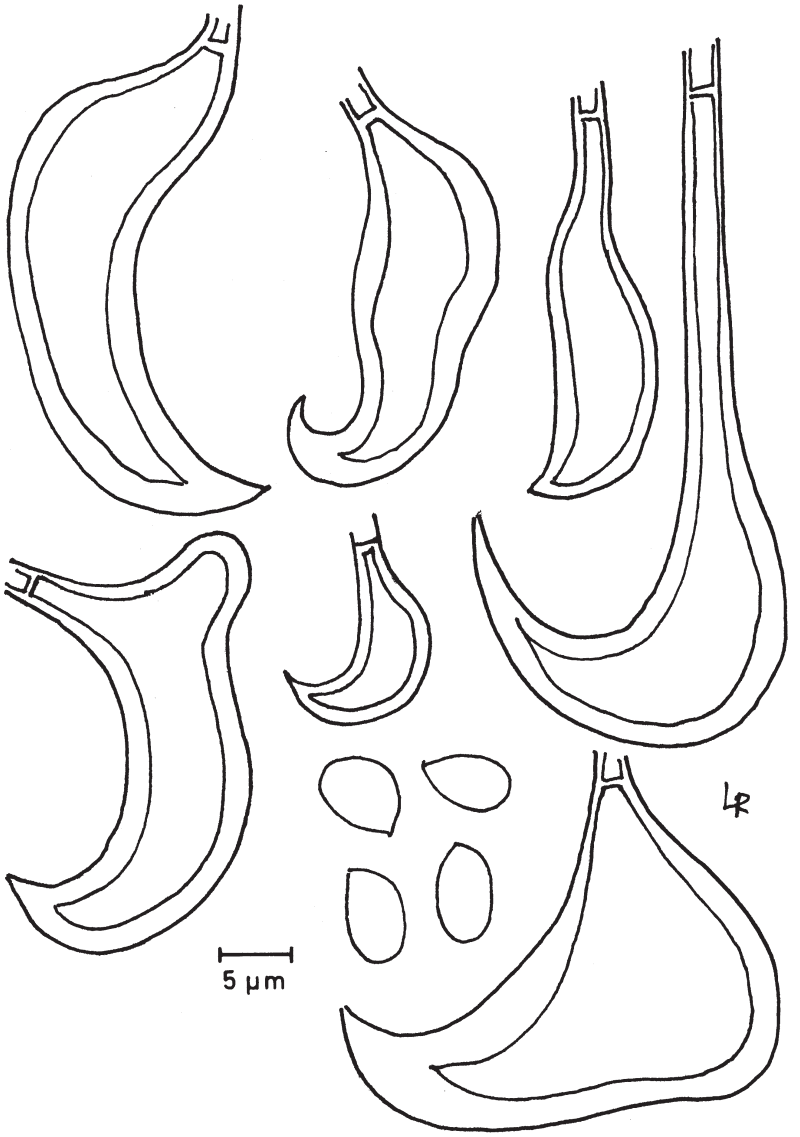

Fig. 4 Inonotus arizonicus. Hymenial setae and basidiospores, from an isotype.

to California and north to Oregon along the Pacific Coast, Korea, Japan, rare in central Europe.
Remarks. Basidiocarps of *I. andersonii* generally begin development under the outer rings of the sapwood and split off these outer layers as the fungus mature and begins to sporulate. The spore deposits are a bright golden yellow. *I. andersonii* is similar to *I. obliquus* in its growth habit and pathogenicity. The latter occurs mainly on birch in boreal regions and the ranges of the two species do not overlap.

Inonotus arizonicus Gilbn. Fig. 4
Southwest. Nat. 14:123, 1969.
Basidiocarps annual, sessile or effused-reflexed, consisting of a single pileus or several imbricate pilei, ungulate to applanate, up to 8 cm thick, 13 cm wide, and 11.5 cm deep, upper surface finely matted-tomentose, snuff brown to warm buff, becoming glabrous or eventually blackened and rimose with age and weathering, margin rounded, cinnamon-buff to warm-buff, sterile below, lower surface dark brown when fresh bruising darker on handling, drying brown, glancing and with a bright sheen when viewed obliquely, pores angular, 3-5 per mm, with thin, lacerate dissepiments, context homogeneous, faintly zonate, dark brown, fibrous-corky, tending to tear along lines of fibre orientation, lustrous on cut surfaces, up to 7 cm thick, tube layer concolorous, becoming brittle on drying, up to l cm thick, spore print bright golden yellow context with clusters of coarse hyaline crystalline material scattered throughout.
Hyphal system monomitic, hyphae easily separated, pale yellowish and thin-walled to dark reddish-brown and thick-walled, 3-8 µm diam.
Hymenial setae frequent, thick-walled, ventricose to subulate, strongly to slightly hooked at the tip, 20-50 µm long and 12-20 µm diam at the widest part, projecting up to 25 µm.
Basidia clavate, 4-sterigmate, 12-13 x 4.5-5 µm.
Basidiospores golden yellow, ovoid to ellipsoid, often flattened or slightly depressed on one side, 4-6 x 3-4 µm.
Substrata. Known only from *Platanus wrightii* and *P. racemosa.*
Distribution. Apparently restricted to southern Arizona, southeastern New Mexico and southern California. Probably present in northern Mexico.
Remarks. This is a highly distinctive species with hooked setae and small, pigmented basidiospores as diagnostic characters. Although its geographical distribution is limited, it is quite common in the area wherever sycamores grow. Basidiocarps develop on the surface of the main trunk or in the large basal cavities so common in large Arizona sycamores. *Inonotus arizonicus* will continue to decay wood in dead standing and fallen trees and is occasionally found fruiting on them also.

Inonotus australensis Ryvarden species nov
Fructificatio sessilia ad stipitata, pileus et stipes ferruginosus, pori facies umbrina, pori rotundi, 6-7 per mm, tubi et contextus ferruginosus, systema hypharum monomiticum, hyphae generatoriae afibulatae, ferruginosus ad aureum, hyphae setales absentia, setae nulla, basidiosporae subglobosae hyalinae ad pallidus luteus 4-5 x 3-3.5 µm, dextrinoideae.
Holotype: Australia, New South Wales, Hornsby, 16 May 1976, R. Goldsack no 6043 in NSW, isotype in O.
Basidiocarp annual, solitary to imbricate, substipitate with a lateral tapering partly flattened stipe to fan shaped and semicircular in outline, up 10 cm wide from the base to the margin, up to 1.5 cm thick in single pilei, thicker in more composite basidiocarps, probably soft when fresh, hard and fragile when dry, upper surface dull, azonate, finely adpressed velutinate, rusty to ochraceous brown, pore surface whitish to pale rusty brown, pores round, 6-7 per mm, tubes thin walled, fragile, up to 8 mm deep, concolorous with the pore surface, context rusty brown, homogenous, rusty brown distinctly darker than the tubes, up to 7 mm thick at the base.
FHyphal system monomitic, generative hyphae, pale yellow to rusty brown, up to 10 µm wide in the context, 3-5 µm wide in the trama.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores subglobose, hyaline to pale yellowish, slightly thick-walled, dextrinoid in Meltzer's reagent, 4-5 x 3-3.5 µm.
Substrata. Noted on *Eucalyptus* sp. and *Rondia* sp, besides dead branches on the ground
Distribution. Known only from Australia.
Remarks. The species is striking by the combination of a substipitate basidiocarp, a total lack of setal organs and subglobose dextrinoid basidiospores.
I. pirisporus Pegler seems to be related, but has piriform basidiospores 5-6 x 3.5-4.5 µm and larger pores, i.e. 2-4 per mm.
Specimens examined. Australia, New South Wales, Myall Lakes National Park, Seal Rocks, Bridge Hill Ridge, M. Jose 30, 12. March 1985 (NSW, O), Australia, Queensland, Lamington National Park, Buna, Buna 26. may 1953, W. Green 3371 (MEL, O), Australia, New South Wales, Pennant Hills, Cumberland Forest, 17. April 1982, R. Coveny 13/1982 (NSW, O), Australia, Victoria, Friday Creek, 4. July 1963 H. J. Cane, CISRO 9278 (MEL, O).

Inonotus austropusillus Ryvarden species nov.
Ad *Inonotus pusillus* sed sporae 3-4.5 x 2.5-3 µm (4.5-6 x 3.5-4.5 µm in *I. pusillus*). Holotype: Japan, Sendai, Leg. A. Yasuda, 25. April 1923, O.

Basidiocarps minute, flabelliform to semipendant , up to 4 mm wide and broad and to 3 mm thick at the base, upper surface yellowish brown, dull, glabrous, pore surface rusty to umber, pores angular, 4-6 per mm, tubes concolorous, context rusty brown, very thin.
Hyphal system monomitic, generative hyphae golden to rusty brown, 3-6 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores ellipsoid. hyaline to pale yellow, abundantly present, 3-4.5 x 2.5-3 µm.
Substrata. Dead hard woods.
Distribution. Known only from Sendai in Japan.
Remarks. The very small, semipendant basidiocarps and the lack of setal characters should be sufficient to recognize this species.

Inonotus boninensis Hattori & Ryvarden, Fig. 5
Mycotaxon 49:210, 1993.
Basidiocarp, resupinate, woody pore surface dark brown, pores angular, 3-4 per mm, dissepiments thin to moderate, tubes up to 8 mm, concolorous with pore surface, context very thin, up to 1 mm, concolorous with pore surface.
Hyphal system monomitic, generative hyphae 2.5-4 µm wide, hyaline to rusty brown, thin to thick walled, moderately branched.
Setal hyphae abundant both in dissepiments and context, 10-25 µm wide, 100 to 300 µm long in dissepiments, up to 700 µm long in context, thick walled, pointed, tramal setal hyphae mostly buried in the trama and rarely projecting into hymenium.
Hymenial setae not seen.
Basidia 15-22 x 7.5-10 µm, ellipsoid, with 4 sterigmata, without a basal clamp.
Basidiospores ellipsoid, 9.5-12 x 5-7.5 µm(length / width:1.5-2.0), hyaline to pale brown, with or without one oily drop.
Substrata. Known only from *Persea kobu* (Lauraceae).
Distribution. Anijima Is., Bonin Islands, Japan.
Remarks. The large basidiospores, the setal hyphae and the resupinate basidiocarps make this a very characteristic species.

Inonotus brevisporus (Thind & Chat.) Sharma Fig. 6
Hymenochaetaceae India p. 76, 1995. - *Inonotus dryadeus* Pers.:Fr. var. *brevisporus* Thind & Chat. Indian Phytopat. 13:82, 1960.
Basidiocarps annual, sessile, solitary or imbricate, applanate to ungulate, dimidiate, up to 8-24 cm wide, 7-18 cm wide and 1-2 cm thick at the base, upper

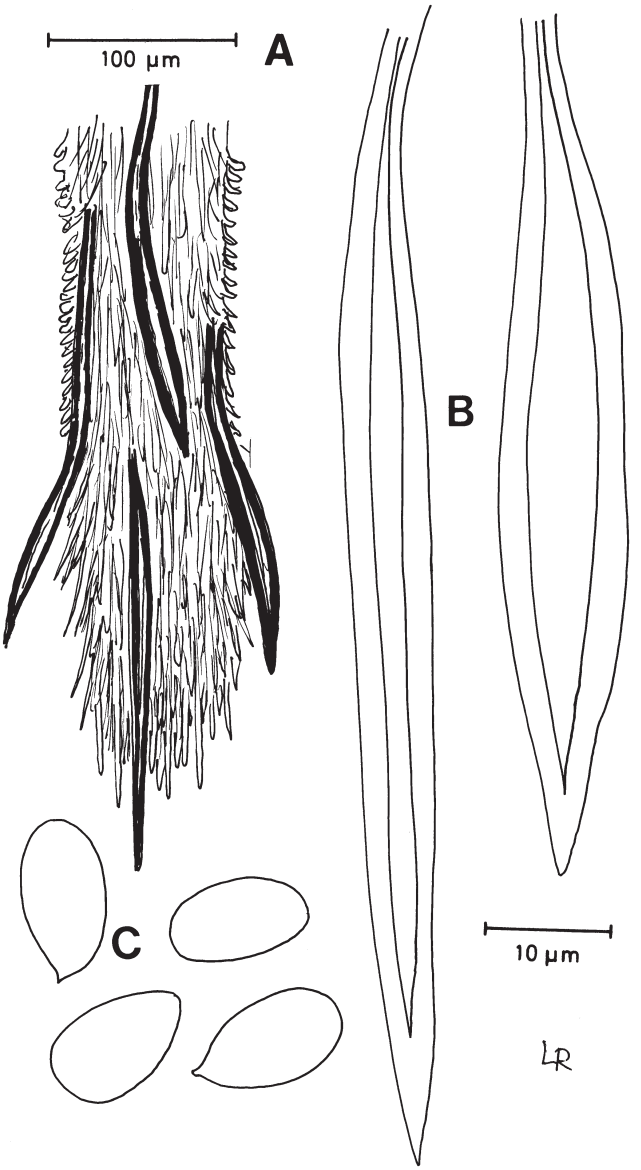

Fig. 5. *Inonotus boninense*, A) section through ta tube, B) setal hyphae C) basidiospores. From an isotype.

surface buff to dark brown, very finely tomentose or glabrous, faintly zonate, radially rimose with age, margin concolorous sharp, pore surface pale brown, often with exuding droplets of amber liquid in fresh specimens, becoming dark brown and cracking with age, the pores circular or angular, 5-7 per mm, with thin, entire dissepiments, tube layer concolorous, up to 2 cm thick, context bright yellowish-brown at first to reddish-brown in older specimens, soft, fibrous, zonate,
Hyphal system monomitic, hyphae varying from pale brown in KOH and thin-walled to dark brown and thick-walled, with occasional branching, 3-7 µm in diam, tramal hyphae uniformly pale brownish, thin-walled to moderately thick-walled, with rare branching, 5-9 µm wide.
Hymenial setae usually frequent, ventricose, usually hooked, 10-25 x 4-7 µm.
Basidia broadly clavate to ovoid, 4-sterigmate, 8-14 x 7-9 µm.
Basidiospores subglobose, hyaline, becoming thick-walled, dextrinoid in Meltzer's reagent, 4.5-5.5 x 3.5-5 µm.
Substrata. Only found on *Quercus*.
Distribution. Known only from North West India.
Remarks. The species is closely related to *Inonotus dryadeus* and is mainly distinguished by the smaller basidiospores and setae.

Inonotus chihshanyenus Chang & Chou
Mycol. Res. 102:788, 1998.
Basidiocarps annual, resupinate, woody, pore surface pale to dark brown, pores angular, elongate, in parts irregular and daedaleoid, 1-3 per mm, tubes concolorous, up to 2 mm deep, subiculum about 0.5 mm, dark brown.
Hyphal system monomitic, generative hyphae, hyaline to pale rusty brown, thin-walled to thick-walled, 2.5-5 µm wide.
Setal hyphae present both in context and dissepiments, 10-30 µm wide, 100-280 µm long, acute, mostly embedded, rarely projecting into the hymenium.
Hymenial setae present, abundant, fusiform and straight, 25-60 x 5-10 µm.
Basidia clavate 15-20 x 6-8 µm.
Basidiospores broadly ellipsoid to subglobose, hyaline to pale brown, 5-6.5 x 6.5-9 µm.
Substrata. The type was collected on *Melicope merrillii*.
Distribution. Known only from Taiwan.
Remarks. The irregular and large pores, the setal hyphae and the fairly long hymenial setae should be diagnostic for this species.

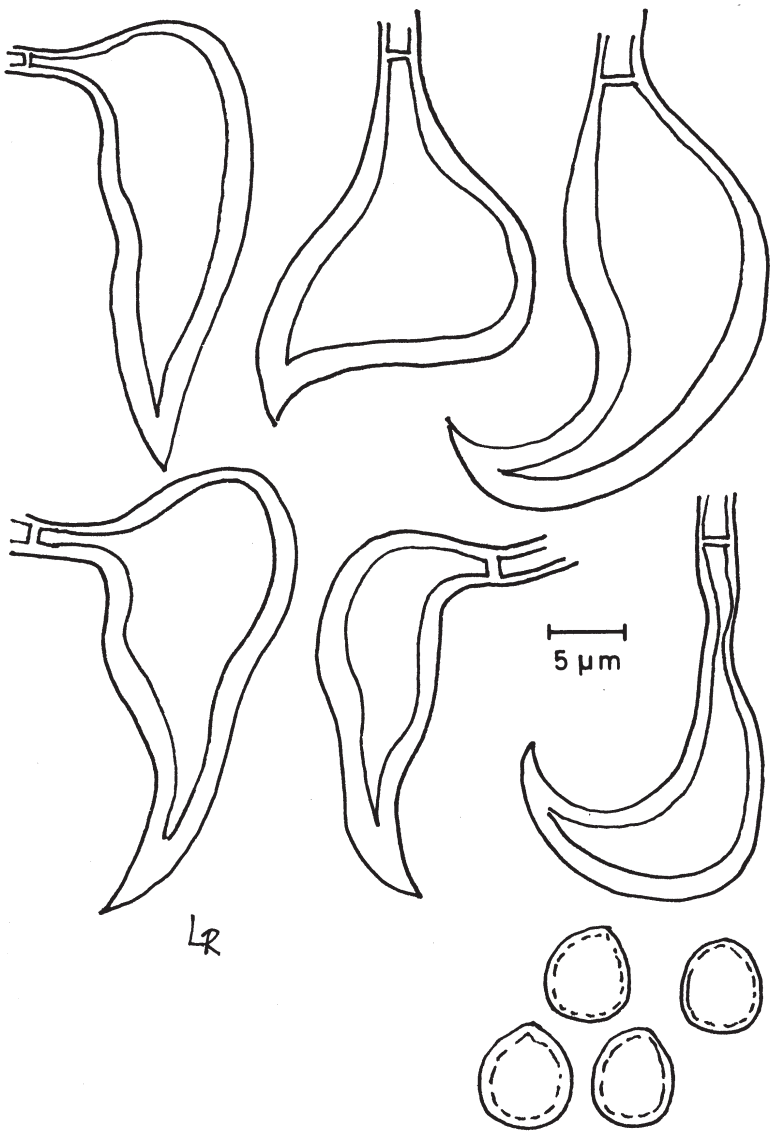

Fig. 6. *Inonotus brevisporus*, hymenial setae and basidiospores, Bakshi 48, Mundale, India.

Inonotus chondromyelus Pegler Fig. 7.
Trans. Br. mycol. Soc. 47:167, 1964.
Basidiocarps annual, sessile, dimidiate, ungulate to triquetrous in section, often imbricate to confluent with adjacent basidiocarps, up to 5 cm wide and thick, upper surface glabrous, cinnamon to rusty brown, by age developing a crust which may become rimose or radially rugose, margin acute to obtuse, entire, undulate, pore surface umber to dark rusty brown, flat to convex, in fresh specimens often curved with a white pruina due to fresh hyphal growth, pores round to angular, in part irregular, 2-4 per mm, tubes up to 14 mm deep, rusty brown, context dominated by a large granular core next to the Substrata, rusty brown with numerous white spots or streaks, core up to 3 cm in diameter, context proper concentrically zoned, fibrous, watery when fresh, soft and brittle when dry, in section with a silky shine, cinnamon to rusty brown, paler towards to the pileus.
Hyphal system monomitic, generative hyphae, thin-walled, yellow to hyaline, interwoven, sparingly branched, 2-5 µm wide, in the context rusty brown with a thickened wall, 4-10 µm wide.
Setal hyphae absent.
Hymenial setae present, rare, often in groups in certain parts of the tubes, thick-walled ventricose to subulate, 22-35 x 7-14 µm.
Basidia clavate, 12-15 x 7-8 µm.
Basidiospores ellipsoid, sometimes unilaterally flattened, hyaline to pale yellowish, 7.5-10 x 5.5-7 µm.
Substrata. *Eucalyptus*, often fruiting high above the ground.
Distribution. Australia.
Remarks. The host, distribution, the pilear crust or cortex and the large granular core characterize this species.

Inonotus clemensiae Murrill,
Bull. Torr. Bot. Cl. 35:401, 1908.
Basidiocarp annual, single or more commonly in imbricate large clusters, single pilei dimidiate and applanate, fleshy when fresh, light and fragile when dry, individual pilei up to 10 cm wide and 4 cm thick, upper surface velutinate becoming smooth and glabrous with age and weathering, soft, dark brown to chestnut, easily crushed when touched with a finger, pores angular, 2-4 per mm, tubes fragile, rusty brown and up to 4 mm deep, context soft and light of weight, fragile, up to 3 mm thick.
Hyphal system monomitic, generative hyphae, often agglutinated and embedded in resinous substances, easily broken in microscopical preparations, 3-7 µm wide.
Setal hyphae and **hymenial setae** absent.

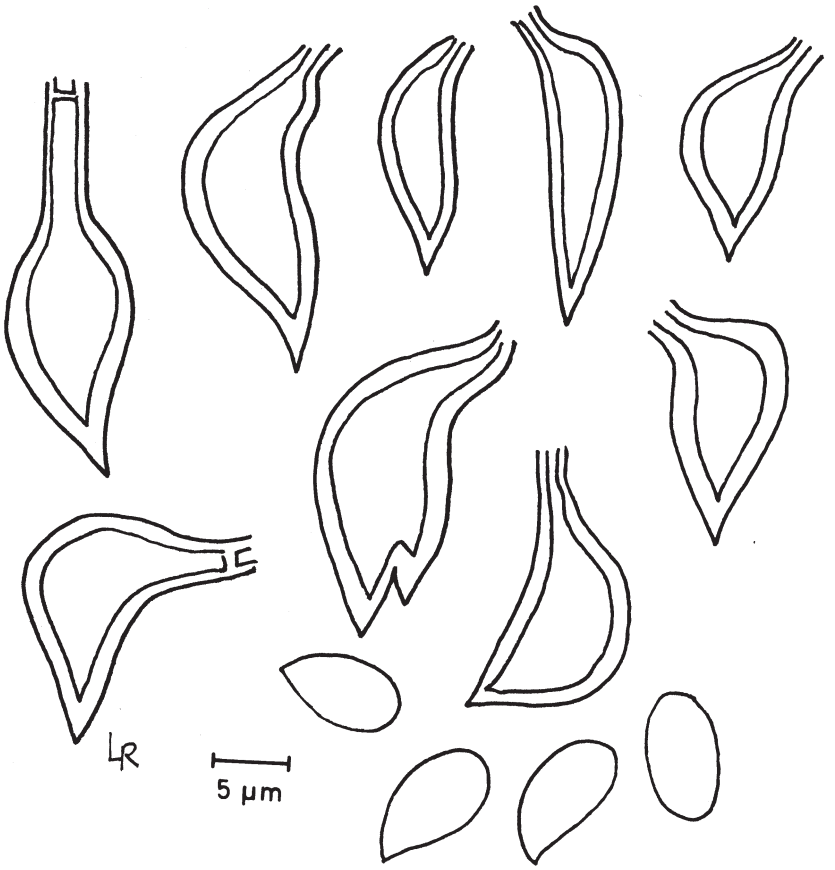

Fig. 7. *Inonotus chondromyelus*, hymenial setae and basidiospores, P. Buchanan, New Zealand, Craigburn Forest Park.

Basidia not seen.
Basidiospores ellipsoid, rusty brown to fulvous brown, thick-walled, 5-8 x 4-5.5 µm,
Substrata. Dead hard wood.
Distribution. Known from the Philippine Islands and Japan.
Remarks. The large fragile basidiocarps with a total lack of setal organs besides the East Asian distribution should be sufficient to recognize this species. It is similar to *I. ludovicianus* from Southern United States and could be looked upon as a subspecies of this species.

Inonotus costaricensis Ryvarden,
Synopsis Fung. 15:72, 2002.
Basidiocarps annual, resupinate, individual basidiocarps more or less circular, up to 6 cm in diameter, soft when fresh, hard and brittle when dry, pore surface greyish brown, shiny when turned in incident light in fresh condition, slightly also so when dry, margin thin and narrow and pale cinnamon, pores round to angular, 7-8 per mm, not visible to the naked eye, tubes deep brown, up to 3 mm deep, context very thin, cinnamon.
Hyphal system monomitic, generative hyphae thin to thick-walled, golden to rusty brown, 3-5 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia 10-12 x 7-8 µm with 4 sterigmata.
Basidiospores globose, slightly thick-walled, pale yellow in 3% KOH, 5.5-6.5 (7) µm in diameter.
Substrata. On unknown dead hardwood.
Distribution. Known only from the type locality in Southern Costa Rica.
Remarks. This species is easily separated from other resupinate species in the area by the combination of globose basidiospores and a total lack of setal organs. *I. venezuelicus* is another resupinate species lacking setal organs, but this species has larger pores (3-4 per mm), a black line next to the Substrata and ellipsoid basidiospores.

Inonotus crocitinctus (Berk. & W. A. Curtis) Ryvarden, Fig. 8
Norw. J. Bot. 19:232, 1972. - *Polyporus crocitinctus* Berk. & W. A. Curtis J. Linn. Soc. Bot. 10:311, 1868.
Basidiocarps annual, sessile, dimidiate, probably fleshy when fresh, hard and brittle when dry, up to 2 cm wide and long, up to 4 mm thick at the base, upper surface dark cinnamon, glabrous, smooth to slightly wrinkled in dry condition, basal portion becoming reddish-brown, laccate, with a fine crust in section, pore surface cinnamon, pores round, almost invisible to the naked eye, 7-9 per mm,

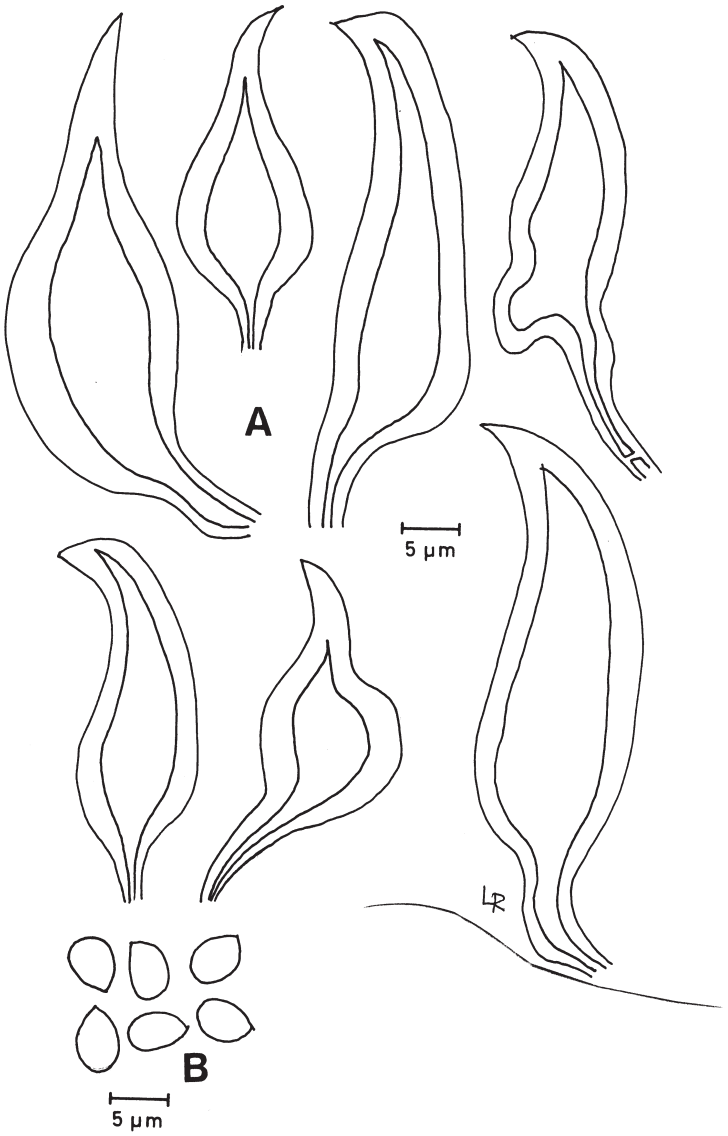

Fig. 8. Inonotus crocinctus, A) hymenial setae, B) basidiospores, from the holotype.

tubes concolorous with pore surface, up to 2 mm deep, context dense, golden brown, l-2 mm thick, homogeneous.
Hyphal system monomitic, contextual hyphae 3-5 µm wide with slightly thickened walls, pale yellow, those of the trama similar, but in the subhymenium more thin-walled and hyaline.
Hymenial setae subulate to ventricose and hooked with slightly to moderately thickened walls, thick-walled, dark brown 20-50 x 7-15 µm.
Basidia not seen.
Basidiospores broadly ellipsoid, hyaline to pale yellowish, 4-4.5 x 3-3,5 µm,
Substrata. Type annotated as "on logs", no other information available.
Distribution. Known from Cuba, Jamaica and Costa Rica and will probably be found all over the Caribbean.
Remarks. The species is close to *I. radiatus* and *I. arizonicus* but is separated by smaller spores and pores.

Inonotus crustosus (Speg.) Wright & Deschamp.
Fl. Crypt. Tierra del Fuego 9(3): 21, 1975. - *Polyporus crustosus* Speg., Bol. Acad. Cien. Cordoba 11: 64, 1887.
Basidiocarps resupinate, annual, effused, decurrent, adnate, margin irregular, coriaceous when fresh, rigid and fragile when dry, pore surface rusty brown, pores angular, 2-4 per mm, partly split along the margin, context thin, rusty brown.
Hyphal system monomitic, generative hyphae, yellow to rusty brown, in the subhymenium 2.5-4.5 µm wide, in the trama and context wider and more thick-walled, 3.5-10 µm wide.
Hymenial setae present, pointed, 24-30 x 8-13.5 µm.
Basidia not seen.
Basidiospores subglobose, pale to rusty brown, 9-11 x 6.5-8 µm.
Substrata. *Nothofagus* spp.
Distribution. Known only from Tierra del Fuego in Argentina.
Remarks. The resupinate basidiocarp, the host and the large spores make this a characteristic species.

Inonotus cuticularis (Bull.: Fr.) P.Karsten, Fig. 9
Medd. Soc. Fauna Fl. Fenn. 5:37, 1879. - *Polyporus cuticularis* Bull.: Fr., Syst. Mycol. l:363, 1821. - *Boletus cuticularis* Bull. Herb. France pl. 462, 1789.
Basidiocarps annual, sessile, solitary or in imbricate clusters, dimidiate, applanate, up to 5 x 11 x l.5 cm, upper surface yellowish brown, tomentose or radially fibrillose, becoming glabrous and finally blackened and rimose, azonate or faintly zonate, smooth or shallowly sulcate, margin concolorous or paler, usually acute, sterile below, pore surface pale brown, glancing, the pores angular, 4-5 per

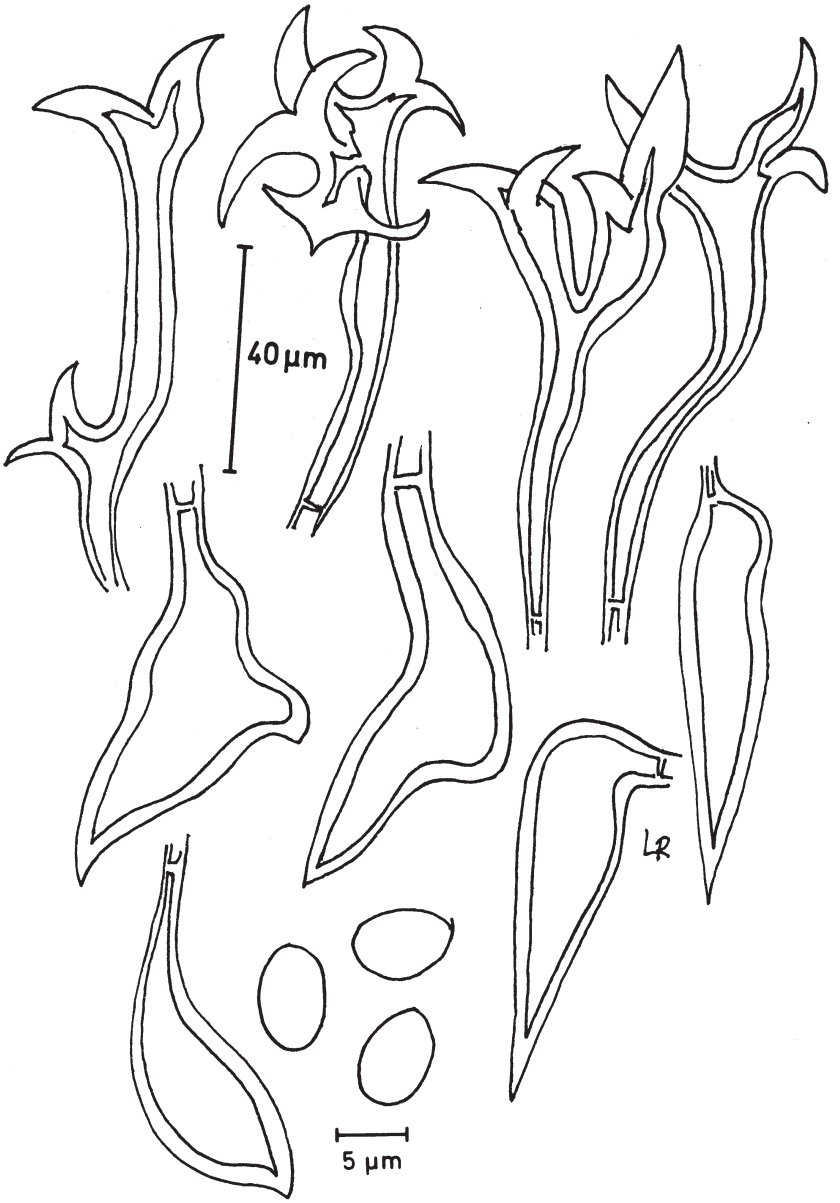

Fig. 9. *Inonotus cuticularis*, branched setae from the pileus, hymenial setae and basidiospores, Germany, Bavaria, Ryvarden 8320.

mm, dissepiments thin, entire, fimbriate to granulose, context bright yellowish brown to reddish brown, firm-fibrous, azonate, up to l cm thick, upper tomentum often delimited by a darker, compact layer that forms the upper surface on weathered pilei, tube layer pale brownish, tubes often whitish within, up to 8 mm thick, spore print bright yellowish brown.
Hyphal system monomitic, generative hyphae, pale yellowish, with infrequent branching, in the context 5-11 µm in diam, others thin- to thick-walled, pale brownish to almost hyaline, with frequent branching, 2.5-5 µm wide.
Setal hyphae branched, abundant on pileus surface, firm- to thick-walled, branching pattern variable, monopodial to dichotomous, branches often curved, main axis up to 12 µm in diam, simple, unbranched setal elements similar to hymenial setae also present on hymenial surface.
Hymenial setae abundant to rare, subulate to ventricose, frequently hooked, firm- to thick-walled, 16-30 x 6-11 µm.
Basidia broadly clavate, 4-sterigmate, 16-21 x 7-8 µm, simple-septate at the base.
Basidiospores broadly ellipsoid to ovoid, pale to dark yellowish brown, 6-8 x 4.5-5.5 µm.
Substrata. Many hardwood genera.
Distribution. Circumpolar in the temperate zone from eastern U.S. and Canada through Japan, China, Russia and south to central Europe.
Remarks. The setae of *I. cuticularis* are relatively pale coloured with only moderately thickened walls and rarely project beyond the basidia. They are extremely abundant, almost crowded, in some specimens and infrequent in others.

Inonotus dentatus Decock & Ryvarden,
Synopsis Fung. 15:73, 2002.
Basidiocarps annual, pileate and dimidiate with strongly contracted base, semicircular of outline, up 1.5 cm wide and long, 1.5 mm thick at base, fragile and brittle when dry, upper surface shiny golden brown, at the base with raised tufts of loose fibres, becoming adpressed velutinate to fibrous towards the margin, azonate or faintly zonate, no cuticle in section, margin sharp, pore surface golden yellow, pores irregular, 1-3 per mm, angular, in parts radially elongated, up to 1 mm deep, context golden yellow brown, homogenous, up to 0.5 mm thick at base, the whole basidiocarp sharply cherry red with 3% KOH.
Hyphal system monomitic, generative hyphae thin to thick-walled, golden to rusty brown, 3-6 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia clavate, 12-15 x 3-4.5 µm with 4 sterigmata. .
Basidiospores ellipsoid, slightly thick-walled, golden yellow, a few with a dis-

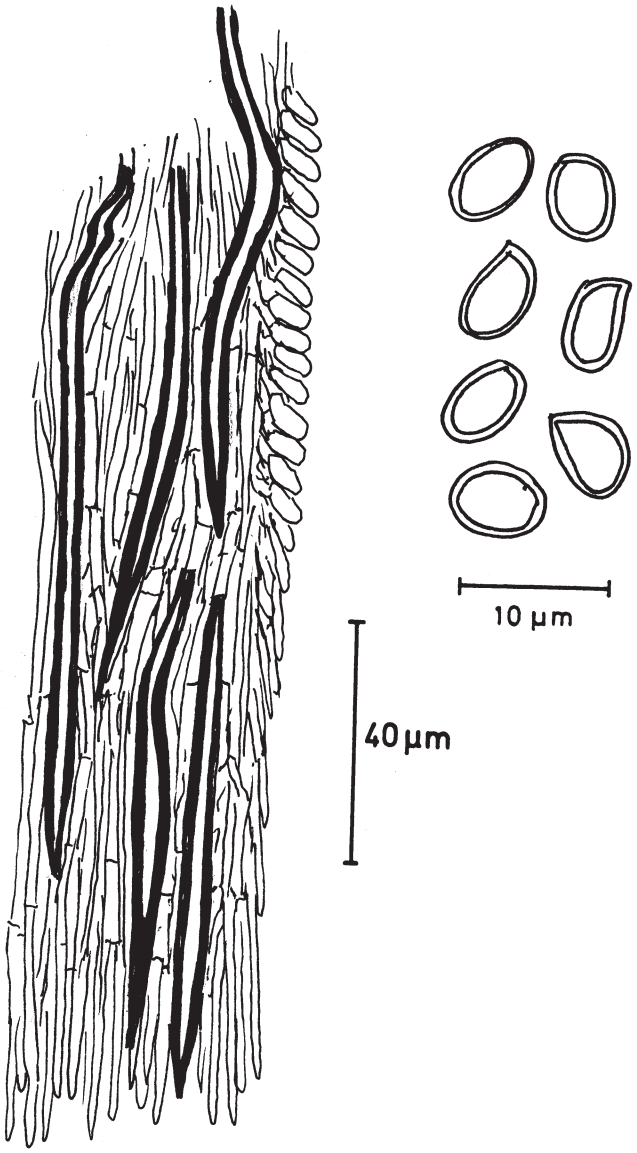

Fig. 10. *Inonotus dentiporus*, section of tube and basidiospores, from the holotype.

tinct oil drop, 4.5-5 x 3-3.5 µm.
Substrata. On unknown dead hardwood.
Distribution. Known only from the type locality at Matouny in French Guyana.
Remarks. This species is remarkable with its small, thin and fragile basidiocarps, the irregular pores and the fibrous hairs on the pileus varying from a vertical clustered position at the base becoming radially flattened and adpressed toward the margin.
The red colour with KOH is distinct, like the one seen in *Inonotus splitgerberi* which also lacks all hymenial organs

Inonotus dentiporus Ryvarden, Fig. 10.
Synopsis Fung. 15:73, 2002.
Basidiocarp annual, solitary or clustered with several partly basidiocarps, dimidiate with distinctly tapering base, semicircular, up to 4 cm in diameter or wide and 1 cm thick at the base, soft when fresh, hard and fragile when dry, applanate when fresh, curled when dry, upper surface glabrous, slightly zoned, yellowish to reddish brown, becoming blackish from base, but no distinct cuticle in section, margin sharp, strongly curled when dry, pore surface deep olivaceous brown and shiny even when dry, pores angular, 3-4 per mm, and with dentate dissepiments, tubes up to 7 mm deep concolorous with the pores surface, inside of pores with numerous small white hyphal pegs, context rusty brown and conspicuously different from the tubes, dense, 3 mm deep, dense, homogenous.
Hyphal system monomitic, generative hyphae pale yellow to rusty brown, 4-6 µm wide in the context, 3-4 µm wide in the trama.
Setal hyphae abundantly present in the trama, embedded and running more or less parallel to the tube walls, up to 180 µm long and 10-20 µm wide and strongly pointed.
Hymenial setae absent.
Basidia not seen.
Basidiospores ellipsoid, abundantly present, yellowish brown, thick-walled, 5.5-6 x 4-5 µm
Substrata. Dead hardwood stump.
Distribution. Known only from the type locality in Costa Rica, Puntarenas prov. Sendero Higuero, Centra Zona protectos Tablas.
Remarks. The species is characterized by the prominent setal hyphae, the angular pores and the ellipsoid spores. The closest relative is undoubtedly *I. patouillardii* which however, usually has large soft basidiocarp, rusty brown colours and larger basidiospores, i.e. 6-8 x 4-5.5 µm.

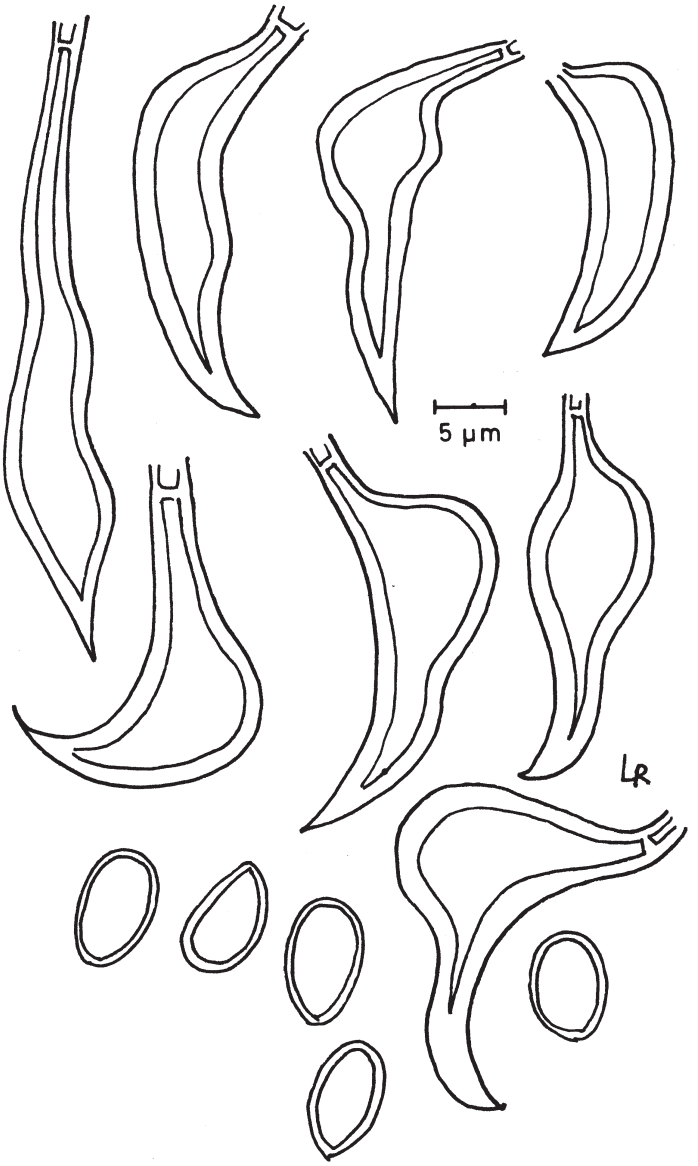

Fig. 11. *Inonotus diverticulosa*. hymenial setae and basidiospores

Inonotus diverticulosa Pegler Fig. 11
Kew Bull. 21:42, 1967.
Basidiocarps annual, imbricate, sessile, effused reflexed or applanate, often confluent, 1-6 x 2-9 cm and up to 3 cm thick at the base, upper surface first velvety to tomentose, pale brown to cinnamon, soon weathered to a radiate strigose surface, concentrically zoned and becoming blackish from the base as a thin, but distinct crust develop, margin thin and deflexed, pore surface plane to convex becoming concave due to margin recurvement, cinnamon to tobacco brown, pores angular, 5-6 per mm, tubes rusty brown to cinnamon, very brittle when dry, becoming black in old specimens, up to 6 mm deep, context very thin, 1-2 mm thick, above tubes, thicker towards the base, cinnamon to rusty brown.
Hyphal system monomitic, generative hyphae in the trama parallel, sparingly branched, yellow to rusty brown, rather thin-walled, 1.5-4 µm wide, in the context wider, 1.5-7 µm wide, not agglutinated except in cuticle on pileus, branching scarce, rusty brown.
Setal hyphae absent.
Hymenial setae present, pointed, lanceolate, sometimes sinuous, often with one to several projections towards the base which in a few cases develop into secondary septa, 15-40 x 5-10 µm, scattered in the tubes.
Basidia not seen.
Basidiospores fulvous to umber brown in KOH, ellipsoid, sometimes unilaterally flattened, mostly with a single oil-drop, 6-7.5 x 4.5-6.5 µm.
Substrata. Known only from dead *Quercus semicarpifoliae* and *Quercus* sp.
Distribution. Northern India and Nepal.
Remarks. As mentioned by Pegler op. cit. the spores are smaller in this species than in *I. nothofagi* which is similar and where the setae arise in the subhymenium while they in *I. diverticulosa* develop deep into the trama and scarcely project into the hymenium.

Inonotus dryadeus (Pers.:Fr.) Murrill, Fig. 12
North Am. Flora 9:86, 1908. - *Polyporus dryadeus* Pers.: Fr., Syst. Mycol. l:374, 1821. - *Boletus dryadeus* Pers. Observ. Mycol. 2:3, 1796.
Basidiocarps annual, sessile, solitary or imbricate, applanate, dimidiate, up to 23 x 35 x 15 cm, upper surface buff to dark brown, very finely tomentose or glabrous, azonate, becoming rimose with age, margin concolorous or sometimes ivory, pore surface buff, often with exuding droplets of amber liquid in fresh specimens, becoming dark brown and cracking with age, the pores circular or angular, 4-6 per mm, with thin, entire dissepiments, context bright yellowish-brown at first to reddish-brown in older specimens, soft, fibrous, zonate, cut surface appearing distinctly mottled because of streaks of darker softer tissue, up to 10 cm

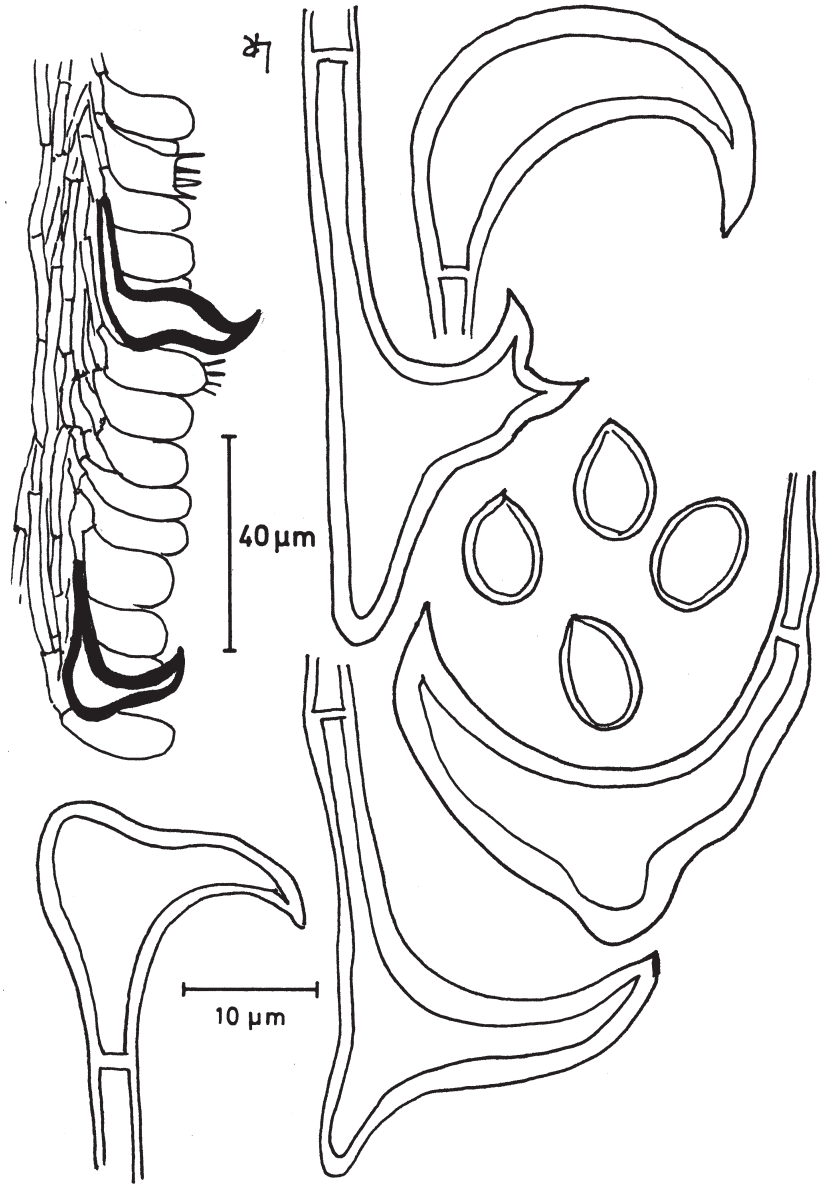

Fig.12. *Inonotus dryadeus*, hymenial setae and basidiospores, England, Windsor Great Park, Ryvarden 8376.

thick, tube layer concolorous, up to 2 cm thick.
Hyphal system monomitic, hyphae pale brown in KOH and thin-walled to dark brown and thick-walled, with occasional branching, 5-14 µm in diam, with a gummy incrustation in some areas, tramal hyphae uniformly pale brownish, thin-walled to moderately thick-walled, with rare branching, 5-9 µm wide.
Hymenial setae usually frequent, rare in some specimens, ventricose, usually hooked, 25-40 x 9-11 µm.
Basidia broadly clavate to ovoid, 4-sterigmate, l0-30 x 9-11 µm.
Basidiospores subglobose hyaline, becoming thick-walled, dextrinoid in Meltzer's reagent, 6-8 x 5-7 µm.
Substrata. In Eurasia and Eastern North America it is most common on *Quercus* spp., but in the south-western U.S. Mexico, and in the Pacific Coast Region it is primarily on *Abies* spp. It is particularly common in stands of *Abies* in northern California, otherwise also seen on *Cedrus, and Pinus.*
Distribution. Circumpolar in the temperate zone.
Remarks. *Inonotus dryadeus* can be readily distinguished by its large basidiocarps, subglobose, hyaline dextrinoid spores, and strongly ventricose, hooked setae. Basidiocarps typically develop at the ground line at the base of infected trees or from roots at some distance from the base.

Inonotus dryophilus (Berk.) Murrill,
Bull. Torrey Bot. Club 31:597, 1904. - *Polyporus dryophilus* Berk., London J. Bot. 6:321, 1847. - *Polyporus corruscans* Fr. Vet. Akad. Forhand. 1851, p. 52, 1851.
Basidiocarps annual, sessile on trunks of living oaks, pilei usually solitary, ungulate, up to 11 x 19 x 9 cm, upper surface buff to reddish brown, tomentose or glabrous, often zonate, becoming rimose, margin rounded, concolorous, pore surface at first buff, becoming dark reddish-brown, rough, the pores angular, l-3 per mm, with thin dissepiments that become lacerate, context consisting mostly of a hard granular core of intermixed brown and whitish mycelium, with a thin layer of fibrous, yellowish-brown tissue on the surface between the core and the tube layer, the granular core up to 8 cm thick, the fibrous portion up to 3 cm thick, tube layer with tubes at first whitish within, becoming concolorous with the context, up to 3 cm thick.
Hyphal system monomitic, hyphae from the fibrous portion mostly thin-walled, pale yellowish, simple-septate, with infrequent branching, 5-10 µm in diam, some frequently branched hyphae also present, hyphae of granular core of two types, some thick-walled, branched, contorted and breaking into small sclerid-like fragments, 4-15 µm diam, others hyaline, septate, thin-walled, mostly 3-4 µm in diam but some with inflated portions up to 15 µm in diam, tramal hyphae

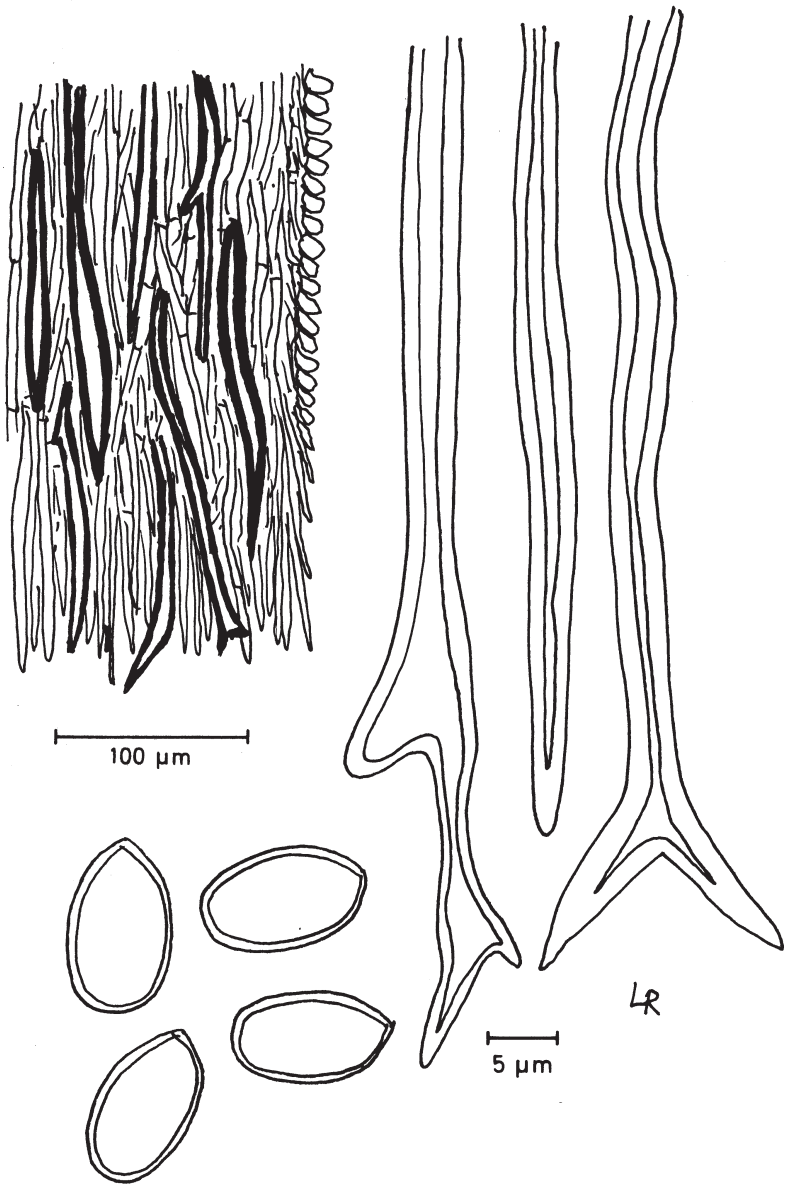

Fig.13 *Inonotus duostratosus*, hymenial setae and basidiospores, from the lectotype.

pale yellowish, thin-walled, simple-septate, 4-6 µm in diam, also some gloeoplerous hyphae with clavate tips, 4-8 µm diam.
Basidia clavate or with a swollen base, 4-sterigmate, 17-20 x 6-8 µm.
Setae or other sterile hymenial elements absent.
Basidiospores ellipsoid to ovoid, brownish, becoming thick-walled, 6-8 x 4.5-6 µm.
Substrata. Primarily on living oaks, also reported on a few other hardwoods such as *Eucalyptus* and *Fraxinus*.
Distribution. South-central Europe to southern Fennoscandia and circumboreal in the North Temperate Zone through Asia to North America.
Remarks. The granular core, pigmented spores, lack of setae, and occurrence on oaks are distinctive characters. *Inonotus rheades* is similar but decays living aspen on which it produces relatively small basidiocarps. The basidiospores of *I. rheades* are also smaller than those of *I. dryophilus*.

Inonotus duostratosus (Lloyd) P. K. Buchanan. & Ryvarden Fig. 13
Mycotaxon 31:14, 1988. - *Polyporus duostratosus* Lloyd, Lloyd Mycol Writ. 7: 1317, 1924.
Basidiocarps solitary to imbricate, annual, dimidiate to laterally to eccentrically stipitate with a expanding stipe or base, pileus up to 8 cm wide, up to 15 mm at the base, upper surface fulvous, sienna to dark cinnamon, often zonate, first finely tomentose, by age becoming agglutinated and with a papery surface but no cortex present, margin wavy, undulate entire to lobed, stipe short and expanding toward the pileus, up to 3 x 2 cm, tomentose, rusty brown, pore surface dark rusty brown, pores angular, thin-walled, 1-2 per mm, tubes up to 10 mm deep, light cinnamon on tube walls in fresh and properly dried specimens, context concolorous with upper surface, dense in lower part, looser and compressible in upper part, up to 6 mm thick.
Hyphal system monomitic, generative hyphae, hyaline 2-5 µm wide, in trama and context 5-10 µm wide, yellow to rusty brown with thickened walls, sparingly branched.
Setal hyphae very abundant in the dissepiments, more scattered in context, thick-walled to almost solid in parts, up to 150 µm long, 5-15 µm wide, sharply pointed, straight, rarely projecting into the pores, occasionally dichotomously forked in the upper part.
Hymenial setae not seen, and apparently absent.
Basidia clavate, 2-4 sterigmate, 24-30 x 6-10 µm.
Basidiospores ellipsoid, to subcylindrical, yellow to rusty brown and thick-walled, 9-12 x 7-9 µm.
Substrata. From roots of hardwoods.

Distribution. Known only from Malaysia and the Seychelles.
Remarks. The species is characteristic by its semistipitate basidiocarp, the numerous setal hyphae, the large spores and the distribution.

Coltricia duportii (Pat.) Ryvarden
Occ. Paper Farlow herb. 18 :15, 1983. - *Xanthochrous duportii* Pat. Bull. Soc. Mycol. Fr. 28:34, 1912 (FH!).
Basidiocarps annual, pileate, laterally to almost centrally stipitate, applanate, up to 2.5 cm wide and long, 1 cm thick, soft when fresh, brittle and hard when dried, but of light consistency, upper surface dull azonate, adpressed velutinate, rusty to deep cinnamon brown, pore surface rusty brown, pores angular, 2-3 per mm, tubes concolorous, up to 5 mm deep, context up to 5 mm thick rusty brown.
Hyphal system monomitic, generative hyphae hyaline to pale rusty brown, thick-walled, 3-7 µm wide.
Hymenial setae absent.
Basidia not seen.
Basidiospores ellipsoid, rusty brown, thick-walled, 8-10 x 6-7 µm.
Substrata. Hard wood trees.
Distribution. So far known only from French Guiana.
Remarks. This species is included here since sometimes its basidiocarps may remind one of an *Inonotus* species, especially when stout and laterally stipitate. Future DNA sequencing is necessary to ascertain its taxonomic status. The ellipsoid, dark brown and large basidiospores, the lack of setae and the semistipitate basidiocarp are distinctive characters.

Inonotus euphoriae (Pat.) Ryvarden comb nov.
Basionym: *Polyporus euphoriae* Pat. Bull. Herb. Boiss. 1:300, 1893 (FH!).
- *Aurificaria indica* (Massee) Reid. Kew Bull. 17:279, 1963. - *Polyporus indicus* Massee, Bull. Misc. Inf. Kew 1910:250, 1910.
Basidiocarp solitary or two or three together in a cluster or imbricate, sessile to broadly stipitate, consistency coriaceous when fresh, woody hard to somewhat brittle when dry, light in weight, pileus dimidiate to flabelliform, up to 16 cm wide, 9 cm broad and 0.4-3 cm thick, upper surface even to radially sulcate, azonate to zonate, appearing velvety or pruinose, often very finely tomentose near the margin, fulvous, greyish brown to dark brown, often with a rusty pruina, cuticle usually present, stipe central to lateral, concolorous with the pileus, up to 3 cm in diameter and 1-4 cm long, with strongly decurrent pore layer, the upper surface with cuticle, pore surface yellowish-brown to dark brown, dull, pores round and thick-walled, 4-6 per mm, tubes single-layered, concolorous or somewhat lighter, up to 1.5 cm thick, context cinnamon to dark brown, homogeneous,

somewhat zonate reflecting several developmental stages, soft, up to 1.5 cm thick, turning reddish-brown to dark brown when touched with KOH.
Hyphal system monomitic, generative hyphae thin to thick-walled, hyaline golden to almost brown, 3-6 µm wide in the tubes, up to 15 µm wide in the context.
Basidiospores broadly ellipsoid to sub-globose, sub-hyaline to dull brown, thin-walled, non-amyloid, (4)5-7 x (4)4.5-6 µm.
Substrata. On dead and living deciduous trees.
Distribution. Asia, in Africa found in Kenya.
Remarks. The spatulate basidiocarps with a black cuticle, often radially wrinkled should make the species easy to recognize. It must be quite rare in Africa.

Inonotus exiliformis Dai & Niemelä,
Mycotaxon 65:275, 1997.
Basidiocarps annual, resupinate, adnate, up to 20 cm in longest dimension, corky when fresh, later woody, margin thin and narrow, rusty brown, pore surface greyish brown, pores angular, 4-5 per mm, tubes concolorous, up to 3 mm deep, subiculum 1 mm thick, dark brown.
Hyphal system monomitic, generative hyphae, hyaline to pale rusty brown, thin-walled to thick-walled, in the subiculum richly branched 4-7 µm wide, in the trama generally more narrow, 3-4 µm wide.
Hymenial setae absent.
Basidia clavate 14-17(20) x 4.5-7 µm.
Basidiospores narrowly ellipsoid, thin-walled, hyaline, with one or two small oil drops, 6-7.3 x 2.5-3.5 µm.
Substrata. Found on *Quercus mongolica*.
Distribution. Hitherto only known from the type locality in China.
Remarks. The resupinate basidiocarp, the host and the hyaline oblong ellipsoid basidiospores are diagnostic. *I flavidus* has similar, but smaller basidiospores, and a pileate basidiocarp with a duplex context.

Inonotus farlowii (Lloyd) Gilbn., Fig. 14.
Mem. N.Y. Bot. Gard. 28:77, 1976. - *Polyporus farlowii* Lloyd, Lloyd Mycol Writ. 3:363, 1915.
Basidiocarps annual, sessile, dimidiate, 5 x 8 x 2 cm, upper surface brown and hispid at first, becoming blackened and rimose or scaly with age, pore surface bright yellowish-brown, blackening with age, the pores angular, 2-4 per mm, with dissepiments that become thin and lacerate, context bright yellowish-brown, faintly zonate, fibrous, breaking out in plates or chunks, up to l.5 cm thick, tube layer distinct from context, concolorous, up to l.5 cm thick.
Hyphal system monomitic, hyphae mostly dark brown, thick-walled, simple-

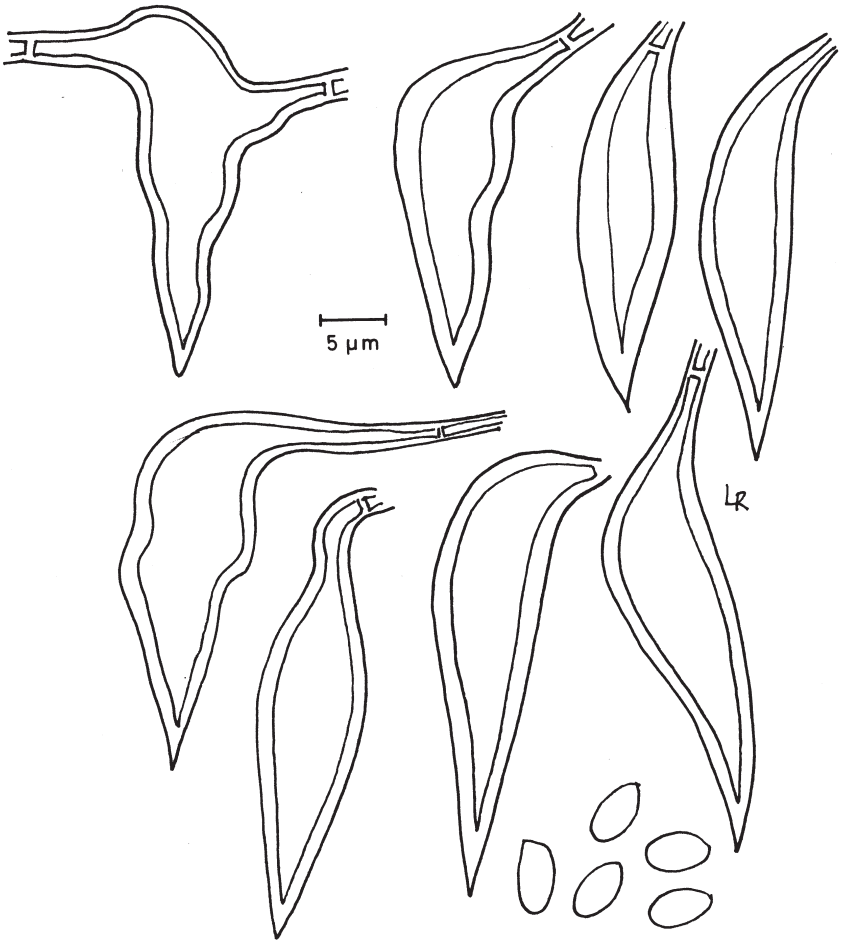

Fig.14. *Inonotus farlowii*, hymenial setae and basidiospores, from the lectotype.

septate, with occasional branching, 3-10 µm diam, some thin-walled, pale yellowish, simple-septate, 5.5-7 µm diam, hyphae of surface layer thin-walled, pale yellowish, with rare branching, 3-11µm diam, tramal hyphae closely packed in a parallel arrangement, thin-walled and pale yellowish to thick-walled and dark brown, 3-6.5 µm diam.

Setae abundant, mostly subulate, some ventricose, 27-50 x 8-11µm and projecting to 35 µm.

Basidia broadly clavate, 4-sterigmate, 17-20 x 7-10 µm.
Basidiospores golden yellowish-brown, becoming thick-walled, ovoid to broadly ellipsoid, 6-8 x 4.5-6 µm.
Substrata. Reported from *Salix* spp. only.
Distribution. Apparently restricted to Mexico, New Mexico and Arizona.
Remarks. The above description is based on two collections, one at BPI and labelled "*Pol. farlowii* Lloyd orig.", presumably from Arizona. The other is a specimen at BPI from Mexico collected by E.O. Matthews (No. 44108). These differ from *I. munzii* in the abundant hymenial setae and slightly smaller basidiospores.

Inonotus fimbriatus Gomez & Ryvarden, Fig. 15
Mycotaxon 23: 291, 1985.
Basidiocarps annual, pileate, sessile, up to 2 cm wide and long, 1 cm thick at the base, upper surface strongly hispid to fimbriate, deep golden brown, azonate, pore surface deep golden brown, pores round to angular, 3-4 per mm, tubes up to 2 mm deep, context homogeneous, golden brown.
Hyphal system monomitic, generative hyphae in the context and trama thick-walled with scattered septa, golden brown, 3-8 µm wide, in the subhymenium more thin-walled, 3-5 µm wide, in the dissepiments many encrusted hyphae, partly projecting.
Setae present in hymenium, straight to hooked, thick-walled and 40-50 x 6-11 µm.
Basidia not seen.
Basidiospores pale rusty brown, ellipsoid, 5-6 x 4-4.5 µm.
Substrata. On dead hardwood log.
Distribution. Known from higher elevations in Costa Rica and Venezuela and is probably widespread along the Andes.
Remarks. The species is recognized by its strongly villose to fimbriate pileus. *I. pertenius* Murr. is probably the closest relative, but this species has smaller pores (5-7 per mm) and the setae are smaller (10-20 µm long).

Inonotus flammans (Berk.) Ryvarden comb. nov.,
Basionym: *Polyporus flammans* Berk. Hooker J. Bot. 6:139, 1854 (K!).
Basidiocarp solitary or imbricate, sessile to broadly stipitate, consistency coriaceous when fresh, woody hard to somewhat brittle when dry, light in weight, pileus dimidiate to flabelliform, up to 6 cm long, 4 cm broad and 8 mm thick, upper surface even to radially sulcate, azonate to zonate, appearing velvety or pruinose, often very finely tomentose near the margin, fulvous, dark brown to almost black, cuticle usually present, stipe central to lateral, concolorous with the

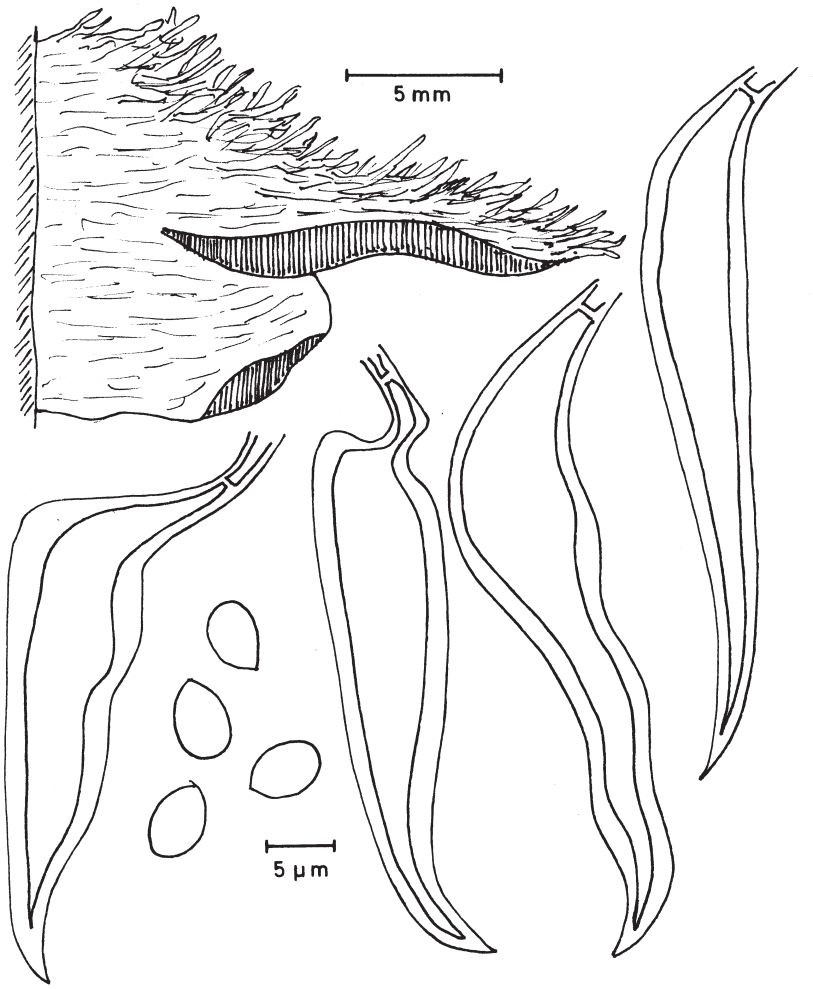

Fig.15. *Inonotus fimbriatus*, section of basidiocarp, hymenial setae and basidiospores, from the holotype.

pileus, with strongly decurrent pore layer, pore surface yellowish-brown to grey brown, dull, pores round and thick-walled, 4-5 per mm, tubes single-layered, concolorous or somewhat lighter, up to 4 mm deep, context cinnamon to dark brown, homogeneous, somewhat zonate reflecting several developmental stages, soft, up to 4 mm thick.
Hyphal system monomitic, generative hyphae thin to thick-walled, hyaline golden to almost brown, 3-6 µm wide.
Hymenial setae absent.
Basidia 12-18 x 5-6 µm..
Basidiospores broadly ellipsoid, sub-hyaline to dull brown, thin-walled, 6-7 x 3-4 µm.
Substrata. On dead and living deciduous trees.
Distribution. Asia, in Africa found in Kenya.
Remarks. The species comes close to *I. euphoriae*, but is separated by the ellipsoid basidiospores.

Inonotus flavidus (Berk.) Ryvarden, Fig. 16
Mycotaxon 20:145, 1984. - *Polyporus flavidus* Berk., Hook. J. Bot. 6:161, 1854. - *Inonotus sciurinus* Imaz., Bull. Tokyo Sci. Mus. 6:106, 1943.
Basidiocarps annual, pileate, sessile, solitary to imbricate, convex to applanate, up to 8 cm long, 4 cm wide and 4-15 mm thick at the base, pileus dark brown to rusty brown, first finely tomentose, soon glabrous in zones, radially furrowed, especially at the base, in section with black zone becoming the indurate cuticle in exposed and glabrous zones, pore surface snuff to sienna brown, pores angular and thin-walled, 4-8 per mm, tubes concolorous, up to 5 mm deep, context cinnamon, up to 1 mm thick below the dark zone separating from the pileus.
Hyphal system monomitic, generative hyphae, pale yellow to rusty brown, thick-walled, sparingly branched, 3-6 µm wide.
Setal hyphae absent.
Hymenial setae ventricose, often with a bent base, rather abundant, 12-20 x 5-8 µm.
Basidia not seen.
Basidiospores hyaline, cylindrical, 4-6 x 1.5-2.5 µm.
Substrata. *Acer, Rhododendron* and other hardwoods.
Distribution. Japan and Nepal, but probably widespread in higher altitudes in the Himalayas.
Remarks. The duplex context, the hyaline cylindrical spores and the short ventricose setae characterize this species.

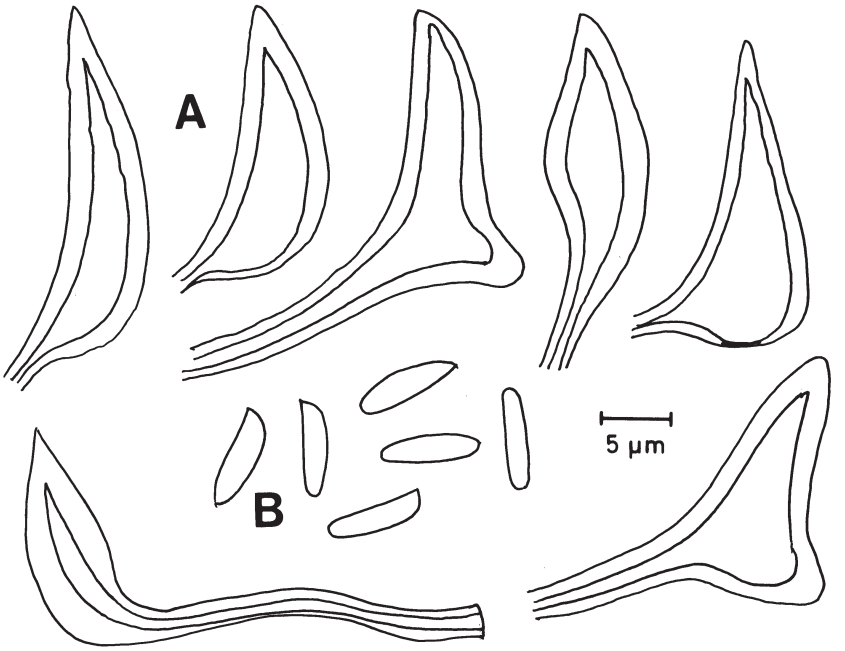

Fig. 16. *Inonotus flavidus*, hymenial setae and basidiospores, Japan, Honda, 1991.

Inonotus formosanus Chang & Chou,
Mycol. Res. 102:789, 1989.
Basidiocarp annual, dimidiate and applanate, commonly in imbricate clusters, fleshy when fresh, light and fragile when dry, individual pilei flabelliform to effused reflexed, up to 5 cm wide and 1 cm thick, upper surface first coarsely tomentose to hispid, later the hyphae agglutinate to tufts, erect at the base, more flattened at the margin, finally becoming glabrous, cinnamon to rusty brown, pore surface yellowish when fresh, becoming dark when bruised or dried and then cinnamon to rusty brown, pores round to angular, 3-5 per mm, tubes concolorous, 3 mm long, context to 7 mm, concolorous with pore surface.
Hyphal system monomitic, generative hyphae, hyaline to dark brown, thin to thick-walled, 2-5 µm wide.
Setal hyphae absent.
Setae present, ventricose, 18-30 x 5-7 µm.

Basidia clavate, 8-11 x 3-5 µm.
Basidiospores broadly ellipsoid, hyaline to pale yellow, 3.5-4 x 1.5-2.5 µm.
Substrata. Dead deciduous wood such as *Persea* and *Cyclobalanopsis*.
Distribution. Known from Taiwan.
Remarks. The small basidiospores make this a distinct species.

Coltricia fragilissima (Mont.) Ryvarden,
Nordic J. Botany 2 :78, 1982. - *Polyporus fragilissimus* Mont. Ann. Sci. Nat. Ser. 4 vol 1:130, 1854.(PC!). - *Polyporus pyrophilus* Wakef. Kew Bull. 1916:71, 1916.
Basidiocarps annual, laterally to centrally stipitate, flat to infundibuliform, up to 8.5 cm in diameter, and 3 cm thick at the base, probably coriaceous when fresh, brittle when dry, upper surface azonate, yellowish-brown to dark cinnamon, velvety adpressed tomentose to almost glabrous with age, smooth to slightly folded radially, also with scattered protuberances and small pits, margin entire to wavy, thin and deflexed, at least in dry specimens, stipe short and expanded both towards the base and the pileus, 5-30 mm in diameter, 2-6.5 cm long, dark rusty to cinnamon, finely adpressed velvety, probably almost smooth with age as the upper hyphae agglutinate, smooth to slight uneven, solid and non-stratified, pore surface cinnamon to brown with a narrow lighter sterile margin, pores angular and thin-walled, often decurrent on the stipe, 2-4 per mm, tubes concolorous, up to 3 mm deep context homogeneous, cinnamon to golden-brown, quite dense, up to 20 mm thick towards the stipe, 2 mm or so at the margin.
Hyphal system monomitic, generative hyphae hyaline, golden-brown or rusty-brown and moderately branched, brittle and breaks easily in microscopic preparations, 3.5-5 µm wide in the hymenium, up to 10 µm wide in context and stipe.
Setal hyphae and **hymenial setae** absent
Basidia not seen
Basidiospores oblong ellipsoid, hyaline, dextrinoid, smooth and thin-walled, 4-5.5 (6) x 3-3.5 µm.
Substrata. On burnt wood or in old fire places.
Distribution. Specimens have been seen from Sierra Leone, Nigeria, Cameroon, French Guiana and Venezuela.
Remarks. The species in included here since it has distinct robust basidiocarps with a thick and mostly short expanding stipe and thus may remind one of an *Inonotus* species. Future DNA sequencing may eventually solve its true taxonomic status. The azonate cinnamon, dull surface with homogeneous stipe and context and the habitat should be good field characteristics. Microscopically the dextrinoid basidiospores are diagnostic.

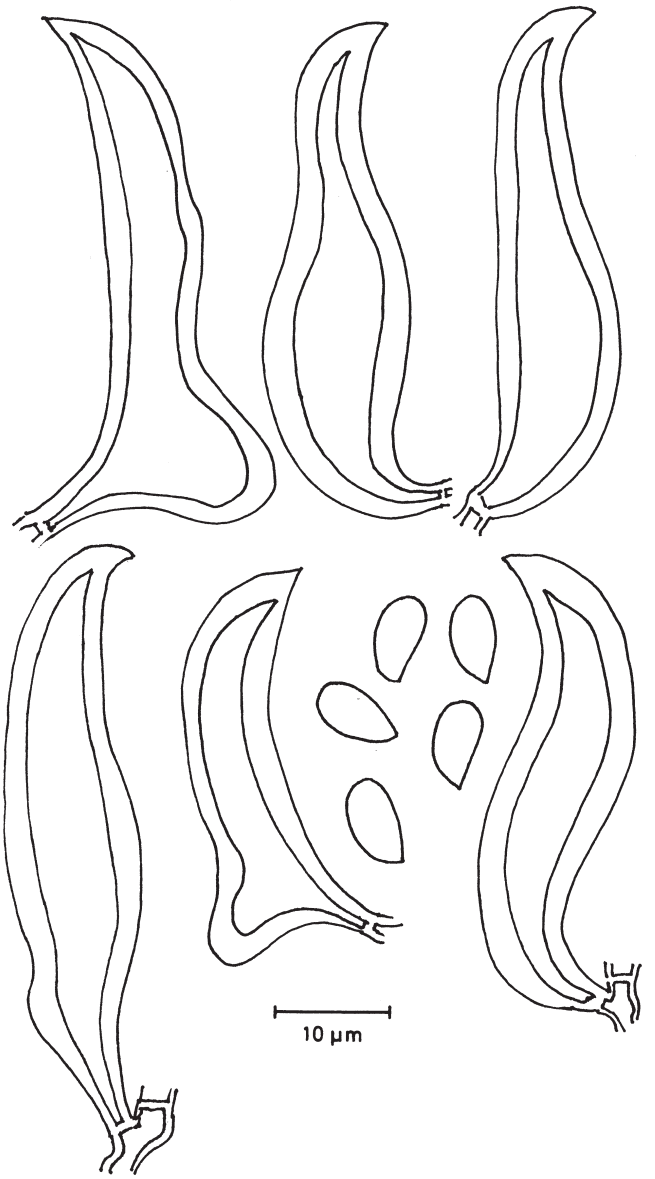

Fig. 17. *Inonotus fulvomellus*, hymenial setae and basidiospores, Mexico, Mathiassan 75123.

Inonotus fulvomelleus Murrill, Fig. 17
North. Am. Fl. 9:87-88, 1908.
Basidiocarps annual, pileate sessile, semicircular, applanate to semiungulate, 3-5 x 5-10 x 1-3 cm, upper surface rusty to dark brown, densely strigose to hispid and zone wise covered with dark brown forked hairs, margin with shorter hairs, softer and rounded, pore surface yellowish to cinnamon brown, pores hardly visible to the naked eye, 4-5 per mm, tubes concolorous, up 1 cm deep, context shiny, dense, yellowish brown, up to 7 mm thick at the base.
Hyphal system monomitic, generative hyphae, yellow to rusty brown, 2-6 µm wide.
Setal hyphae absent.
Hymenial setae acute, usually hooked, 30-55 x 8-14 µm.
Basidia not seen.
Basidiospores ellipsoid to short cylindrical, golden yellow to rusty brown, 6-7.5 x 4-5 µm.
Substrata. Hardwoods, noted on *Quercus*.
Distribution. Known from Jamaica and Mexico.
Remarks. The hispid and villose pileus, the small pores and the large hooked setae characterize this species.

Inonotus fushanus Chang,
Mycol. Res. 101:1003, 1997.
Basidiocarp annual, sessile to laterally stipitate, solitary, ungulate, dimidiate to reniform, up to 10 cm wide and 4 cm thick at the base, first soft, then fibrous to chalky, upper surface glabrous, yellow to pale brown and with some sulcate zones, pore surface dark cinnamon brown, pores angular, 1-3 per mm, tubes up to 1.5 mm deep, concolorous with the pore surface, context yellowish brown, up to 3 mm deep.
Hyphal system monomitic, generative hyphae, pale yellow to rusty brown, 5-12 µm wide in the context, generally narrower in the trama.
Setal hyphae and **hymenial setae** absent.
Basidia 15-20 x 5-8 µm with 4 sterigmata.
Basidiospores oblong ellipsoid to cylindrical, brown, 6.5-8.0 x 3-4 µm.
Substrata. The type was collected on *Quercus longinus*.
Distribution. Known only from the type locality.
Remarks. The species comes close to *I. clemensiae*, known from the Philippine Islands and Japan, which is separated only by slightly wider basidiospores (i.e. 4-5.5 µm).

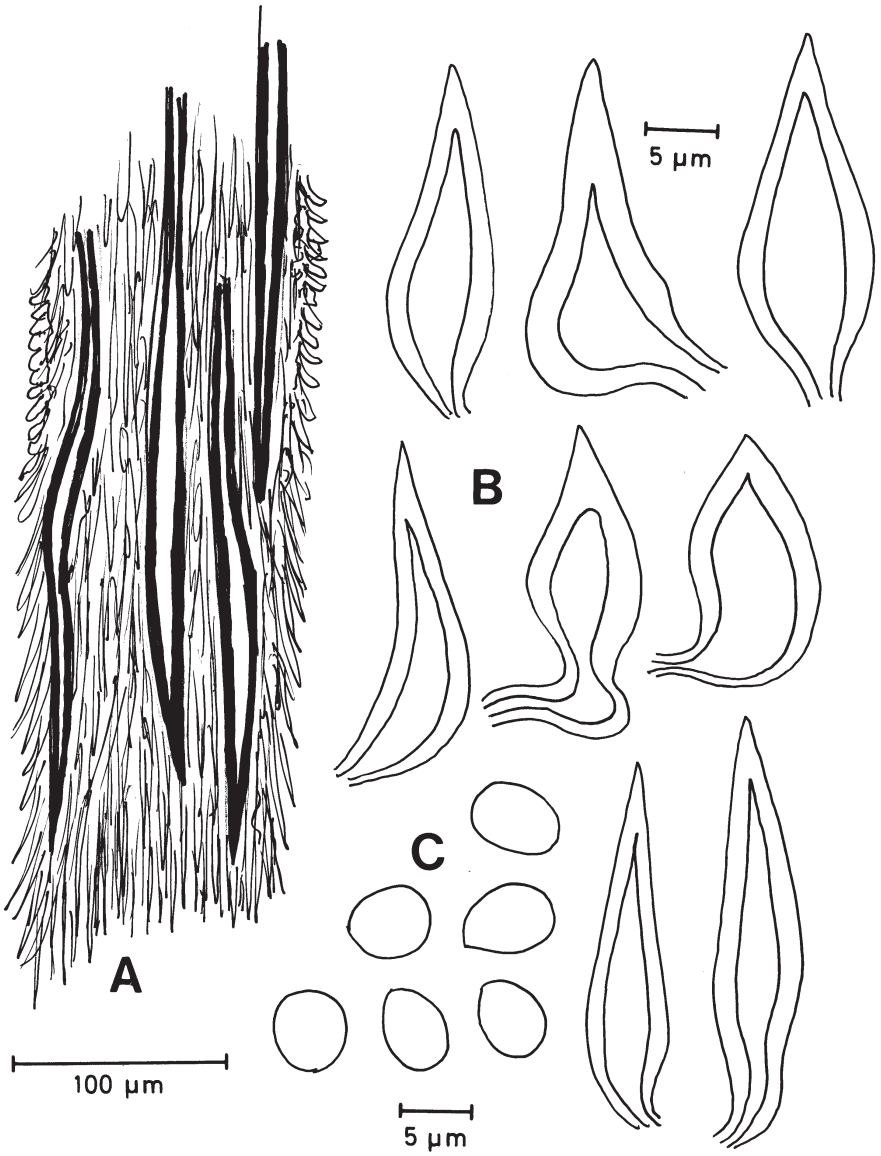

Fig. 18. *Inonotus glomeratus*, section through a tube wall, hymenial setae and basidiospores, USA, Ryvarden 14303.

Inonotus glomeratus (Pk.) Murrill, Fig. 18
Mycologia 12:18, 1920. - *Polyporus glomeratus* Pk., N.Y. State Mus. Ann. Rept. 24:78, 1872.
Basidiocarps effused-reflexed or resupinate, often effused for a distance of l-2 meters on fallen trees, pilei often imbricate, up to 4 x 10 x 1.5 cm, upper surface yellowish-brown, finely tomentose to glabrous, azonate, often covered with a bright golden yellow mass of basidiospores, margin concolorous or yellow to ochraceous, undulate, pore surface greyish brown, glancing, the pores angular, 3-5 per mm, with thin, tomentose dissepiments that become lacerate with age, context up to l cm thick, olden brown to dark yellowish brown, shiny on cut surfaces, fibrous-corky, faintly zonate, often with a hard, blackish upper layer, tube layer concolorous but separated by a darker layer, up to 7 mm thick, spore print bright golden yellow.
Hyphal system monomitic, generative hyphae pale yellowish brown in KOH, thin to thick-walled, rarely branched, 3-7 µm wide.
Setal hyphae dark reddish-brown in KOH, thick-walled, tapering to a point, unbranched, 7-12 µm in diam, setal hyphae more numerous and conspicuous in trama, projecting at dissepiment edges and often obliquely into the tubes, 250 to over 500 µm long, 10-15 µm in diam, clearly visible on broken tube surfaces under 30 x lens.
Hymenial setae abundant, subulate to ventricose, thick-walled, 16-28 x 5-9 µm.
Basidia ellipsoid, 4-sterigmate, 9-12 x 5-6 µm.
Basidiospores broadly ellipsoid to ovoid, pale yellowish, 5-7 x 4-5.5 µm.
Substrata. Mainly on *Acer* and *Fagus* not uncommon on *Populus* and occasionally on other hardwood genera.
Distribution. Common in hardwood forests of the north eastern U.S. and eastern Canada, rare in western North America.
Remarks. *Inonotus glomeratus* does not fruit on living trees, but often produces sterile conks on *Fagus* and *Acer*. It produces large basidiocarps on stumps and fallen trees in which it continues to decay after death of the host.

Inonotus gracilis Ryvarden novo sp.
Fructificatio sessilia, pileus et stipes ferruginosus, pori facies umbrina, pori rotundi, 4-5 per mm, tubi et contextus ferruginosus, systema hypharum monomiticum, hyphae generatoriae afibulatae, ferruginosus ad aureum, hyphae setales presentia, basidiosporae cylindricae ad pallidus luteus 6-7 x 3-3.3 µm.
Holotype: Costa Rica, Mellijas, CAFROSA, sendero Samia, 20 June 1998. E. Navarro 225. holotype in INbio, isotype in O.
Basidiocarp annual, solitary, dimidiate, semicircular, applanate, corky when dry, pileus up to 1 cm in diameter and 3 mm thick at the base, upper surface

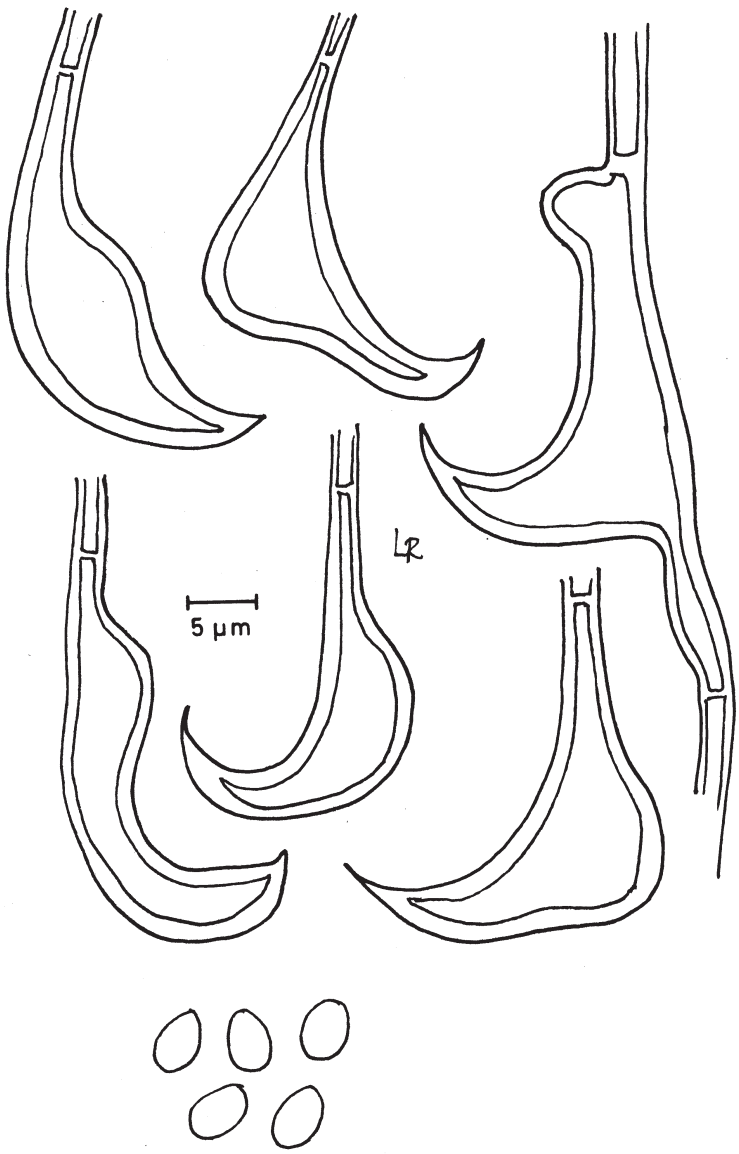

Fig. 19. *Inonotus hamusetulosus*, hymenial setae and basidiospores, from the holotype.

glabrous, shiny, slightly radially furrowed or undulating, zonate with a few black thin zones and wider reddish brown zones, pore surface deep yellowish brown, pores angular, 4-5 per mm, tubes up to 1,5 mm deep, concolorous with the pore surface, context dense, yellowish brown, thin up to 1.5 mm thick at the base.
Hyphal system monomitic, generative hyphae pale yellow to rusty brown, up to 5 µm wide in the context, 2-4 µm wide in the trama.
Tramal setae abundantly present in the bottom of the tubes, partly embedded, partly projecting up to 40 µm, straight, dark brown and usually acute, but a few also with rounded apices, up to 90 µm long and 12 µm wide in the middle.
Hymenial setae absent.
Basidia 18-20 x 5-6 µm with four sterigmata.
Basidiospores cylindrical, hyaline to very pale yellowish, thin-walled to slightly thick-walled, , 6-7 x 3-3.3 µm.
Substrata. Unknown.
Distribution. Known only from the type locality.
Remarks. The species is striking by the combination of the partly projecting setal hyphae and the cylindrical basidiospores. Even if only the type has been seen, the distinct microscopical characters seem to justify a description as a new species.

Inonotus hamusetulosus Ryvarden, Fig. 19
Mycotaxon 20: 145, 1984.
Basidiocarps annual, sessile, fan shaped to flabellate, up to 8 cm wide and 12 cm long and 10 mm thick at the base, fleshy when fresh, hard and brittle when dry, pileus rusty to dark brown, first adpressed tomentose, then becoming glabrous and darker from the base, exposing a thin black zone which is visible as a dark line under the tomentum, faintly zonate and slightly wrinkled radially when dry, pore surface dark rusty brown, pores round to angular, 5-7 per mm, tubes concolorous, up to 6 mm deep, context rusty brown, dense and duplex with a thin black line below the tomentum.
Hyphal system monomitic, generative hyphae, in the subhymenium thin to slightly thick-walled, 2-3 µm wide, in the trama and context with a wider lumen, sparingly branched and with scattered septa, 3-8 µm wide.
Hymenial setae present, abundant, dark brown and hooked, 20-30 µm from base to top, often with an elongated base, most setae terminal, but a few intercalary ones do also occur.
Basidia clavate, 10-12 x 4-5 µm.
Basidiospores ellipsoid to ovoid, yellow, 3-4 x 3-3.5 µm.
Substrata. On dead or living hardwoods.
Distribution. Known only from the type locality in Western Nepal.

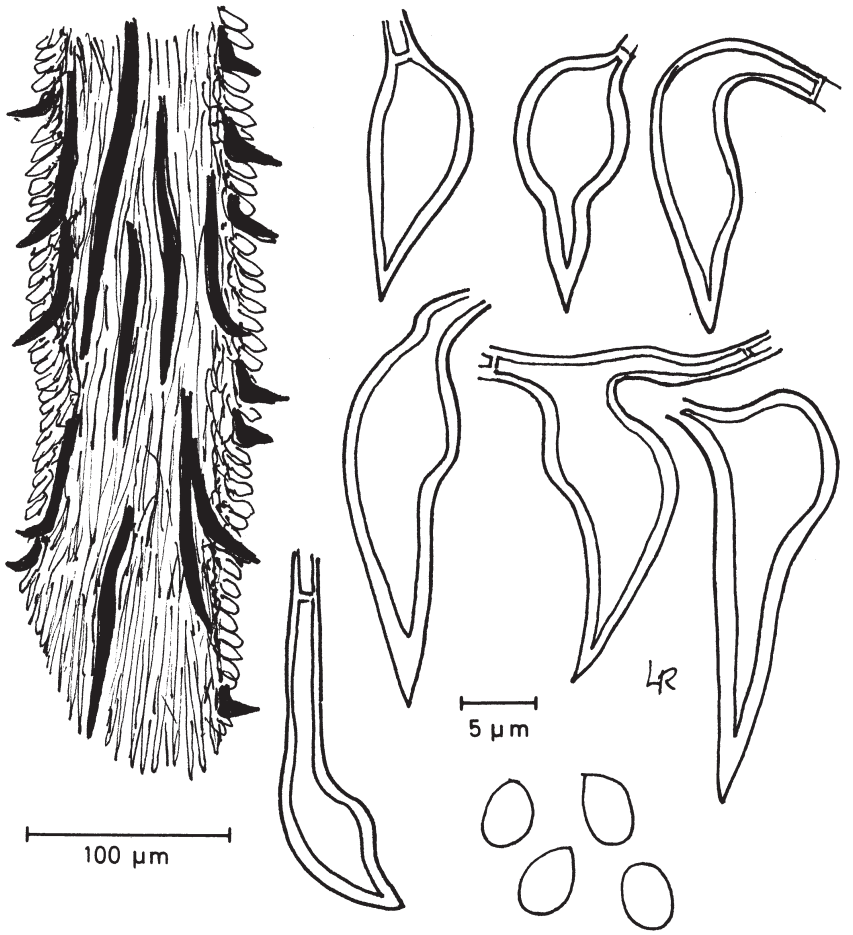

Fig. 20. *Inonotus hastifer,* section through a tube wall, hymenial setae and basidiospores, Germany, Jahn 21356.

Remarks. The species should be easy to recognize by the flabellate basidiocarps, the hooked setae and the small spores. *I. crocitinctus* from North America is probably the closest relative also having hooked setae, but larger spores and smaller pores. *I. arizonicus* is also similar but has larger spores and is restricted to *Platanus* in North America.

Inonotus hastifer Pouz. Fig. 20
Ceska Mykol. 35: 25, 1981.
Basidiocarps annual, resupinate to more rarely nodulose with rudimentary and oblique pilei, often widely effused, up to 1 cm thick, pilei when present, up to 1 cm wide, soft and fleshy when fresh, hard and brittle when dry, margin wide to narrow, yellowish to deep rusty brown, pore surface cinnamon to rusty brown, pores angular 3-4 per mm, elongated and larger on oblique surfaces, tube layer up to 3 mm thick, context cinnamon to rusty brown in old specimens, up to 6 mm thick.
Hyphal system monomitic, generative hyphae hyaline to rusty brown, thin- to thick-walled, 3-8 µm wide.
Setal hyphae present in the dissepiments, up to 300 µm long, 7-15(20) µm wide, dark brown and acute, mostly straight, but some also bending into the hymenium, in a few cases forked at the tip.
Hymenial setae rare to abundant, ventricose with a bent and often elongated base, 12-30 x 5-10 µm.
Basidiospores ellipsoid, hyaline to pale yellowish with age, slightly thick-walled, non- to weakly dextrinoid, 4.5-5.2 x 3-4 µm.
Substrata. On *Fagus sylvatica* and *Carpinus betulus*.
Distribution. Follows *Fagus sylvatica* from Spain to Southern Norway and eastward to Caucasus and Turkey, but not common.
Remarks. The close association with *Fagus* is distinctive, as is the semi-resupinate and decurrent basidiocarp. It is close to *I. radiatus* but this has sessile basidiocarps and is not found on *Fagus* besides having larger spores and no setal hyphae in the dissepiments and many of its hymenial setae are hooked.
A more closely related species is *I. nodulosus* which also is restricted to *Fagus*. This species has normally many smaller pilei, has no setal hyphae in the dissepiments, but there are some long hymenial or almost tramal setae present close to the bottom of the tubes.

Inonotus hemmesii Gilbn. & Ryvarden, Fig. 21
Mycotaxon 81:91, 2002.
Basidiocarp annual, pileate, sessile to effused reflexed, up to 30 x20 x 15 cm, pileus dark brown, shallowly sulcate, zonate, first finely tomentose becoming

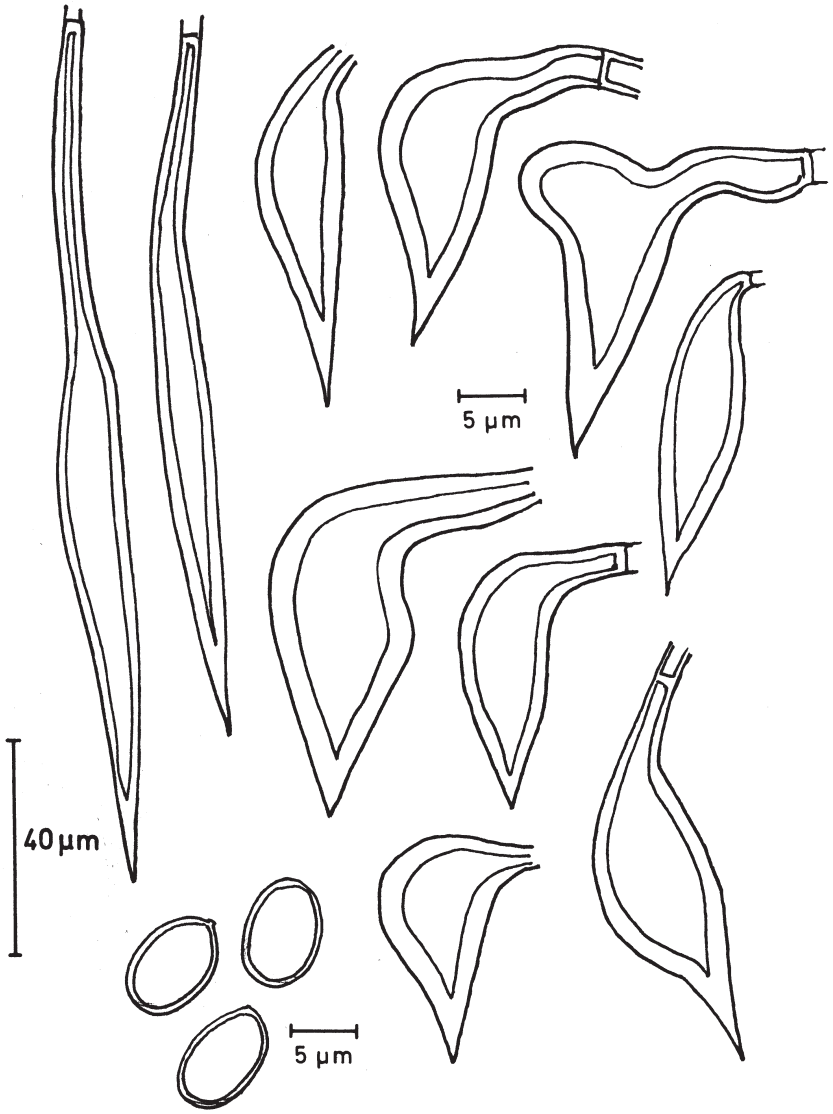

Fig. 21. *Inonotus hemesii*, setal hyphae, hymenial setae and basidiospores, from an isotype.

glabrous to crustose and finally black and often cracked or rimose, pore surface yellowish brown becoming dark brown, pores 3-4 per mm, angular to round, with thin entire dissepiments, tubes concolorous with the pore surface, up to 4 cm deep, context brown, corky and with an thin upper loose part and a lower much denser part, up to 6 cm thick.
Hyphal system monomitic, hyphae thin walled and hyaline, or thick-walled and dark brown, in the context 7-10 µm wide, 3-5 mm in the trama.
Setal hyphae present, frequent in trama, absent in context embedded not projecting into the hymenium and tubes, thick-walled, dark brown 6-10 µm wide, up to 170 µm long.
Hymenial setae rare, absent in many sections, ventricose, acute, dark brown 20-25 x 7-10 µm.
Basidia broadly ovoid, 12-15 x 8-10 µm.
Basidiospores ellipsoid to ovoid, pale golden brown, becoming thick walled 7-9 x 5.5-7 µm.
Substrata. On different hardwoods.
Distribution. Known only from Hawaii Island.
Remarks. This species is probably related to *I. rodwayii* D. A. Reid from Australia, but has wider basidiospores besides having embedded and not projecting setal hyphae as in the Australian species. *I. patouillardii* (Rick) D. A. Reid is also similar, but has very abundant projecting setal hyphae besides smaller spores (4.5-6 x 3.5-4.5 µm).

Inonotus hispidus (Bull.:Fr.) P.Karsten,
Krit. Finl. Basidsv. p. 330, 1889. - *Polyporus hispidus* Bull.: Fr., Syst. Mycol. l: 362, 1821. - *Boletus hispidus* Bulliard, Herb. France, plate 210, 1784.
Basidiocarps sessile, pilei usually solitary, applanate, dimidiate, up to 10 x 16 x 8 cm, upper surface bright reddish-orange in early stages of development, becoming dark reddish-brown to blackish, coarsely hispid or rarely strigose, azonate, margin concolorous, pore surface yellowish-brown, becoming blackish, very rough, the pores angular, l-3 per mm, with thin, lacerate dissepiments, context dark reddish-brown, soft-fibrous, azonate, up to 4 cm thick, tube layer at first yellowish-brown, later concolorous with the context, brittle when dry, up to l.5 cm thick.
Hyphal system monomitic, generative hyphae mostly pale yellowish-brown, thin-walled, with occasional branching, 3-4 µm in diam, hispid surface composed of aggregates of thin-walled hyphae, 3-6 µm diam, tramal hyphae pale yellowish and thin-walled to dark brownish, thick-walled, with frequent branching, 3-6 µm wide.
Hymenial setae absent.

Basidia broadly clavate, 22-27 x 9-11 µm.
Basidiospores brown, becoming thick-walled, subglobose to ovoid, 8-11 x 6-8 µm.
Substrata. Living hardwoods, particularly *Quercus*, but also recorded on *Robinia, Morus, Pistachia, Malus, Abies, Juglans, Populus* and *Ulmus*.
Distribution. Circumpolar in the temperate zone from Eastern and south-western U.S. through East Asia to Europe, India and Pakistan.
Remarks. *Inonotus hispidus* is capable of killing sapwood in living trees and is commonly associated with trunk cankers on oaks. The strongly hispid upper surface, the large, pigmented spores make this a distinct species.

Inonotus iliensis Kravts.
Bull. Acad. Sci. Kazakh. SSR. 98. Bot. Ser. 5:128, 1950.
Basidiocarps resupinate, growing inside tree-cavities, up to 5 cm wide and 1-5 cm thick, margin very wide, pore surface tobacco brown, pores angular, 3-4 per mm, tubes oblique, concolorous, up to 8 cm long, context very thin, tobacco brown.
Hyphal system monomitic, generative hyphae 3-6 µm wide.
Hymenial setae scattered, pointed, 20-40 x 4-6 µm.
Setal hyphae abundant in the subiculum and margin, 80-120 x 8-10 µm, in parts inflated to 25 µm, in margin in parts forming dark lines.
Basidia not seen.
Basidiospores pale yellowish, ovoid to ellipsoid, 4-7.5 x 4-5.5 µm.
Substrata. *Populus.*
Distribution. Known only from Kazakhstan in Central Asia.
Remarks. The species should be easy to recognize due to its very distinctive habitat. The only other species growing in tree-cavities is *I. nidus-pici* which has much smaller pores, larger spores and is hitherto only recorded from Europe.

Inonotus indurescens Dai & Zhou,
Mycotaxon 74 :332, 2000.
Basidiocarp annual, effused-reflexed to pileate, imbricate, broadly attached and shelf-like, very hard when dry, up to 2 cm wide and 4 cm long in the individual pilei and 1 cm thick at the base, upper surface glabrous, concentrically zoned, reddish brown, becoming chestnut blackish from base, but no distinct cuticle in section, margin sharp, curled when dry, pore surface reddish brown to almost blackish chestnut by age, pores angular, 5-7 (8) per mm, and with dentate to lacerate dissepiments, tubes up to 3 mm deep concolorous with the pore surface, context yellowish brown, dense, up to 2 mm thick at the base.
Hyphal system monomitic, generative hyphae, hyaline, pale yellow to rusty

brown, 4-6 (7) µm wide in the context, generally narrower in the trama, 3-4 µm wide.
Setal hyphae present in the trama, embedded and occasionally bending into the hymenium, up to 160 µm long and 8-12 µm wide and strongly pointed.
Hymenial setae present, subulate to ventricose, 20-35 x 6-10 µm.
Basidia clavate 8-10 x 4-5 µm.
Basidiospores ellipsoid, abundantly present, yellowish brown to rusty brown, 4.3-6 x 3-4 µm.
Substrata. Dead hardwood of unknown identity.
Distribution. Known only from the type locality in the Yunnan province in China.
Remarks. The species is characterized by the prominent setal hyphae, the angular pores and the ellipsoid spores. The closest relative is undoubtedly *I. glomeratus* which however, usually has larger pores (3-5 per mm) and larger and wider basidiospores (5-7 x 4-5.5 µm).

Inonotus jamaicensis Murrill,
Bull. Torr. Bot. Cl. 31:597, 1904.
Basidiocarps annual, pileate to effused reflexed, sessile to dimidiate to triquetrous, single or imbricate, 2-4 x 3-7 x o,5-1.5 cm, upper surface first dark brown and rugose, then becoming wrinkled and blackish with a thin crust, pore surface dark brown, pores 3-4 (5) per mm, tubes concolorous, up to 1 cm deep, context very thin, up to 2 mm thick, cinnamon and rusty brown.
Hyphal system monomitic, generative hyphae, yellow to rusty brown, 3-7 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores ellipsoid, rusty to umber brown, 5-7 x 4-5 µm.
Substrata. Dead hardwoods, in Tristan da Cunha reported from *Phylica*.
Distribution. Known from Jamaica, Argentine and Tristan da Cunha.
Remarks. The encrusted almost blackish and wrinkled pileus and the lack of setae are characteristic for this species.

Inonotus japonicus Ryvarden novo sp. Fig. 22
Fructificatio resupinatae, pori facies umbrina, pori angulati, 2-4 per mm, tubi et contextus ferruginosus, systema hypharum monomiticum, hyphae generatoriae afibulatae, ferruginosus ad aureum, hyphae setales absentia, setae praesentia, basidiosporae ellipsoideae, hyalinae, 4.5-5.5 x 4-4.5 µm.
Holotype: Japan, Fukushima pref., Tadami, Mt. Asakusa, 30 October 1991, on a dead log of *Fagus crenata*, L. Ryvarden 30201, Holotype in M, isotype in TFMF.

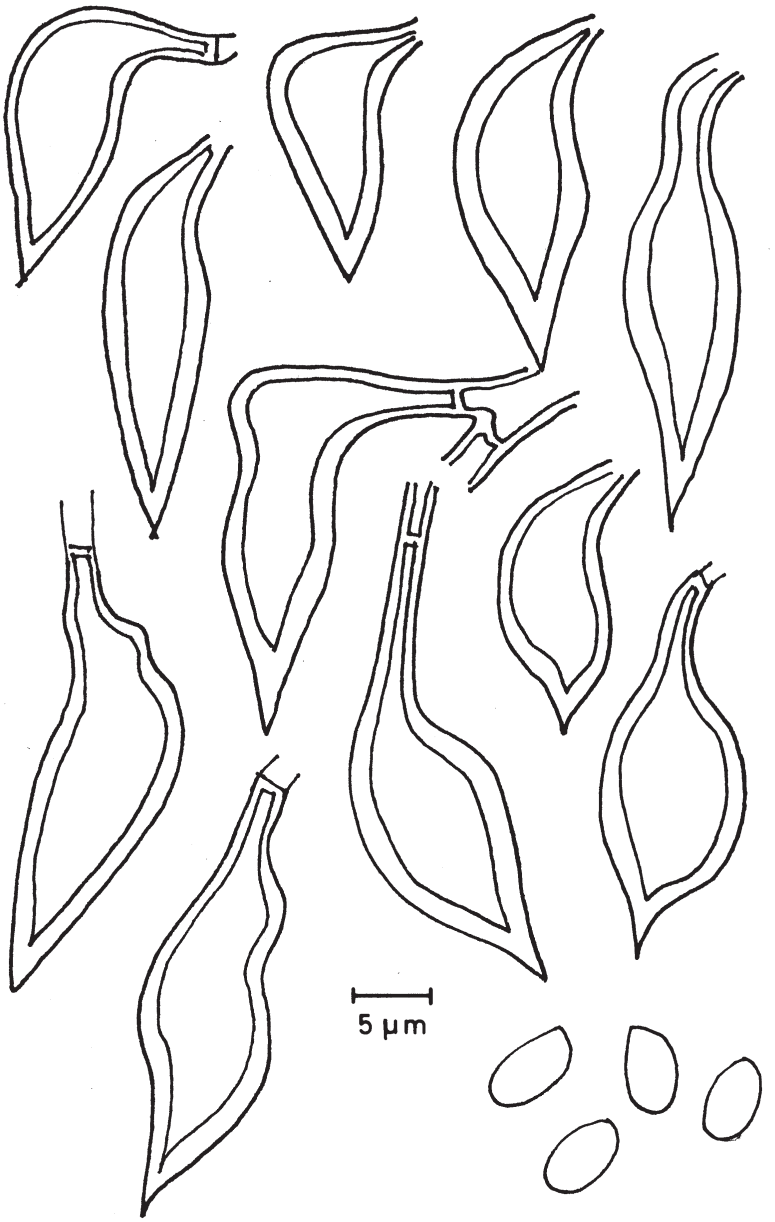

Fig. 22. *Inonotus japonicus*, hymenial setae and basidiospores, from the holotype.

Basidiocarp annual, resupinate, effused, up to 3 mm thick, fragile when dry, pore surface deep reddish brown, pores angular, 2-4 per mm, tubes up to 3 mm deep, non-stratified, concolorous with the pore surface, context rusty brown, up to 1 mm thick.
Hyphal system monomitic, generative hyphae with simple septa, pale yellow to rusty brown, 2-5 um wide.
Setal hyphae absent.
Hymenial setae subulate, thick-walled, often with a bent base, 17-25 x 5-9 um.
Basidia not seen.
Basidiospores ellipsoid, hyaline, negative in Meltzer's reagent, 4.5-5.5 x 4-4.5 um.
Substrata. Known only from *Fagus crenata.*
Distribution. Known only from the type locality.
Remarks. There is no doubt that this new species is related to *Inonotus nodulosus* of Europe, also frequently found on *Fagus*. The two species share the same type of setae while the basidiospores of *I. nodulosus* are 3.5-4 um wide and the basidiocarp is thicker and as the name implies, are mostly nodulose.

Inonotus juniperinus Murrill,
North Am. Fl. 9:88, 1912.
Basidiocarps annual, pileate, sessile to dimidiate to flabelliform or substipitate, 3-7 cm wide and long, 0.5-2 cm thick, soft and flexible when fresh, brittle and rigid when dried, upper surface rusty to umber brown, at first finely tomentose, then glabrous, often zonate and rugose or radially lined, in old specimens almost blackish and with incrusted zones from the base, pore surface deep rusty to umber brown, pores angular and slightly irregular and dentate when dried, 3-4 (5) per mm, tubes concolorous, up to 10 mm deep, context deep rusty to umber brown, fibrous and fragile, up to 1 cm thick.
Hyphal system monomitic, generative hyphae, thick-walled and golden to rusty brown, 3-8 µm wide, in the subhymenium hyaline and narrower.
Hymenial setae absent.
Basidia clavate , 12-18 x 4-6 µm.
Basidiospores ellipsoid, rusty brown, 5-6 x 4-5.5 µm.
Substrata. Only known from roots of *Juniperus* spp.
Distribution. Known only from Texas.
Remarks. The host and the lack of setae and setal hyphae characterize this species.

Inonotus leporinus (Fr.) P. Karsten, Fig. 23
Bidr. Känn. Finl. Nat. Folk 37:72, 1882. - *Polyporus leporinus* Fr. Svenska Vet. Acad. hand. 1852 p. 130, 1852.

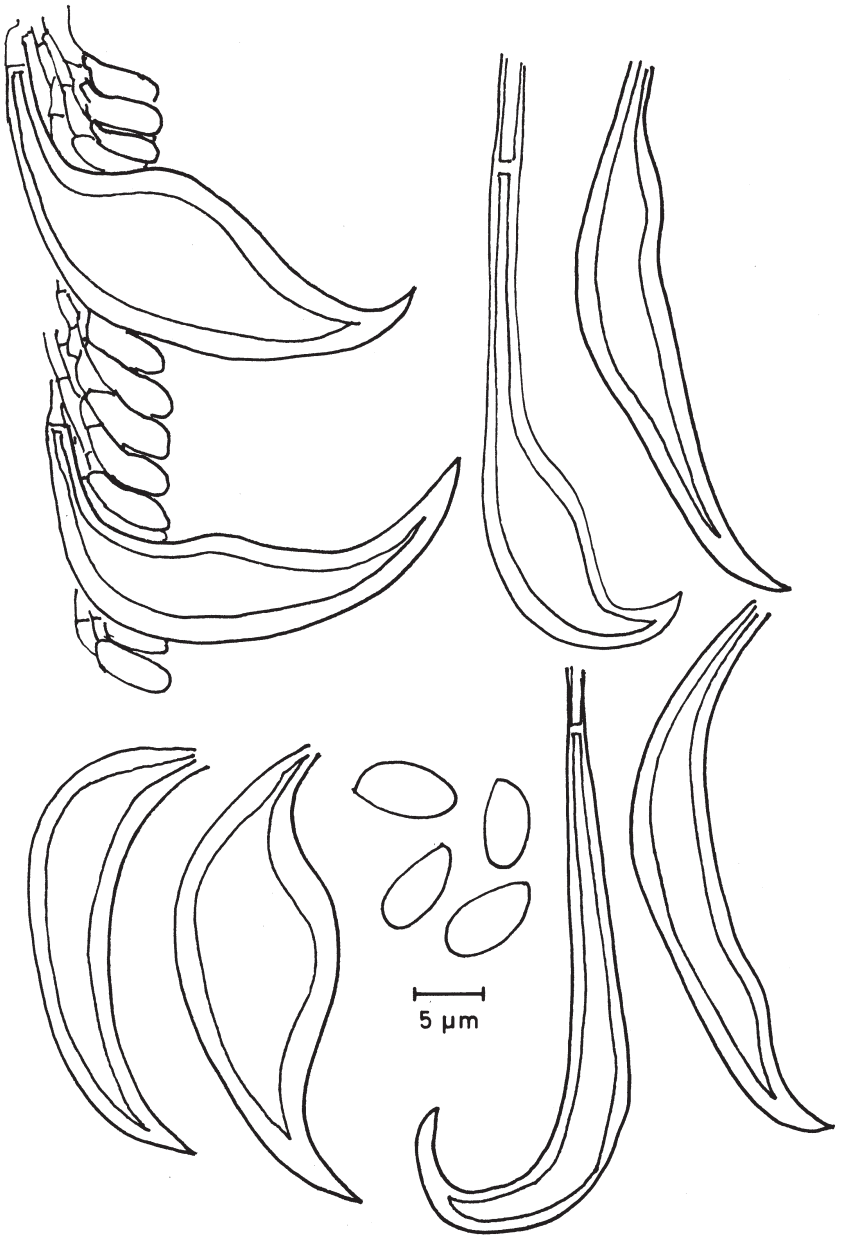

Fig. 23. *Inonotus leporinus*, hymenial setae and basidiospores, Norway, Ryvarden 12105.

Basidiocarps annual, pileate, sessile to dimidiate or slightly fan shaped, sometimes with a short eccentric stipe, single, more commonly in imbricate clusters, soft and fleshy when fresh, brittle and light of weight when dry, pileus applanate, 3-8 cm wide, up to 12 cm long, 3-20 mm thick, upper surface cinnamon to rusty brown, usually darker towards the base, at first velutinate to finely tomentose, later the erect hyphae agglutinate to a thin irregular cuticle and upper surface then more or less glabrous, margin sharp and thin, in actively growing specimens whitish to yellow, pore surface in growing specimens whitish yellow and then immediately darker when bruised or touched, later cinnamon to rusty brown, pores thin walled, at first round to slightly angular, 3-4 per mm, by age more irregular and in parts hexagonal to elongated and then up to 2 mm wide, tubes concolorous, up to 10 mm deep, context, rusty brown, 2-8 mm thick, distinctly duplex, the lower part dense and corky, in section shiny, upper part cottony and softer and radially fibrous, no sharp zone or black line between the two layers, when fresh with a sweet aromatic scent.
Hyphal system monomitic, generative hyphae, at first hyaline, then thick-walled and yellow to rusty brown, moderately branched, 3-6 µm wide.
Hymenial setae present, pointed, thick-walled and hooked, occasionally straight, 30-70 (100) x 8-15 µm.
Basidia clavate, 12-18 x 6-8 µm.
Basidiospores narrowly ellipsoid, hyaline to pale yellow, thin-walled, 5.5-7 x 3-4.5 µm.
Substrata. In Europe exclusively found on living or dead *Picea abies*, in Siberia also recorded on *Larix,* and in North America on other gymnosperms as well.
Distribution. A boreal-montane species, known from the inner parts of Fennoscandia, in Central Europe very rare, but known from Germany, The Czech republic and Ukraine, widespread through Russia to north East United States..
Remarks. The species is an important pathogen in boreal spruce forests in Fennoscandia, but the basidiocarps develop only after the host is dead and they are very short lived, apparently quickly eaten by insects.
The closest relative is undoubtedly *I. triqueter* having the same spores and hooked setae. However, this species is distinctly southern in Europe, grows on *Pinus* and has a much more distinct eccentric to laterally stipitate basidiocarp, and as the name suggests, a much more triquetrous basidiocarp.

Inonotus levis P.Karsten,
Hedwigia 26:112, 1887. - *Inonotus pseudohispidus* Kravts. & Schwarzm., Bull. Accad. Sci Kazak. SSR 98. Bot. Ser. 5:128, 1950.
Basidiocarps pileate, annual, semicircular, applanate to ungulate, soft when fresh, brittle when dry, up to 30 cm wide, 70 cm long and 20 cm thick at the base

in fused groups of basidiocarps, upper surface first hispid to villose, cinnamon brown to pale umber, by age glabrous but keeping its colour, pore surface rusty to cinnamon brown, pores round to angular, 1-3 per mm, tubes concolorous with pore surface, up to 8 cm deep, context fibrous with a silky shine, up to 11 cm thick at the base with a large spotted granular core.
Hyphal system monomitic, generative hyphae agglutinated, 4-10 µm wide, those of the dissepiments only 3-4.5 µm wide..
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores hyaline to pale yellow, ellipsoid, 7-9 x 5-6.5 µm.
Substrata. *Populus, Salix, Acer* and *Fraxinus.*
Distribution. Kazakhstan and China.
Remarks. Except for the host range, this species comes close to *I. tamaricis* and *I. dryophilus*.

Inonotus lloydii (Clel.) P.K. Buchanan & Ryvarden,
Austr. Syst. Bot. 6:217, 1993. - *Fomes lloydii* Cleland, Trans. & Proc. Roy. Soc. South Australia 59:219, 1935.
Basidiocarps pileate, subungulate to applanate, broadly laterally attached, with margin bluntly rounded, hard but of light weight for size when dry, breaking cleanly on cutting, when fresh firm but easily cut, to 12 cm across, 9.5 cm radius, 5 cm thick, pileus surface sulcate to irregular with shallow crevices, yellow-brown to brown, velutinate to finely scrupose, pore surface yellow-brown to dark brown, entire or sometimes with discrete small islands of pore surface, pores 5-7 per mm, tubes 3-6 mm deep, concolorous with pore surface but distinctly darker than context, context bright golden-brown, shiny on broken surface, concentrically zonate, of parallel hyphae arching up to be perpendicular at pileus surface, in some collections with one or more dark brown seams below pileus surface.
Hyphal system monomitic, hyphae yellow-brown to red-brown, 3.5-8 µm diam., with wall 0.5-2.5 µm thick and a distinct lumen, sparsely branched except at pileus surface where hyphal ends are often irregularly branched and somewhat inflated, hyphae of trama agglutinated, elsewhere free. In aging parts of tubes hyphae narrow, 1.2-3 µm diam., hyaline to pale yellow, projecting from tube walls into the lumen.
Hymenial setae and **setal hyphae** absent.
Basidia not seen.
Basidiospores brown, subglobose, 4.5-6 x 4-5 (-5.5) µm.
Substrata. *Eucalyptus* spp and other hardwood trees.
Distribution: New Zealand and Australia.
Remarks. Distinctive features are the shiny, golden context, light weight when

dry and contorted hyphae on the pileus.
The species is close to *I. porrectus* Murrill, known from Louisiana and the Bahamas, but pilei of the latter are flabelliform to substipitate, with somewhat narrower spores (4.5-6 x 3.5-4.5 µm). *I. pirisporus* Pegler from Australia differs from *I. lloydii* in its imbricate pilei and hyaline, apiculate spores. *Inonotus luteo-umbrina* (Romell) Ryvarden, also recorded from Australia, is distinguished by the presence of a distinct pileal cuticle and narrower spores, 4.5-5.75 x 3.2-4.2 µm.

Inonotus ludovicianus (Pat.) Murrill,
South. Polyp. p 41, 1915. - *Xanthocrous ludovicianus* Pat. Bull. Soc. Mycol. Fr. 24:6, 1908.
Basidiocarps annual, sessile to substipitate, usually forming large clusters or rosettes of imbricate pilei, the compound basidiocarp up to 50 cm in diam, individual pilei flabelliform 10-30 cm wide and long, 1-2.5 cm thick, sappy and tough when fresh, brittle when dry, upper surface rusty red to rusty brown, rugose to warted, often zonate and radially lined, at the margin more matted tomentose, pore surface often decurrent on the base, cinnamon to chestnut brown, pores thin-walled, angular to slightly irregular on drying, 2-3 per mm, tubes concolorous , up to 1 cm deep, context rusty brown, fibrous and friable, up to 2 cm thick at the base.
Hyphal system monomitic, generative hyphae in the context 4-8 µm wide, thick-walled and pale rusty to golden brown, some hyphae with irregular thickened walls making them look punctate in the light microscope, in the subhymenium golden to hyaline and narrower.
Hymenial setae absent.
Basidia clavate, 15-20 x 4-6 µm.
Basidiospores ellipsoid, rusty brown, 5-7 x 3.5-4.5 µm.
Substrata. Known from *Quercus, Nyssa* and *Liquidambar.*
Distribution. Southeastern United States from North Carolina to Texas.
Remarks. The large, partly imbricate cluster like basidiocarps make this a distinct species in the field. The complete lack of setae and setal hyphae and relatively large pores separate it from related species.

Inonotus luteocontextus D.Reid,
Kew Bull. 17: 274, 1963.
Basidiocarps pileate, annual, sessile, ungulate and almost triquetrous in section, up to 10 cm long and 5 cm wide and thick, margin rounded, upper surface velvety to finely tomentose, yellow to ochraceous, a thin cuticle present under the fine adpressed tomentum, pore surface ochraceous, pores 2-3 per mm, tubes

up to 3 mm deep, cinnamon brown and darker than the much paler context, the latter up to 5 cm thick at the base, cream to pale yellowish brown, slightly cheesy of structure, in KOH reddish brown becoming pale brown.
Hyphal system monomitic, hyphae in the trama 2-5 µm wide, hyaline to pale yellow, thin to slightly thick-walled, sparingly branched, in the context up to 8 µm wide, freely branched, walls distinctly thickened, pale yellow to hyaline, paler than those of the trama, thin-walled conducting (gloeoplerous) hyphae present, up to 5 µm wide and filled with a golden yellow content, in the tomentum the hyphae are like those of the trama.
Setal hyphae absent.
Hymenial setae subulate, dark brown with thick walls, often with thin transverse hyaline septa, 50-70 x 6-8 µm.
Basidia not seen.
Basidiospores hyaline, ellipsoid to ovate, 6.5-8 x 4-5 µm.
Substrata. On unknown hardwood.
Distribution. Only known from the type locality in New South Wales, Australia.
Remarks. The very pale cheesy context and the long subulate setae are diagnostic. The secondary septa are thin and rather inconspicuous and their taxonomic significance is uncertain.

Inonotus luteo-umbrinus (Romell) Ryvarden comb. nov.,
Basionym: *Phaeoporus luteo-umbrina* Rom., Kung. Sv. Vetensk. Akad. Hand. 26, no. 16:27, 1901 (S!). - *Pyropolyporus sublinteus* Murrill, North Am. Fl. 9: 110, 1908.
Basidiocarps annual, pileate, sessile or conchate with a contracted base, applanate, up to 10 cm wide and long, 0,3-3 cm thick, soft when fresh, brittle and hard when dried, but of light consistency, upper surface first cinnamon brown, later darker and finally becoming blackish from the base as the cuticle below the tomentum becomes exposed, often zone wise, first adpressed tomentose, glabrous by age and with a thin black cuticle below the tomentum, best developed close to the base, sulcately zonate and when dried with some slight radial undulations, margin thin, bent down in dry specimens, pore surface cinnamon to pale yellowish brown when actively growing, rusty brown, pores tiny, almost invisible to the naked eye, 7-8 per mm, tubes concolorous, up to 1 cm deep, context up to 1 cm thick, brilliant yellowish brown and red with KOH, often slightly zonate, fibrous and homogeneous with a black cuticle on top.
Hyphal system monomitic, generative hyphae, hyaline to pale rusty brown, thin-walled to thick-walled, sparingly branched in the context, 3-6 µm wide, in the trama generally more narrow, 3-5 µm wide.
Hymenial setae absent.

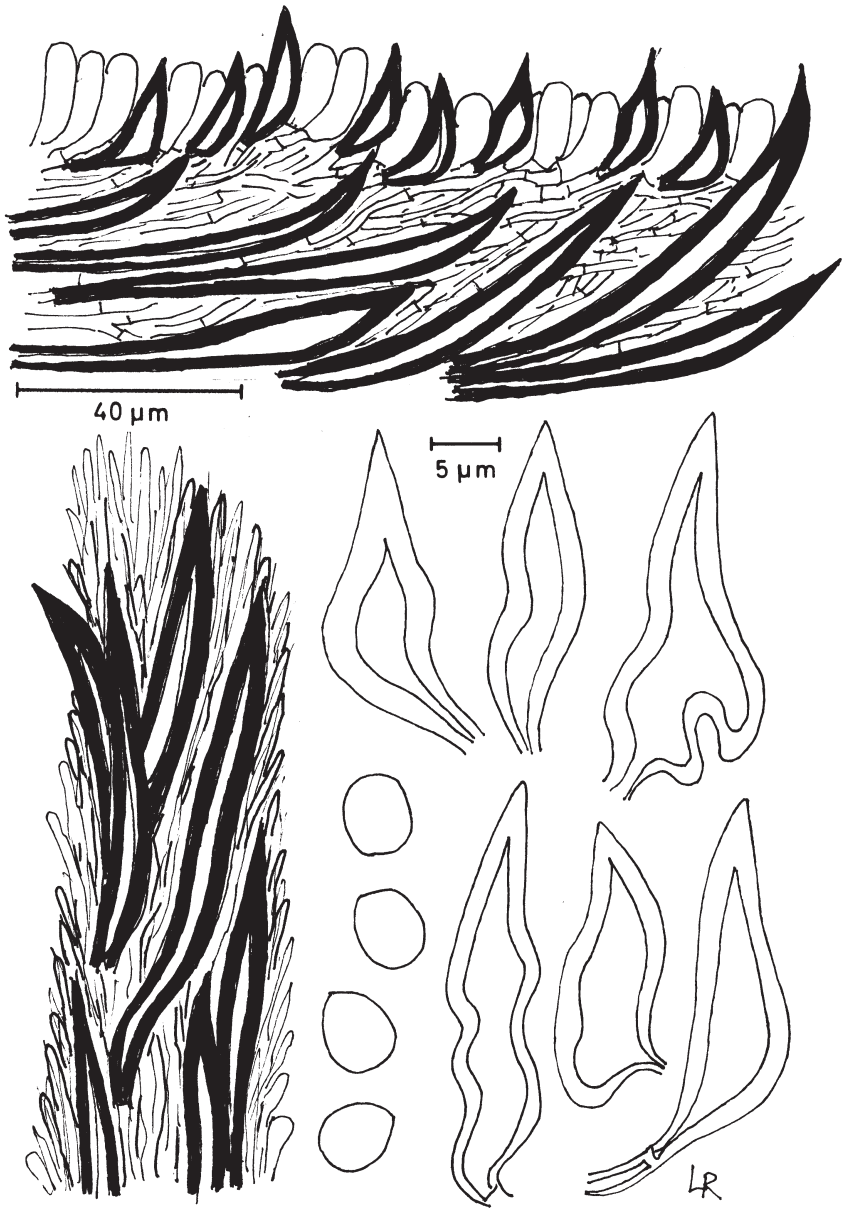

Fig. 24. *Inonotus marginatus* section through hymenium, section through a tube wall, hymenial setae and basidiospores, from the holotype.

Basidia clavate 12-18 x 6-7 µm.
Basidiospores globose to subglobose, yellowish brown in water, olivaceous brown in KOH, 4-5 x 3,5-4,5 µm.
Substrata. On living or dead hardwood trees of different kinds.
Distribution. American species known from Brazil to Louisiana and Texas in United States, rather common.
Remarks. In the field this species can be taken for a *Phellinus* species, but the olivaceous spores in KOH, the thin cuticle below a thin tomentum and the red reaction with KOH should be sufficient for a generic determination.

Inonotus marginatus Ryvarden, Fig. 24
Synopsis Fung. 15:75, 2002.
Basidiocarps annual, resupinate, in parts with new basidiocarps developing on top of old ones, as if biannual, individual basidiocarps more or less circular to elongated, up to 7 cm in longest dimension, soft and flat when fresh, hard, brittle and bent in thickest parts due to shrinking when dry, pore surface deep yellowish brown, margin 1-2 mm wide, deep brown to black and glabrous, distinct and sharp with a sloping surface as the pores has a tendency to be well developed all the way to the sterile margin, pores round to angular, 7-8 per mm, invisible to the naked eye, tubes deep brown, up to 3 mm deep, subiculum cinnamon to rusty brown with intermittent black lines, in parts up to 1.5 mm thick, in some parts missing and in others extending to the margin. In old and dead basidiocarps below living ones, the subiculum is almost entirely transformed to a thick, black zone extending to the margin.
Hyphal system monomitic, generative hyphae, thin to thick-walled, golden to rusty brown, 3-5 µm wide.
Setal hyphae very abundant in the trama, embedded or projecting, especially in the dissepiments, 30-180 x 5-12 µm, dark brown and thick-walled.
Hymenial setae present, slightly ventricose to evenly tapering from the base, 18-30 x 6-10 µm.
Basidia 10-15 x 6-7 µm with 4 sterigmata.
Basidiospores globose, thin-walled, hyaline, 4.5-5 µm in diameter.
Substrata. On unknown dead hardwood.
Distribution. Known from the type locality in Costa Rica and one locality in Venezuela.
Remarks. This species is easily separated from other resupinate *Inonotus* species in the area by the distinct, partly black margin originating from a black zone in the subiculum, the small globose basidiospores and presences of setal hyphae and hymenial setae.

Inonotus micantissimus (Rick) Rajchenberg, Fig.25
Nord. J. Bot. 7: 565, 1987. - *Poria micantissima* Rick, Iheringia Bot. 7: 287, 1960.
Basidiocarps annual, resupinate, 10 x 4 cm , up to 1.4 cm thick, woody, margin regular, light fulvous, pore surface dark sienna to grey chestnut, pores round, 5-7 per mm, tube layer dark fulvous, oblique, up to 1.4 cm thick, context dark brown almost absent.
Hyphal system monomitic, generative hyphae 3-5 µm wide, with yellowish to chestnut, slightly thickened walls.
Setal hyphae abundant in the dissepiments, 160-300-(400) µm long, 10-15 µm wide but swelling up to 25 µm in KOH, dark chestnut, walls up to 4 µm thick, tapering towards the ends, not protruding into the pores or rarely so.
Hymenial setae lanceolate with a ventricose base, 20-32 x 5-9 µm, scattered and in parts totally absent, apparently found only in the young pore mouths.
Basidia not seen.
Basidiospores globose to subglobose, often drop-like, 10-13 x 8-12 µm, apiculate, with thickened walls, slightly yellow to pale brown, with abundant oily contents,
Substrata. Dead hardwood trees.
Distribution. Known from Southern Brazil, Venezuela, Dominican Republic and Virgin Islands
Remarks. The resupinate basidiocarp and the large spores are diagnostic. As mentioned by Rajchenberg (op. cit.) the spores are deviating in the genus and of doubtful origin, being larger and more irregular than those of any other species in the genus and filled with oily inclusions, a feature not known from other *Inonotus* species. They are abundantly present in the lower part of the tubes and are reminiscent of chlamydospores. Fresh material is necessary to determine their origin with certainty.

Inonotus microsporus Ryvarden,
Kew Bull. 54:803, 1999.
Basidiocarps annual pileate and sessile in large imbricate dense clusters covering 1,5 meter of standing trunks, individual pilei up to 2 cm wide and 3 cm long, 3-8 mm thick at the base, fleshy when fresh, dense when dry, frequently fused with adjacent pilei to wavy and compound basidiocarps, upper surface yellowish brown, finely velutinate, faintly zonate, margin sharp and straight, lower surface with distinct sterile yellow margin, pore surface yellowish brown, pores round to angular, 4-6 per mm, tubes concolorous, up to 3 mm deep, context dense, homogeneous, yellowish brown, upper 1 mm loosed forming the tomentum.

Fig. 25. *Inonotus micantissimus*, section through a tube wall, hymenial setae and basidiospores, Argentina, Iguazu, Ryvarden 19717.

Hyphal system monomitic, generative hyphae, pale yellow to yellowish brown, parallel in the trama, 2.5-5 µm wide, in the context wider and mostly 4-7 µmin diameter.
Setal hyphae and **hymenial setae** absent.
Basidia barrel-shaped with 4 sterigmata, 8-10 x 4-5 µm.
Basidiospores ovoid, hyaline to pale yellowish, thin-walled, 3-3.5 x 1.8-2 µm.
Substrata. Known only from dead mopane (*Colophospermum mopane*).
Distribution. Known from the type locality at Victoria Falls, Zimbabwe.
Remarks. The microscopic characters outlined above remind one about those of a *Phylloporia* species characterized by the same type of hyphae, lack of setae and small spores. However, all species in this genus are found on living plants or just killed by the fungus and occur usually individually. They all have a distinct duplex context with a thick upper loose tomentum separated from a lower and much denser and thinner part by a black line. The very large basidiocarp with hundreds of pilei is also a feature that has not been observed in the latter genus. The type locality was visited exactly a year later and the log was then collapsed on the ground without a trace of basidiocarps. This seems to indicate that the rot is intense and the perfect stage with basidiocarps rather short-lived.

Inonotus mikadoi (Lloyd) Nunez & Ryvarden,
Synopsis Fung. 13:75, 1999. - *Polyporus mikadoi* Lloyd, Lloyd Mycol. Writ. Letter 43:3, 1912.
Basidiocarps small, dimidiate to almost ungulate, 1.5 x 2.5 x 0.5 -1 cm, upper surface dark brown, radially strigose to scrupose, margin acute and bent downwards, pore surface dark brown, pores 2-3 per mm, tubes concolorous, up to 7 mm deep, context thin, dark rusty brown, fibrous up to 2 mm thick and with a small granular core at the base, up to 5 mm in diameter.
Hyphal system monomitic, generative hyphae pale to rusty brown, 4-7.7 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores rusty brown, ellipsoid, 4.5-6.0 x 3.5-4.5 µm.
Substrata. Known only from *Prunus* spp.
Distribution. Known only from Japan and Taiwan.
Remarks. The small basidiocarp, lack of all setal characters and the host characterize this species.

Inonotus minutoporus Ryvarden, species nov.
Fructificatio sessilia, pileus et stipes ferruginosus, pori facies umbrina, pori rotundi, 10-12 per mm, tubi et contextus ferruginosus, systema hypharum monom-

iticum, hyphae generatoriae afibulatae, ferruginosus ad aureum, setae nulla, hyphae setales absentia, basidiosporae globosae ferruginosae, 5-6 µm in diametro, Holotype: Thailand, Khao Yai National Park, 6. Aug. 1997, on dead hardwood log, leg. Cony Decock, TH-11, MUCL acc. no 40591 in MUCL, isotype in O.
Basidiocarp annual, solitary, dimidiate to spatulate, soft when fresh, hard when dry and slightly curled in the drying, up to 7 cm wide and long and 7 mm thick at the base, upper surface deep rusty brown, dull, azonate, soft to touch and covered with a very finely adpressed tomentum (lens), pore surface dark brown, pores round, invisible to the naked eye, 10-12 per mm, tubes up to 3 mm deep, concolorous with the pore surface, context deep rusty brown, homogenous, up to 4 mm thick at the base.
Hyphal system monomitic, generative hyphae pale yellow to rusty brown, 3- 7 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia 15-18 x 6-8 µm with four sterigmata.
Basidiospores globose, rusty brown, thick-walled, 5.5-6.5 µm in diameter.
Substrata. Unknown hard wood log.
Distribution. Known only from the type locality.
Remarks. The species is striking by the combination of extremely minute pores, the total lack of setal organs and the round, rusty brown basidiospores.

Inonotus munzii (Lloyd) Gilbn., Fig. 26
Southwestern Nat. 1:125, 1969. - *Polyporus munzii* Lloyd, Mycol. Notes 67: 1163, 1922.
Basidiocarps sessile, often in large imbricate clusters, applanate to ungulate, 20 x 30 x 6 cm, upper surface bright yellowish brown at first, becoming reddish brown, short-hispid to tomentose, becoming rough-fibrillose to glabrous, finally rimose and blackened with age, pore surface yellowish brown, the pores angular, 2-4 per mm, with thin, lacerate dissepiments, context duplex at first, with a soft, spongy upper layer which rapidly deteriorates and disappears, leaving the lower context exposed, this becomes blackened and rimose, context lustrous golden brown, faintly to distinctly zonate, firm, fissile, up to 4.5 cm thick, tube layer clearly distinct from context, yellowish brown, up to l.5 cm thick, spore print bright yellowish brown.
Hyphal system monomitic, generative hyphae pale yellowish, thin- to firm-walled with occasional branching, 3-9 µmin diam, tramal hyphae similar, 3-7 µm wide.
Setal hyphae branched, abundant on upper surface of pileus, becoming thick-walled, with few to numerous branches, each tapering to a point, main axis of setal hyphae 5-10 µm wide.

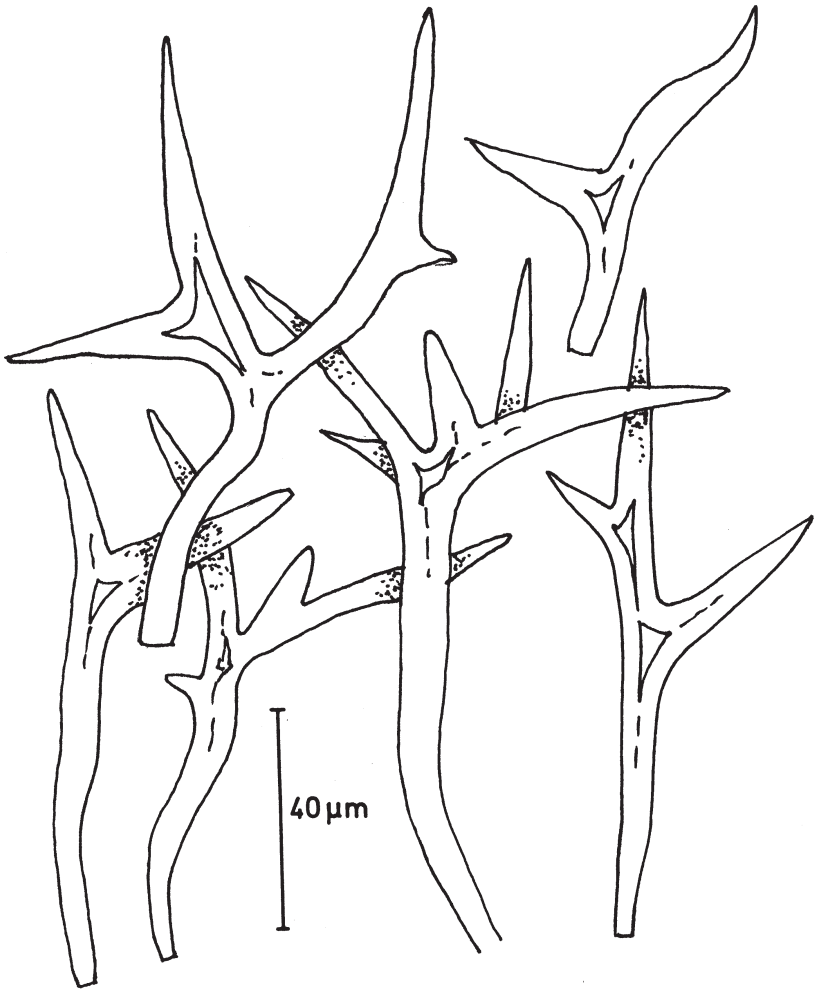

Fig. 26. *Inonotus munzii*, branched setal organs from the pileus, USA, Arizona, J. R. Weir.

Hymenial setae absent.
Basidia broadly clavate, 4-sterigmate, 15-20 x 7-9 µm.
Basidiospores broadly ellipsoid, golden brown, becoming thick-walled, 6-8 x 4.5-6 µm.
Substrata. Numerous hosts like *Salix, Populus, Schinus molle, Morus alba*, *Acer, Carya, Ficus, Quercus, Platanus, Sambucus,* and *Ulmus.*

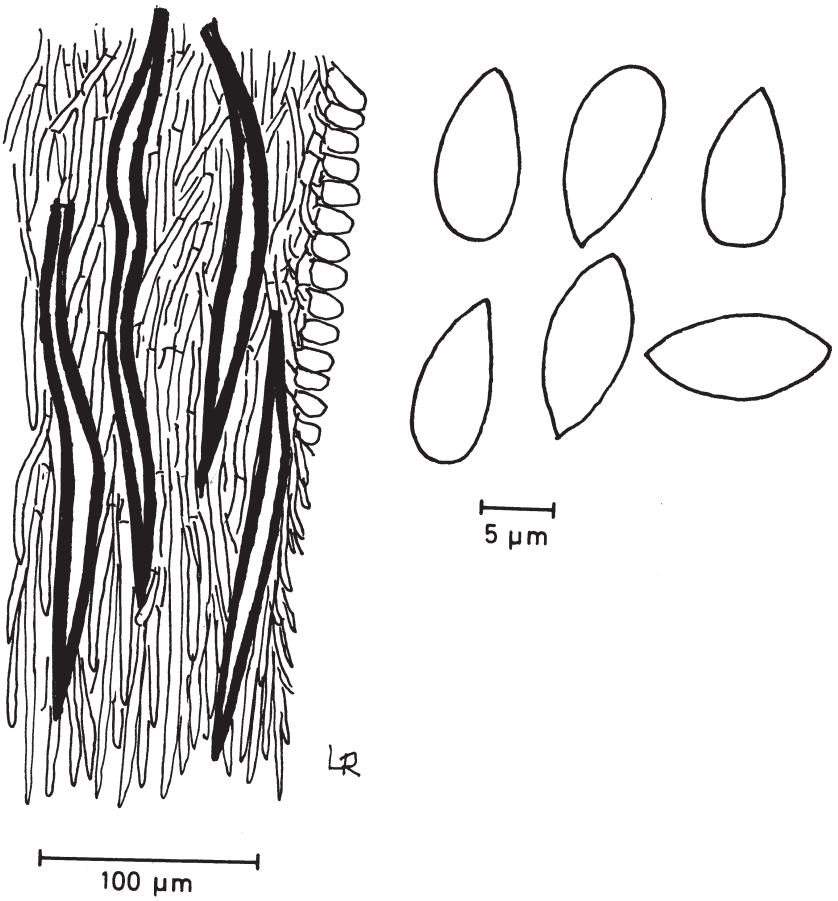

Fig. 27. *Inonotus navisporus* section through a tube wall and basidiospores

Distribution. Southwestern U.S. and Mexico.
Remarks. *Inonotus munzii* is one of a complex that also includes *I. farlowii* and *I. cuticularis*. It differs from these two species in the complete absence of hymenial setae and in its large basidiocarps and thick, duplex context.

Inonotus navisporus Ryvarden novo sp. Fig. 27
Fructificatio resupinatae, pori facies umbrina, pori rotundi, 5-7 per mm, tubi et contextus ferruginosus, systema hypharum monomiticum, hyphae generatoriae afibulatae, ferruginosus ad aureum, hyphae setales presentia, basidiosporae ellipsoideae ad naviculare, hyalinae ad pallidus luteus 9-12 x 4.8-6 µm,

Holotype: Australia, W. Australia, Ludlow State Forest, 150 miles south of Perth, on *Agonis* sp., 5. September 1964, Kitty Smith. Holotype in M, isotype in O.
Basidiocarp annual, solitary, resupinate, up to 2 cm thick in the centre, woody hard when dry, soft when fresh, pore surface rusty brown, pores round, 5-7 per mm, tubes up to 15 mm deep, non-stratified, concolorous with the pore surface, context rusty brown, up to 5 mm thick.
Hyphal system monomitic, generative hyphae, pale yellow to rusty brown, 3-6 µm wide.
Setal hyphae scattered in the trama, straight and not bending into the hymenium, dark brown, acute, 8-15 µm wide, up to 200 µm long.
Hymenial setae absent.
Basidia not seen.
Basidiospores ellipsoid to navicular, hyaline to pale yellowish, slightly thick-walled, 9-11 x 4.8-6 µm.
Substrata. Known only from *Agonis* spp..
Distribution. Known only from the type locality.
Remarks. The species comes close to *I. pacificus* by its combination of having setal hyphae, no hymenial setae and large almost hyaline basidiospores. However in *I. pacificus* the spores are 7-8 µm wide besides that the basidiocarp is ungulate compared with the resupinate habitat of the species described here. However, having sparse material, this difference may prove to be of less importance when more material has become available.

Inonotus neotropicus Ryvarden,
Synopsis Fung. 15:77, 2002.
Basidiocarp annual, dimidiate, semicircular, up to 4 cm wide and 5 mm thick at the base, fragile when dry, upper surface dull, soft to touch and covered with a very fine adpressed tomentum, faintly concentrically zoned, deep rusty brown, margin sharp and slightly undulating, not deflexed when dry, pore surface rusty brown, pores angular, 4-5 per mm, and with entire dissepiments, tubes up to 3 mm deep concolorous with the pore surface, context rusty brown, dense, up to 2 mm thick at the base.
Hyphal system monomitic, generative hyphae, hyaline, pale yellow to rusty brown, 3-7 µm wide in the context, 5-4 µm in the trama, no contorted hyphae present on the pileus.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores subglobose, abundantly present, yellowish brown to rusty brown, 7-8 x 6-7 µm, .
Substrata. Dead hardwood of unknown identity.

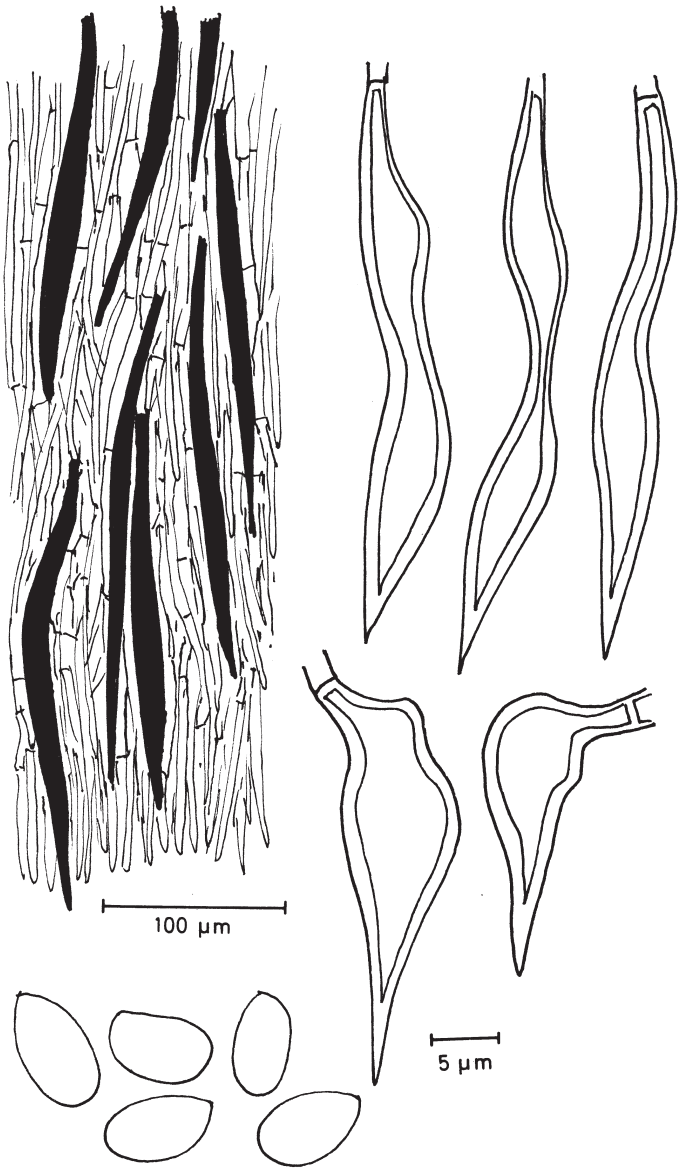

Fig. 28. *Inonotus niduspici*, section through a tube wall, hymenial setae and basidiospores, Slovakia, Kotlaba & Pouzar.

Distribution. Known only from the type locality in Panama, Barro Colorado Island, the Shannon trail.
Remarks. The species is characterized by the lack of setae and setal hyphae besides the fairly large subglobose basidiospores.

Inonotus nidus-pici Pilat, Fig. 28
Acta Mus. Nat. Pragae IX, B, no 2, Bot. 1:108, 1953.
Basidiocarps resupinate, annual, effused, lining cavities in old trees, often those made by wood-peckers, soft when fresh, brittle when old and often loosening and in parts falling from the cavity to the ground, pore surface yellowish green to olivaceous when fresh, brown when dry, pores round, 5-6 per mm, tubes up to 1.5 cm deep, concolorous with pore surface, subiculum very thin, cinnamon brown.
Imperfect stage annual, develop on the bark of infected trees, spherical to oblong, 3-6 cm wide and thick, as young yellowish brown often with dark brown excreted drops, later black, hard and rimose, last years stages often rimose of chlamydospores, inner part brown with strands of mycelium.
Hyphal system monomitic, generative hyphae yellow to rusty brown 3-8 µm wide.
Setal hyphae richly present, partly pointing into the hymenium, very abundantly present in the subiculum, 100-400 x 5-15 µm.
Hymenial setae few, fusiform and straight, 20-25 x 8-10 µm.
Basidia not seen.
Basidiospores subglobose to ovoid, pale brown, 6.5-9 x 5.5-7 µm.
Chlamydospores developed on the surface of the imperfect fruitbodies making these in parts pruinose, 1-4 celled, 5-20 x 3-6 µm, thick-walled and pale brown.
Substrata. On living trees in cavities, noted on *Quercus, Fagus, Acer, Juglans, Aesculus, Fraxinus,* but most commonly on *Quercus*.
Distribution. Central European species: France, Austria, Germany, the Czech republic former Yugoslavia, Russia, Bulgaria and Hungary.
Remarks Easily recognized species because of the very peculiar habitat. It is probably overlooked and Central European mycologists are urged to look in cavities in living hardwoods.

Inonotus nodulosus (Fr.) P.Karsten, Fig. 29
Bidr. Känned. Finl. Nat. Folk 37:73, 1882. - *Polyporus nodulosus* Fr., Epicr. p. 474, 1838.
Basidiocarps annual, resupinate to nodulose-pileate with numerous spaced, small and rounded pilei on an effused part, individual pilei up to 2 cm wide and 2 cm thick, hoof-shaped to triquetrous in section, surface first soft tomentose, ochraceous to pale yellowish brown, later scrupose to warted by agglutinated

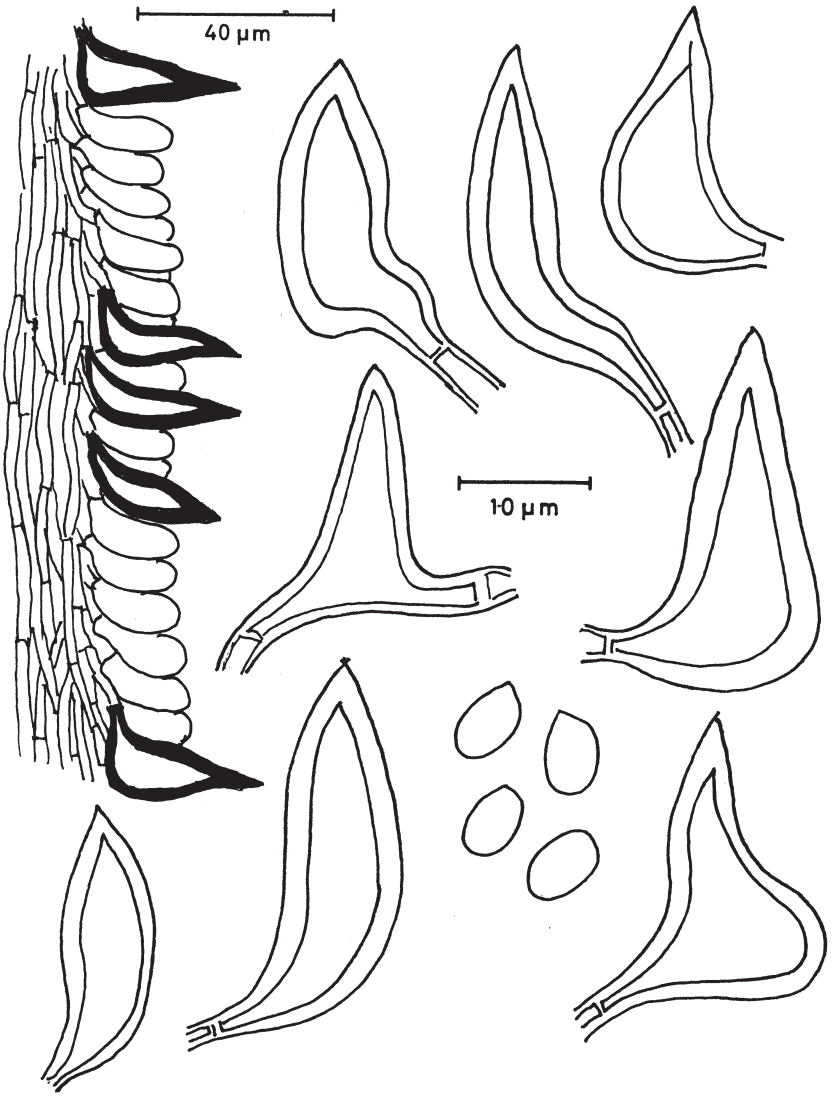

Fig. 29. *Inonotus nodulosus* , section of a hymenium, hymenial setae and basidiospores

hyphae and then dark brown, margin narrow to wide, yellowish, pore surface cinnamon to rusty brown when old, pores angular, 3-4 per mm, in decurrent parts more irregular, split to elongated, 1-2 per mm, when dry with a silvery shine when turned in incident light, tubes up to 5 mm deep, cinnamon in trama, pale inside the tubes, context hard, cinnamon to rusty brown, up to 1 cm thick at the base.
Hyphal system monomitic, generative hyphae hyaline to pale rusty brown, thin to slightly thick-walled, up to 8 µm wide in the tomentum, narrower in context and trama.
Setal hyphae absent.
Hymenial setae present, mostly close to the bottom of the tubes, always straight, rare to abundant, acute, 15-40 x 6-12 µm, mostly bent at the base or sometimes with an elongated base or foot.
Basidiospores ellipsoid to subglobose, hyaline to pale brown in old parts of the basidiocarp, 4.5-5 x 3.5-4 µm, weakly dextrinoid, but reaction often difficult to observe.
Substrata. On *Fagus sylvatica*.
Distribution. On its host from Spain to Southern Norway and eastward to Caucasus and Turkey, but rare.
Remarks The species may be confused with *I. radiatus* which however has hooked to straight hymenial setae and where tramal setae are present close to the base of the tubes. Besides that this species occurs only rarely on *Fagus. I. hastifer* is also a related species occurring exclusively on *Fagus*. However, this species has long setal hyphae in the dissepiments or pore mouths and is more or less completely resupinate.

Inonotus nothofagi G.H. Cunningh., Fig. 30
N.Z. Dep. Sci. Ind. Res. Bull. 78:1, 1948.
Basidiocarps annual, imbricate, applanate to dimidiate or flabelliform, occasionally effused-reflexed and rarely almost resupinate, up to 5 cm wide and long, to 5 mm thick at the base, upper surface rusty brown, umber becoming black with age and then with a distinct black cuticle, radially striate concentrically zoned and glabrous, margin acute, entire to lobed, pore surface rusty brown becoming umber, pores angular 2-4 per mm, tubes up to 3 mm deep, context rusty brown to 2 mm thick, homogeneous,
Hyphal system monomitic, generative hyphae, yellow to rusty brown, 3-7 µm wide.
Setal hyphae absent.
Hymenial setae ventricose, subulate, 20-30 x 10-12 µm.
Basidia subclavate 8-10 x 3-5.

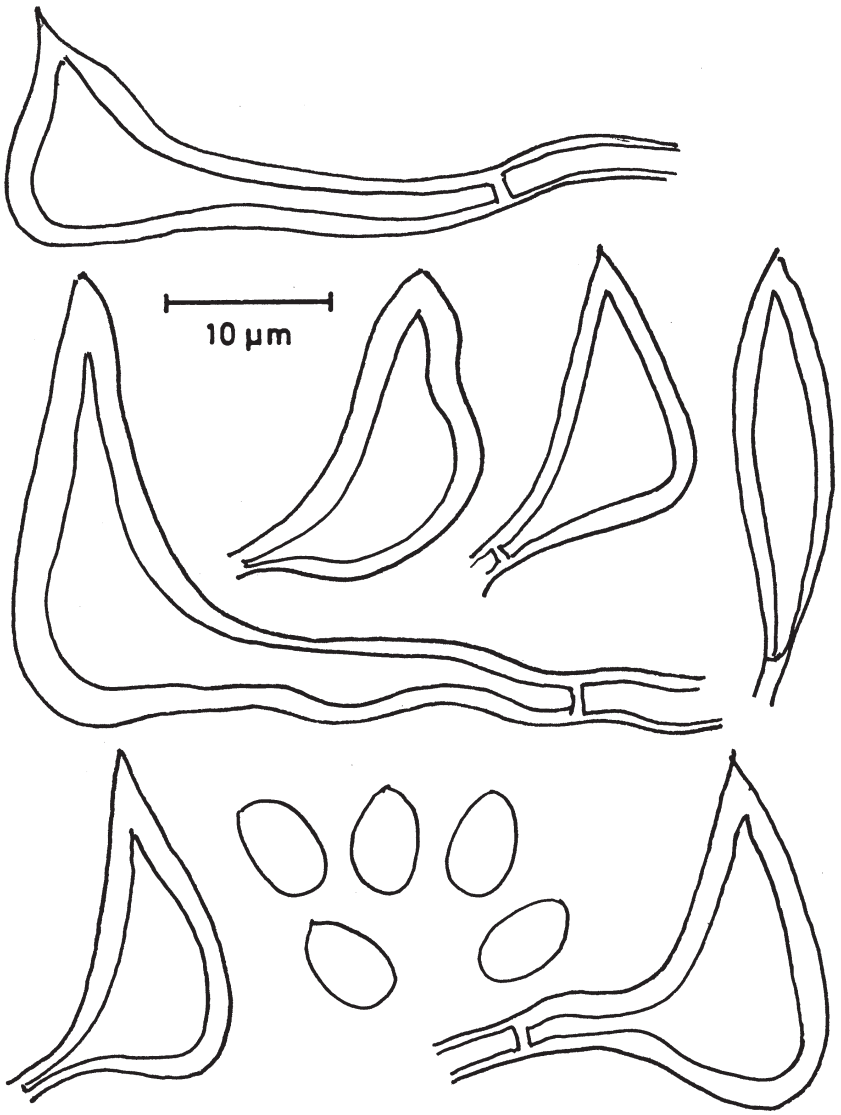

Fig. 30. *Inonotu snothofagi*, hymenial setae and basidiospores, New Zealand, Wellington, Rawlings.

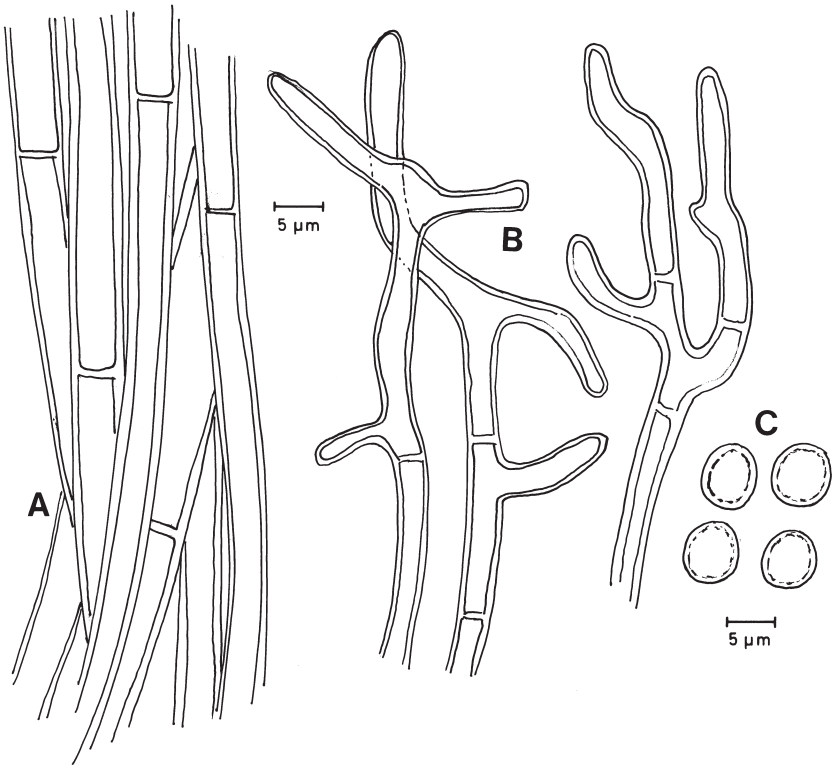

Fig. 31. *Inonotus novoguinensis*, hyphae from trama, branched hyphae from the pileus and basidiospores, from the holotype.

Basidiospores rusty brown, ellipsoid, 5-6 x 3-3,5 µm
Substrata. Known only from *Nothofagus* sp.
Distribution. New Zealand and Australia.
Remarks. The setae, the rusty spores, the host and its distribution will characterize this species.

Inonotus novoguinensis Ryvarden, species nov. Fig. 31
Fructificatio stipitata, pileus et stipes ferruginosus, pori facies umbrina, pori rotundi, 8-10 per mm, tubi et contextus ferruginosus, systema hypharum monomiticum, hyphae generatoriae afibulatae, ferruginosus ad aureum, basidiosporae globosae, ferrugineo-fusca, 6-7 um in diametro, setae nulla.
Holotype: Papua, New Guinea, Madang province, Gunn River Valley, Ohu but-

terfly farm area, 5° 10´ S, 145° 45´ W, 6. February 1997, leg. P. Van der Veken 97/322, isotype in O.
Lectotype: Same locality and same day, P. Van der Veken 97/246, GENT and O.
Basidiocarp annual, solitary or clustered with several fused basidiocarps, laterally stipitate, soft when fresh, corky dry, pileus up to 15 cm in diameter or wide and 1 cm thick at the base, upper surface deep umber to rusty brown, felty, fibrose, tuberculate to warted with some radial grooves and indistinct sulcate zones, soft to touch, stipe round, 2-4 cm long, 1.5-2.5 cm in diameter, rusty brown smooth, velvety and soft to touch, pore surface deep greyish rusty brown, pores round, 8-10 per mm, invisible to the naked eye, tubes up to 4 mm deep, context rusty brown, up to 5 mm deep, dense, homogenous and without any cuticle.
Hyphal system monomitic, generative hyphae with simple septa, pale yellow to rusty brown, up to 10 µm wide in the context, generally narrower in the context, very sparingly branched in the context, more so in the context and some hyphae on the upper surface more branched becoming antler-like.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores globose, abundantly present, rusty brown, thick-walled, 6-7 µm in diameter
Substrata. Dead hardwood stump.
Distribution. Known only from the type locality.
Remarks. The species is striking by its large stipitate dark rusty brown basidiocarp with very tiny pores, no setal structures and dark brown globose thick-walled basidiospores.

Both *Inonotus albertinii* (Lloyd) P. K. Buchanan & Ryvarden and *I. duostratosus* (Lloyd) P. K. Buchanan & Ryvarden have similar stipitate basidiocarps, but both have larger angular pores (1-2 per mm) and setal hyphae.

I. novoguinensis seems to occupy an isolated position in the genus and may remind of some *Coltricia* species such as *C. montagnei* (Fr.) Murrill, which has similar stipitate basidiocarps and lacks all setal structures. However, this species is terrestrial and presumably ectomycorrhizal as the type species *Coltricia perennis* (L.:Fr.) Murrill, besides having yellow cylindrical basidiospores.
Only future DNA sequencing will give us the clue to the interrelationships in *Inonotus* and its connection with the dimitic *Phellinus*.

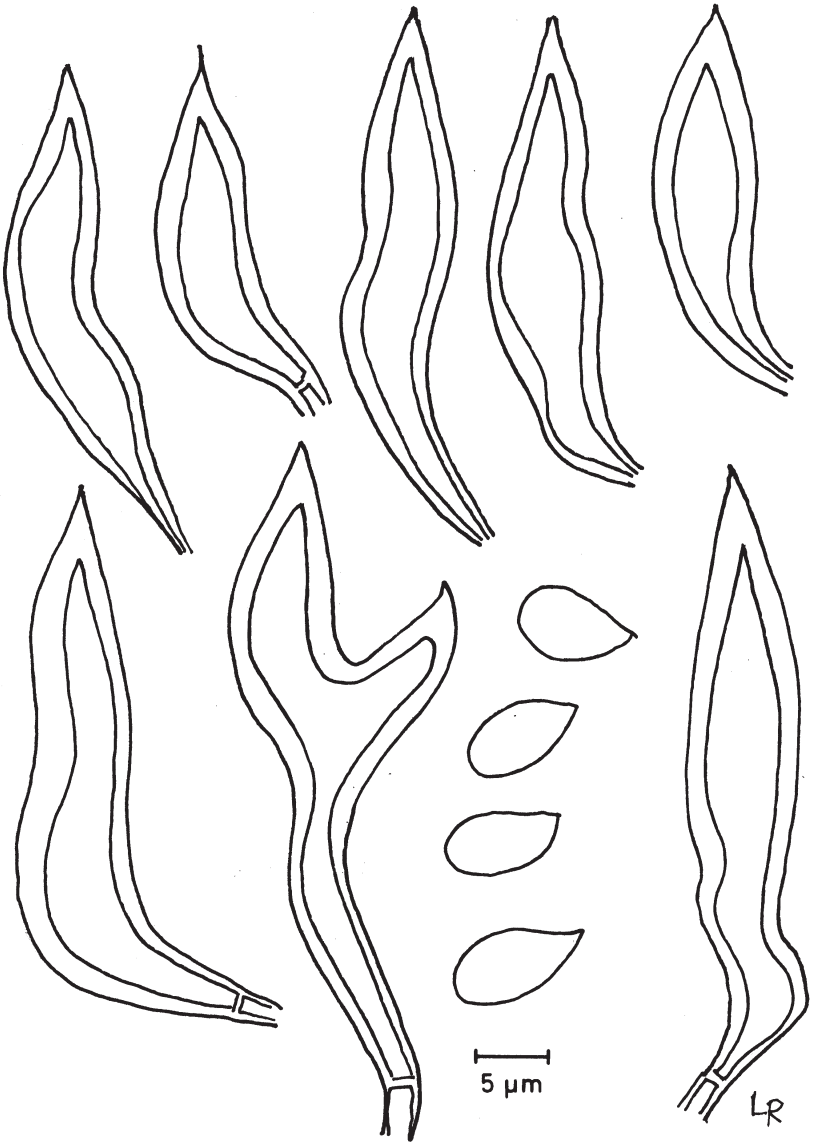

Fig. 32. *Inonotus obliquus*, hymenial setae and basidiospores, Norway, Ryvarden 13694.

Inonotus obliquus (Pers.:Fr.) Pilát, Fig. 32
Atl. Champ. Eur. III (I), p. 572, 1942. - *Polyporus obliquus* Pers.:Fr., Syst. Mycol. l:378, 1821.
Basidiocarps annual, becoming widely effused, developing only once beneath the bark or outer layers of wood on dead standing or fallen trees, eventually rupturing the bark, hard and brittle when dry, becoming easily separable, margin fertile, pore surface becoming dark reddish-brown, the pores circular, 6-8 per mm, with thick, entire dissepiments that become thin and lacerate, tube layer becoming dark reddish-brown, brittle, up to 3 mm thick context bright yellowish-brown, faintly zonate, corky, up to 3 mm thick, but usually less than l mm,.
Sterile conks black, hard and strongly cracked will developed on the living attacked trees many years before they die and the basidiocarps develop, up to 15 cm in diameter.
Hyphal system monomitic, generative hyphae dark brown in KOH solution, thin-to moderately thick-walled, with frequent branching, 3.5-7 µm wide.
Basidia broadly clavate, 15-18 x 11-12 µm.
Hymenial setae scattered, scarcely projecting or imbedded, subulate to ventricose, 16-22 x 4.5-7 µm.
Basidiospores hyaline to pale brownish, broadly ellipsoid to ovoid, 9-10 x 5.5-6.5 µm.
Substrata. *Betula*, rarely on *Alnus, Fagus* and *Ostrya.*
Distribution. Throughout the northern hemisphere in the range of *Betula* spp.
Remarks. *Inonotus obliquus* produces conspicuous, black "sterile conks" on living trees. It invades, kills, and decays the sapwood, weakening the tree which then finally die and the next summer the basidiocarps will develop once under the disrupted bark. The basidiocarps are generally quickly eaten by insects and weathering, and are rare to find, even in stands where infected trees are numerous.

Inonotus ochroporus (Van der Byl) Pegler Fig. 33
Trans. Brit. Mycol. Soc. 47: 183, 1964. - *Polyporus ochroporus* Van der Byl, S. Afr. J. Sci. 18: 269, 1922.
Basidiocarps annual, pileate, broadly attached, solitary or imbricate, up to 16 cm broad and 17 cm wide, 0.3-2.5 cm thick, consistency soft and spongy when fresh, brittle to hard when dry, pileus dimidiate or attenuated towards the base, convex, upper surface first soft and pubescent, becoming glabrous and hard with age mostly with an agglutinated cuticle, sometimes concentrically zoned and partly radially striate, light brown, fulvous to dark brown, margin thin to rather thick, entire or slightly lobed, pore surface ochre-yellow to dark brown, sometimes with a rosy tint, pores angular to irregular, 2-5 pr mm, dissepiments thin, entire

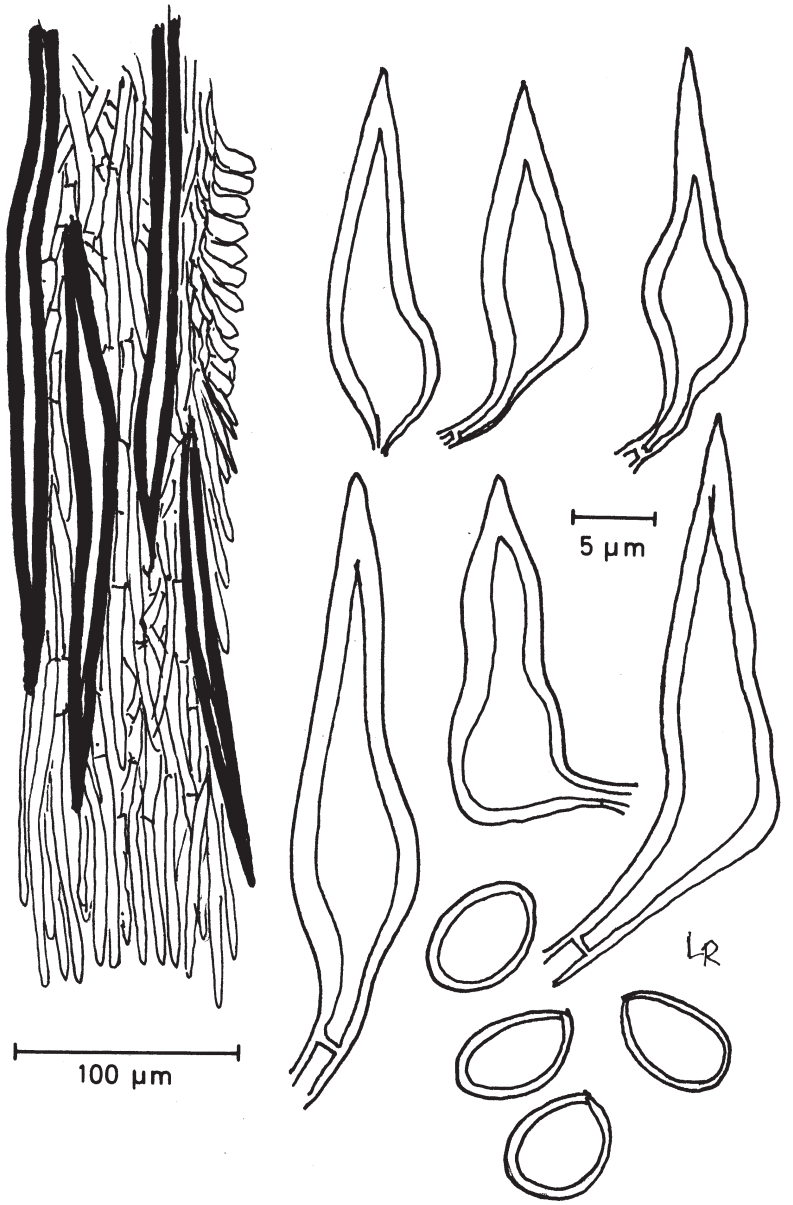

Fig. 33. *Inonotus ochroporus*, section through a tube wall, hymenial setae and basidiospores, Tanzania, Ryvarden 10040.

or dentate, tubes 1-8 mm deep, ochraceous-yellow, thin, context 0.5-2 cm thick, duplex in young specimens, upper part soft and ochraceous to golden-brown, mostly separated from the lower part by a thin, often indistinct black zone, becoming more prominent with age and closer to the base of the basidiocarp, lower part shiny, radially fibrous and hard, dark cinnamon brown.
Hyphal system monomitic, generative hyphae hyaline to rusty-brown, moderately branched, 2-6 µm wide.
Setal hyphae prominent in the dissepiments, rather rare and often difficult to find in the upper part of the context, mostly confined to the basal part of the pileus, acute, very thick-walled, 10-17 µm wide, up to 300 µm long, mostly embedded, but also obliquely projecting into the hymenium, in some collections they are of a variable form, occasionally forked in the upper part.
Hymenial setae apparently absent but reported by Pegler as acute, slightly ventricose, thick-walled, dark brown and 12-28 x 6-9 µm.
Basidia ellipsoid to broadly clavate, 4-sterigmate, 16-19 x 7-10 µm.
Basidiospores abundant, sub-globose to globose, yellow, thick-walled, thick-walled when ripe, 6-9 x 5-7 µm.
Substrata. Noted on *Acacia abyssinica, Celtis, Ficus, Ziziphus* and other hardwoods.
Distribution. Southern and eastern parts of Africa, specimens have been seen from Kenya, Uganda, Zimbabwe, South-Africa and Tanzania besides Canary Islands
Remarks. The species is undoubtedly related to *I. patouillardii*, but is separated by the larger spores and the distinct duplex consistency which however can be difficult to observe in old and weathered specimens.

Inonotus pacificus Ryvarden species nov. Fig. 34
Fructificatio sessilia, pileus et stipes ferruginosus, pori facies umbrina, pori rotundi, 5-7 per mm, tubi et contextus ferruginosus, systema hypharum monomiticum, hyphae generatoriae afibulatae, ferruginosus ad aureum, hyphae setales presentia, basidiosporae ellipsoideae hyalinae ad pallidus luteus 9-12 x 7-8 µm in diametro, setae nulla.
Holotype: New Caledonia, Plage de Poe, 19 May 1995, A Bresinsky no 360. holotype in M, isotype in O.
Basidiocarp annual, solitary, sessile, semicircular, slightly ungulate, fleshy when fresh, woody hard when dry, up to soft when fresh, corky dry, pileus up to 8 cm in diameter and 2 cm thick at the base, upper surface rusty brown, radially fibrose to adpressed strigose, without zones, pore surface rusty brown, pores round, 5-7 per mm, tubes up to 18 mm deep, slightly stratified, concolorous with the pore surface, context rusty brown, thin consisting almost only of the fibres on

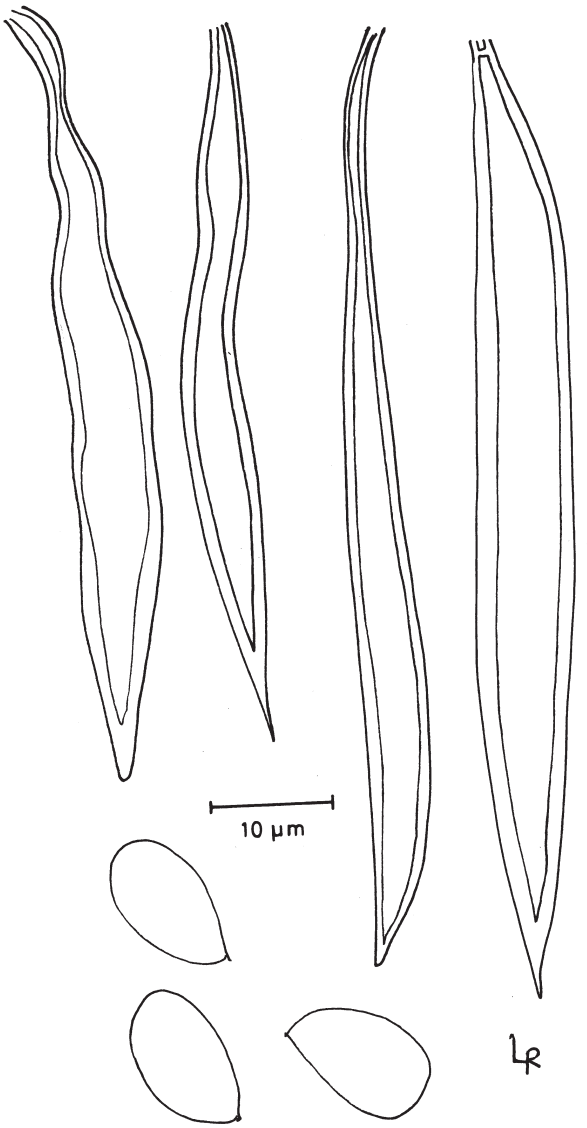

Fig. 34. *Inonotus pacificus* setal hyphae and basidiospores, from the holotype.

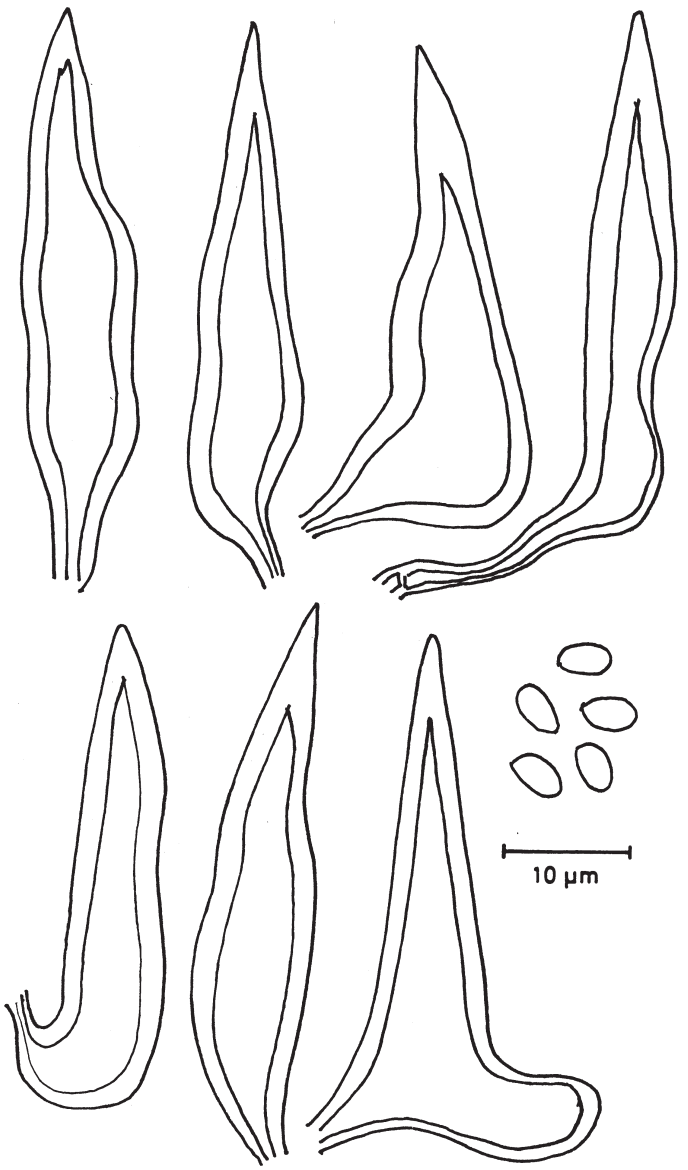

Fig. 35. *Inonotus papyrinus.* Hymenial setae and basidiospores. From the holotype.

the pileus.
Hyphal system monomitic, generative hyphae, pale yellow to rusty brown, up to 8 µm wide in the context, 3-5 µm wide in the trama.
Setal hyphae abundantly present in both trama and context, straight to slightly sinuous, but not bending into the hymenium, dark brown, acute, 8-20 µm wide, up to 250 µm long, tapering strongly towards the base.
Hymenial setae absent.
Basidia 18-25 x 6-8 µm with four sterigmata.
Basidiospores ellipsoid, hyaline to pale yellowish, slightly thick-walled, 9-12 x 7-8 µm.
Substrata. Unknown.
Distribution. Known only from the type locality.
Remarks. The species is striking by the combination of setal hyphae in both context and trama and the large basidiospores. *I. ochroporus*, known only from Africa has similar setal hyphae in context and trama, but its basidiospores are smaller, i.e. 6-9 x 5-7 µm.

Inonotus palmicola Ryvarden,
Kew Bull. 54:804, 1999.
Basidiome pileate, annual, dimidiate to broadly sessile, more or less triquetrous in section, up to 3 cm wide and long and 1.5 cm thick, light of weight and brittle, upper surface velutinate, dark brown at base, more rusty brown towards the margin, tuberculate and slightly zonate, developing a thin, but distinct cuticle from the base, pore surface brown, pores angular, rather thin-walled, usually 1-2 mm wide, tubes concolorous, up to 3 mm deep, context homogenous, cinnamon to yellowish brown towards the upper surface, up to 1 mm thick at the base.
Hyphal system monomitic, generative hyphae.
Hymenial setae and **setal hyphae** absent.
Basidia barrel shaped, up to 14 µm long, 4-8 µm wide.
Basidiospores ellipsoid, rusty brown, 7.5-8.5 x 5-6 µm.
Substrata. Known only from the base of living palm *Phoenix reclinata*.
Distribution. Known from the type locality in Zimbabwe and Uganda, but since the host is widespresad in tropical Africa, it will certainly be recorded in other countries as well.
Remarks. Microscopically this species comes close to *I. plorans* which however has larger spores. Macroscopically it is grossly different by having a large robust basidiocarp, smaller pores and a fibrous crumbly surface and without a distinct cuticle. *I. plorans* is known only from North Africa on hosts of Salicaceae.

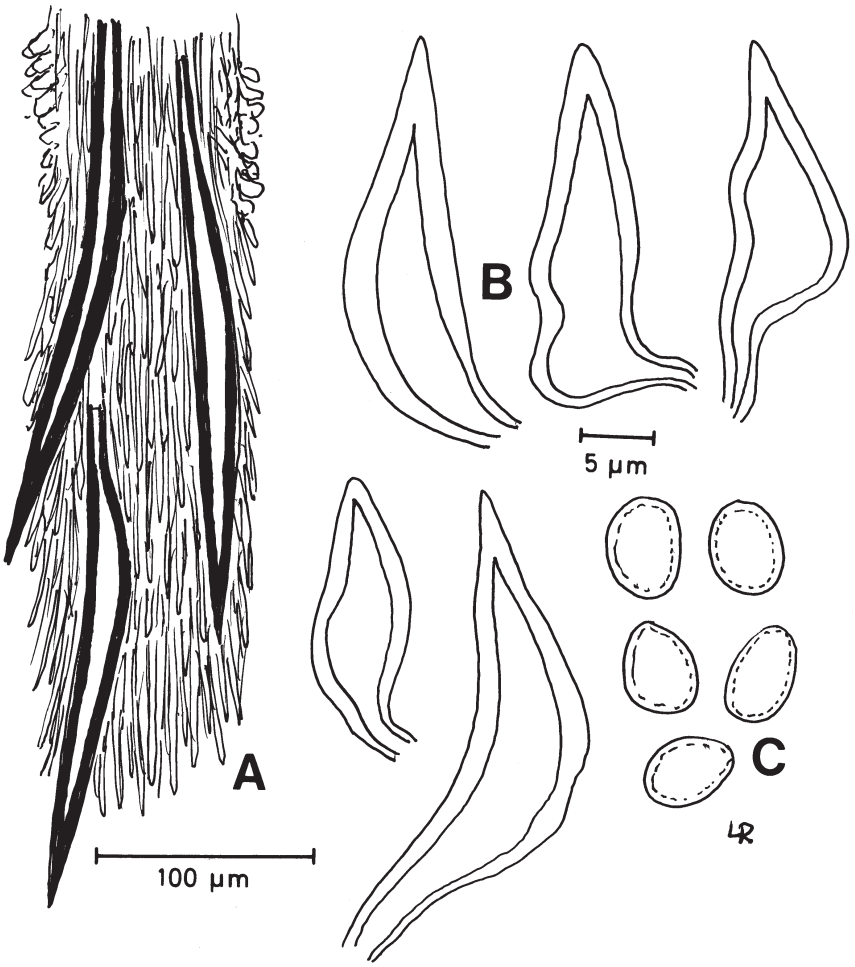

Fig. 36. *Inonotus patouillardii*, section through a tube wall. hymenial setae and basidiospores, from the lectotype.

Inonotus papyrinus Ryvarden, species nov. Fig. 35
Ad *Inonotus dentatus* sed setae praesentia
Holotype: Costa Rica, Cartago, Area de Conservation La Amistad Pacifico, Las Tablas, Sitio Cotoncito, 1500-1600 m, 28 September, 2002, E. Navaroo 2597 INBio, isotype in O.
Basidiocarps annual, pileate and dimidiate with strongly contracted base, semicircular of outline, up 2 cm wide and 3 cm long, 1.5 mm thick at base, papery thin and flexible, upper surface shiny golden brown, adpressed velutinate, azonate or faintly zonate, no cuticle in section, margin sharp and wavy, pore surface golden yellow, pores tiny, invisible to the naked eye, 7-8/mm, up to 0.5 mm deep, context golden yellow brown, homogenous, up to 1 mm thick at base, the whole basidiocarp sharply cherry red with 3% KOH.
Hyphal system monomitic, generative hyphae thin to thick-walled, golden to rusty brown, 3-5 µm wide.
Hymenial setae present, straight, dark brown 30-55 x 6-12 µm.
Basidia clavate, 10-12 x 4-5.5 µm with 4 sterigmata.
Basidiospores ellipsoid, hyaline to golden yellow, 3-4 x 2.5 µm.
Substrata. On unknown dead hardwood.
Distribution. Known only from the type locality.
Remarks. This species is remarkable with its small, papery thin basidiocarps and the large hymenial setae.

Inonotus patouillardii (Rick) Imazeki, Fig. 36
Bull. Tokyo Sci. Mus. 6:105, 1943. - *Polystictus patouillardii* Rick, Broteria 6: 89, 1907.
Basidiocarps annual, sessile, dimidiate, up to 8 cm wide, 5 cm long and 4 cm thick, flat, first and radially rugose, cracking both transversely and radially into angular blocks, first rusty brown then becoming dark blackish-brown with age, margin rounded, concolorous with upper surface in older specimens, fertile below, pore surface yellowish brown, becoming dark reddish-brown on older specimens, the pores circular, 3-4 per mm, with thick dissepiments, context dark brown with lighter streaks , concentrically zonate in thicker portions, very hard and flinty, highly lustrous on broken surfaces, up to 4 cm thick, tube layer dark reddish-brown, streaked pale yellow from stuffed tubes in older specimens, up to l.5 cm thick.
Hyphal system monomitic, hyphae thin- to moderately thick-walled, pale yellow in KOH, 3-5 µm in diam, arranged in parallel fashion, or thick-walled, 5-8 µm.
Setal hyphae abundant in tramal tissue, mostly parallel to hymenial layer but occasionally projecting downward up to 100 µm past hymenium, 8-11 µm diam.
Hymenial setae rare, ventricose, 15-21 x 5-9 µm.

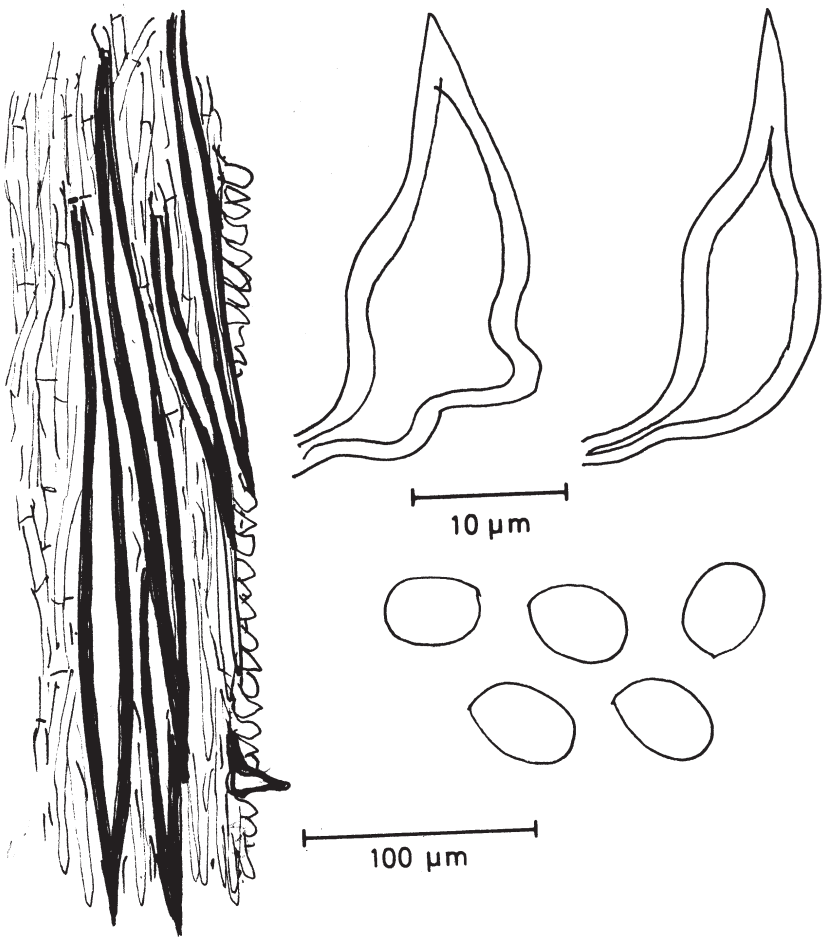

Fig. 37. *Inonotus pegleri*, section through a tube wall, hymenial setae and basidiospores, from the holotype.

Basidia broadly clavate, 17-20 x 7.5-9 µm.
Basidiospores pale yellow in KOH, cyanophilous, becoming thick-walled, ovoid to ellipsoid, (5.5) 6-8 x 4-5.5 µm.
Substrata. Known from many hardwoods, in United States and Europe found on *Quercus*.
Distribution. Tropical to subtropical species and widely distributed in these zones such as from South Africa to Kenya and in tropical Asia rare in Arizona and Southern Europe.

Remarks. The hard, lustrous context and the large, conspicuous setal hyphae are diagnostic characters for *I. patouillardii.*

Inonotus pegleri Ryvarden, Fig. 37
Norw. J. Bot. 22: 31, 1975.
Basidiocarps annual, resupinate, adnate, woody when dry, 12 cm long and wide, up to 15 mm thick in the centre, pore surface umber brown, pores round and moderately thick-walled, 4-5 per mm, tubes dark cinnamon, weakly stratified, up to 15 mm deep, context dark cinnamon, almost lacking, very thin.
Hyphal system monomitic, generative hyphae thin to thick-walled, hyaline to pale brown, 3 -7 µm wide, sparingly branched, often in right angles.
Setal hyphae present in trama, thick-walled, sharply pointed, unbranched, rarely dichotomously branched, 120 to 500 µm long, 5 to 25 µm wide.
Hymenial setae scattered but present in most sections, subulate to ventricose, thick-walled, 18-30 x 6-9 µm.
Basidia broadly clavate, 15-17 x 8-10 µm.
Basidiospores globose, hyaline to pale yellowish, 6-7 µm in diameter.
Substrata. On hardwood tree.
Distribution. Known from Tanzania, Uganda and Zimbabwe, but will certainly be found throughout East Africa in due time.
Remarks. There are no other resupinate *Inonotus* species with setal hyphae and rare, small hymenial setae. This and the globose spores should make the species easy to recognize.

Inonotus perchocolatus Corner,
Beiheft Nova Hedw. 101:123, 1991.
Basidiocarps resupinate, annual adnate, hard and woody, up to 1 cm thick, subiculum missing, pore surface fuscous chocolate brown, pores tiny, 6-9 per mm, almost invisible to the naked eye, tubes concolorous with pore surface, old tubes stuffed with blackish deposits.
Hyphal system monomitic, generative hyphae, 2.5-5 µm wide with yellow to pale brown slightly thickened wall, strongly agglutinated.
Hymenial setae present, conical to ventricose, thick-walled, straight, 10-25 x 5-10 µm.
Setal hyphae present, embedded or obliquely projecting into the hymenium, 40-110 µm long, and 4-10 µm wide, acute and with transitions to the hymenial setae.
Basidia not seen.
Basidiospores ellipsoid, hyaline becoming pale yellow, thin-walled, 5-7 x 4.5-5.5 µm.
Substrata. Known only from *Nephelium lappaceum* (Sapindaceae).

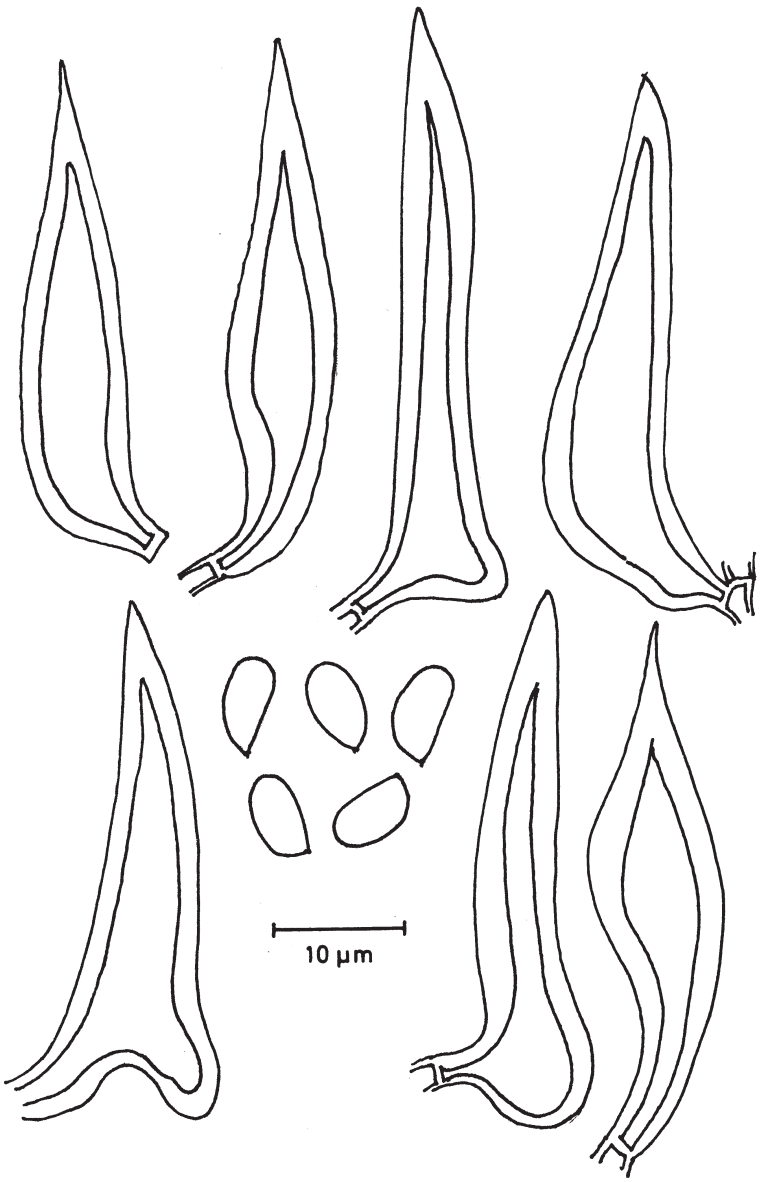

Fig. 38. *Inonotus pertenuis*, hymenial setae and basidiospores, Costa Rica, Carranza.

Distribution. Known only from the type locality in Singapore.
Remarks. Microscopically this species comes very close to *I. glomeratus* from North America, but this species is usually effused reflexed and has larger pores, i.e. 3-5 per mm.

Inonotus pertenuis Murrill, Fig. 38
North. Am. Fl. 9:87, 1908.
Basidiocarps annual,, single or imbricate, applanate, dimidiate to sessile, thin, fragile, 2-3 x 4-6 cm x 2-4 mm, upper surface dull, radially striate to finely scrupose, concentrically zoned, fulvous to rusty brown, pore surface dark brown, pores small, round to angular, 5-8 per mm, tubes up to 2 mm, concolorous, context thin, cinnamon and dense, 1-2 mm.
Hyphal system monomitic, generative hyphae, golden yellow to rusty brown, 3-6 µm wide.
Setal hyphae absent.
Hymenial setae thick-walled, acute with a bent base, 25-45 x 8-15 µm.
Basidia not seen.
Basidiospores dark brown, ellipsoid, 5-6-5 x 3-5-4.5 µm.
Distribution. Known from Cuba, Costa Rica and Panama but is probably widespread in Central America.
Remarks. The small size of the basidiocarp, the large setae and small pores characterize this species.

Inonotus pirisporus Pegler
Trans. Br. Mycol. Soc. 47:169, 1964.
Basidiocarp annual, sessile, imbricate to solitary, applanate, dimidiate, up to 6 cm wide, 8 cm long and 3 cm thick at the base, in fresh condition exuding drops of water, upper surface glabrous without cuticle, rugose and azonate, yellowish brown to cinnamon, margin thin and sharp, pore surface rusty to umber brown, in fresh specimens slightly pruinose due to fresh hyphal growth, pores angular, thin-walled, 2-4 per mm, tubes cinnamon brown, in tubes of lighter colour, up to 7 mm deep, context rusty brown, darker than tube layer, radially fibrous, concentrically zoned, lower part hard and dense, upper part more punky.
Hyphal system monomitic, generative hyphae, in the trama 2.5-6 µm wide, strongly agglutinated, hyaline to pale rusty brown, thin-walled, sparingly branched, in the context up to 14 µm wide, rather thin-walled but pale rusty brown in KOH.
Setal hyphae and **hymenial setae** absent.
Basidia clavate with 4 sterigmata, 10-13 x 5-7.5 µm.
Basidiospores hyaline, thin-walled, subglobose to piriform, 5-6.5 x 3.5-4.5 µm.

Substrata. At the base of *Eucalyptus obliqua* and *Allocasuarina littoralis.*
Distribution. Known from Victoria and New South Wales in Australia.
Remarks. Characteristic is the lack of setal organs and the piriform to subglobose hyaline spores, the host and distribution.

Inonotus plorans (Pat.) Bond. & Sing.
Ann. Mycol. 39:56, 1941. - *Xanthochrous plorans* Pat. Bull. Soc. mycol. Fr. 20: 52, 1904.
Basidiocarps single, large, soft and friable when dry, semicircular, sessile up to 50 cm in radius, up to 10 cm thick at the base, upper surface rusty brown slightly paler towards the margin, slightly tomentose to finely scrupose at the base, adpressed velutinate towards the margin, south and easily crumbled, pore surface cinnamon to rusty brown, pores angular, 2-3 per mm, in the end slightly dentate, tubes concolorous up to 8 cm deep, context brittle, shiny and bright cinnamon to rusty brown, 3-8 cm thick.
Hyphal system monomitic, generative hyphae rusty brown, agglutinated, 3-8 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores ellipsoid yellow to rusty brown, thick-walled, 8-11 x 6-8.5 µm.
Substrata. Only known from hosts of Salicaceae such as *Populus* and *Salix*.
Distribution. Known only from Algeria in North Africa.
Remarks. Microscopically the species is identical to *I. hispidus*, but its upper surface is grossly different from that species. The large spores, the soft upper surface, the restricted range of hosts and the distribution make this an easy species to recognize.

Inonotus poncei (Lloyd) Ryvarden comb nov.
Basionym: *Polyporus poncei* Lloyd, Lloyd Mycol. Writ. 7: Mycol notes 69:1191, 1923 (BPI!).
Basidiocarps annual, pileate, solitary, rarely imbricate, tough when fresh, woody hard and brittle when dry, dimidiate to flabelliform, up to 5 cm long, 3 cm broad and 8 mm thick, upper surface dark brown with a black cuticle developing from the base, paler towards the margin, pore surface grey to yellowish brown, darkens when bruised,, pores round, 4-6 per mm, tubes single layered, concolorous with pore surface, up to 4 mm deep, context golden brown, zonate towards the base, up to 4 mm thick, red with KOH.
Hyphal system monomitic, generative hyphae, hyaline to pale rusty brown, thin- to thick-walled, 4-5 µm wide.
Hymenial setae absent

Basidia clavate 8-13 x 5-6 µm.
Basidiospores thin-walled, golden brown, subglobose, 4.5-5.5 x 3.5-4.5 µm.
Substrata. Deciduous trees of different kinds.
Distribution. Known from Philippine Islands, India, Bangladesh and Australia.
Remarks. The species is similar to *I. euphoriae* but is separated by the smaller basidiospores.

Inonotus porrectus Murrill,
Tropical polypores, p. 68, 1915.
Basidiocarps annual, flabelliform or substipitate with a narrowed base, pilei circular to dimidiate, single or imbricate, up to 4.5 cm wide and 3.5 cm thick, upper surface bright yellowish brown, zonate, finely tomentose under a 30 x lens, margin acute to rounded, concolorous but sometimes staining dark brown on handling and drying, pore surface dull purplish brown, the pores circular to angular, 5-6 per mm, with thick, entire, minutely tomentose dissepiments, context bright golden brown, lustrous, concentrically zonate, firm-fibrous, slightly darker in the narrowed basal portion, up to 3 cm thick, tube layer purplish brown, decurrent on the narrowed base, up to 3 mm thick.
Hyphal system monomitic**,** hyphae thin - to firm-walled, pale yellowish in KOH, 4.5-8.5 µm in diam, tramal hyphae tightly interwoven and agglutinated in dried specimens, difficult to separate, firm- to thick-walled, 3-6 µm in diam, hyphae on pileus surface erect, variously contorted, branched, or lobed, thin- to firm-walled, 3.5-7 µm wide.
Hymenial setae absent.
Basidia broadly clavate, 4-sterigmate, 12-16 x 6-7 µm.
Basidiospores broadly ellipsoid to ovoid, reddish-brown, 4.5-6 x 3.5-4.5 µm.
Substrata. On dead hard woods.
Distribution. Originally described from the Bahamas, but is also known from Cuba and Louisiana.
Remarks. The substipitate type of the basidiocarps, lack of setae, and presence of contorted and branching hyphae on the pileus surface suggest affinities with the genus *Coltricia.* The bright golden yellow, lustrous context and the darker, purplish brown tube layer are distinctive characters.

Inonotus pruinosus Bond. Fig. 39
Not. syst. Inst. Crypt. Bot. Acad. Sci. URSS 15: 99, 1962.
Basidiocarp effused, pulvinate, resupinate, up to 10 cm wide, 15 mm thick in centre, pore surface pale brown with distinct pruina, margin narrow, adnate, pores angular to elongated-sinuous, 2-3 (4) per mm, tubes dark brown, subiculum very thin, 1 mm thick, cinnamon brown.

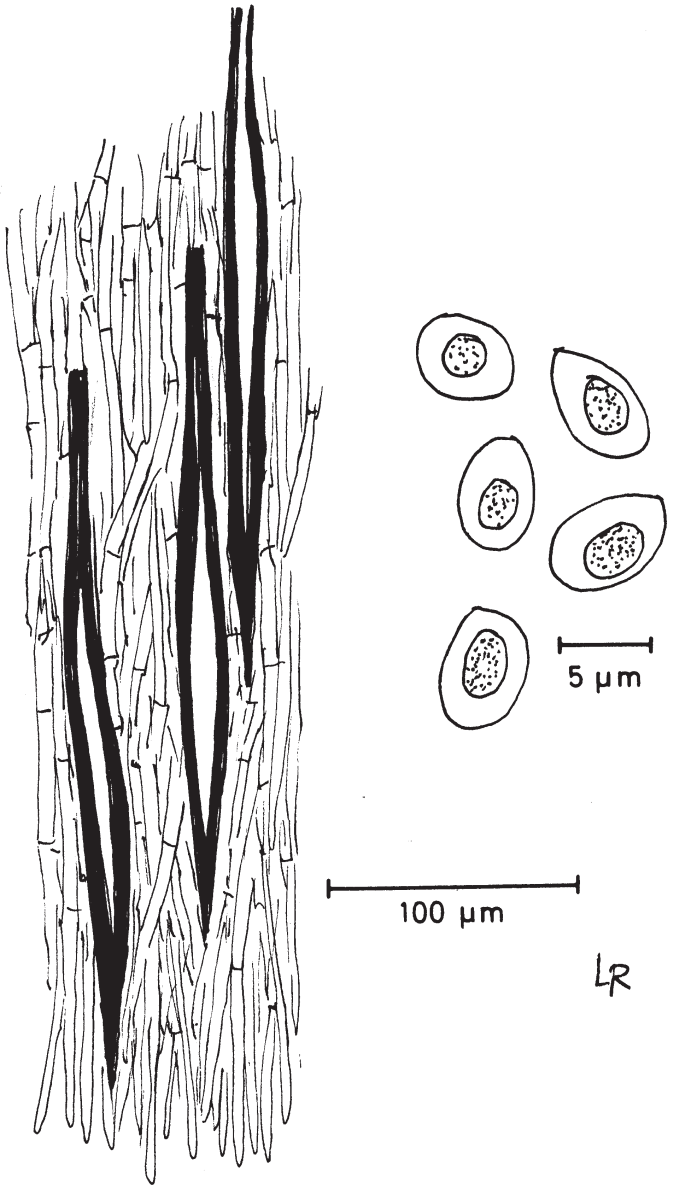

Fig. 39. *Inonotus pruinosus*, section through a tube wall, and basidiospores, China, Dai.

Hyphal system monomitic, generative hyphae, yellowish to rusty brown, 4-6 µm wide.
Setal hyphae present, embedded in the trama, thick-walled and pointed, 200-500 x 10-12 µm.
Hymenial setae absent.
Basidia not seen.
Basidiospores ellipsoid-globose, golden yellow with oil-drop, 6.5-8 x 4.5-6 µm.
Substrata. Known only from *Salix* spp.
Distribution. Only known from Northern China.
Remarks. The species is unique with its whitish pruinose, pale brown pore surface, its lack of hymenial setae and the host.

Inonotus pseudoglomeratus Ryvarden, Fig. 40
Synopsis Fung. 15:78, 2002.
Basidiocarps annual, pileate and dimidiate with strongly contracted base, semicircular of outline, up 6 cm wide and long, 1.8 cm thick at base, probably soft when fresh, hard and brittle when dry, upper surface dark blackish brown, dull, glabrous, concentrically sulcate and with a black cuticle in section, margin sharp, pore surface deep rusty brown, pores angular, 4-6 per mm, tubes rusty brown, up to 8 mm deep, context cinnamon, distinctly paler than the tubes, dense and homogenous.
Hyphal system monomitic, generative hyphae, thin to thick-walled, golden to rusty brown, 3-6 µm wide.
Setal hyphae present, embedded and straight, pointed 5-14 µm wide, up to 150 µm long.
Hymenial setae present, few and scattered, thick-walled and evenly tapering, 15-25 x 6-10 µm.
Basidia not seen.
Basidiospores ellipsoid, slightly thick-walled, yellow in 3% KOH, 5-6 x 4-4.3 µm.
Substrata. On unknown dead hardwood.
Distribution. Known only from the type locality in Venezuela, Estado Bolivar, Gran Sabana, Estacion Aponwao.
Remarks. This species is microscopically reminiscent of *I glomeratus* from North America that however has much more abundant hymenial setae, mostly resupinate basidiocarps only occasionally with imbricate pilei.

Inonotus pseudoradiatus (Pat.) Ryvarden Fig. 41
Occ. Pap. Farlow Herb., 18: 30, 1983. - *Polyporus pseudoradiatus* Pat., Bull. Soc. Mycol. Fr. 11:207, 1895.

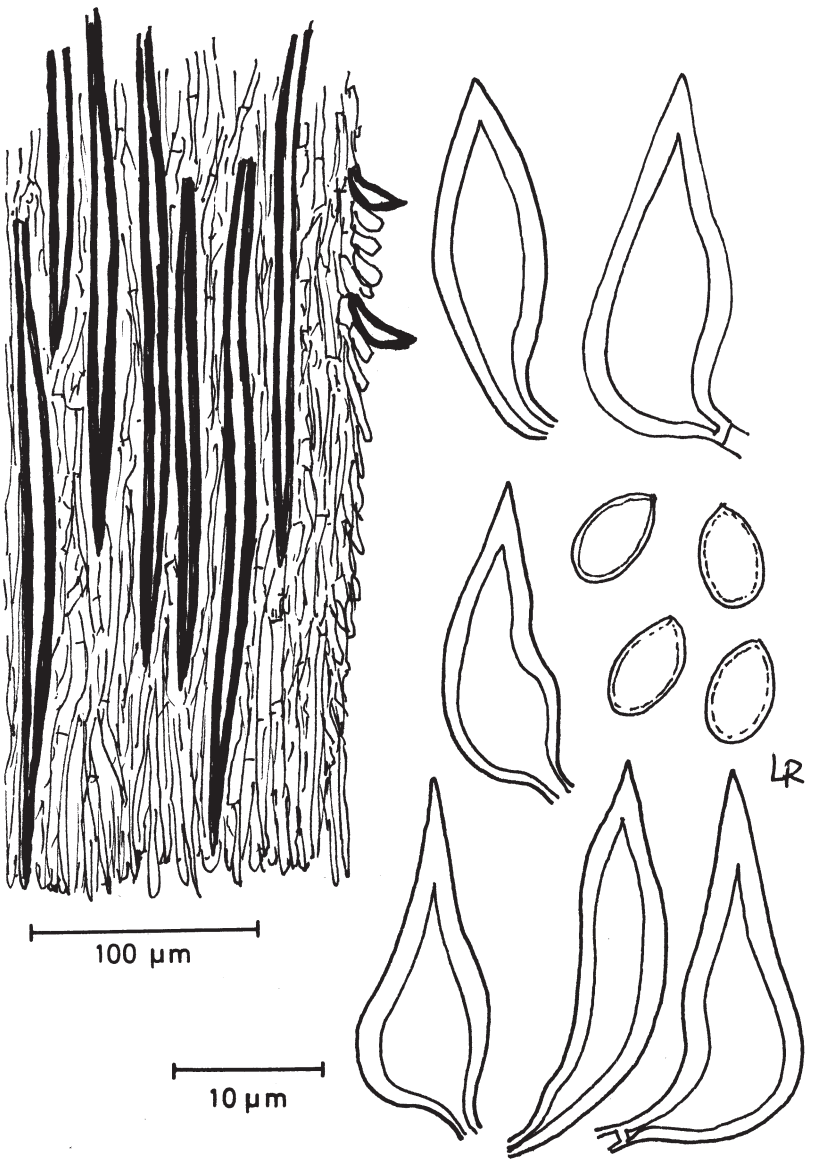

Fig. 40. *Inonotus pseudogolomeratus* section through a tube wall, hymenial setae and basidiospores, from the holotype.

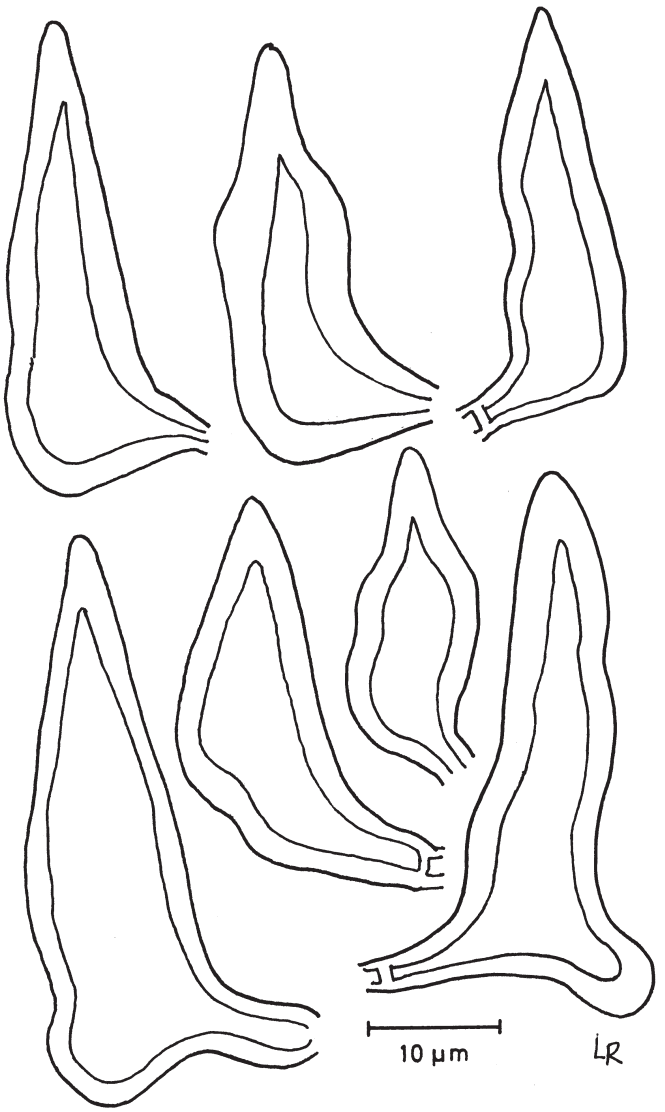

Fig. 41. *Inonotus pseudoradiatus* hymenial setae, from the lectotype.

Basidiocarp annual, sessile, flabellate to fan shaped, 7 cm wide, 6 cm long, dimidiate, tapering towards the base which is up to 1 cm thick, fragile when dry, upper surface rusty brown, dull, azonate, radially folded, finely adpressed velutinate, probably becoming glabrous with age, pore surface dark rusty brown, pores 3-4 per mm, 5 mm deep, context rusty brown, dense and shiny, up to 3 mm thick at the base.
Hyphal system monomitic, generative hyphae thick-walled, yellow to rusty brown, freely branched, 3-8 µm wide.
Setal hyphae absent.
Hymenial setae abundant, straight, 20-40 x 8-12 µm.
Basidia not seen.
Basidiospores hyaline, 4-5 x 3-3.5 µm.
Substrata. Dead hardwood tree.
Distribution. Known from Ecuador and Brazil.
Remarks. The species may remind of *I. xanthoporus*, which however has conspicuously slender setae, i.e. 4-6 µm wide and smaller pores, i.e. 5-7 per mm.

Inonotus pusillus Murrill,
Bull. Torr. Bot. Cl. 31:599, 1904.
Basidiocarps minute, flabelliform. growing from lenticels or openings in the bark, up to 2 mm wide and broad and to 1 mm thick at the base, upper surface rusty to dark brown, finely striate, shining and faintly zonate, pore surface rusty to umber, pores angular, 4-6 per mm, tubes concolorous, context rusty brown, very thin.
Hyphal system monomitic, generative hyphae golden to rusty brown, 3-7 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores ellipsoid, hyaline to pale yellow, abundantly present, 4.5-6 x 3.5-4.5 µm.
Substrata. Dead hard woods.
Distribution. Known from Mexico and Belize.
Remarks. The tiny basidiocarps and the lack of setal characters should be sufficient to recognize this species. *I. splitbergeri* has normally larger basidiocarps besides that the spores are more oblong ellipsoid.

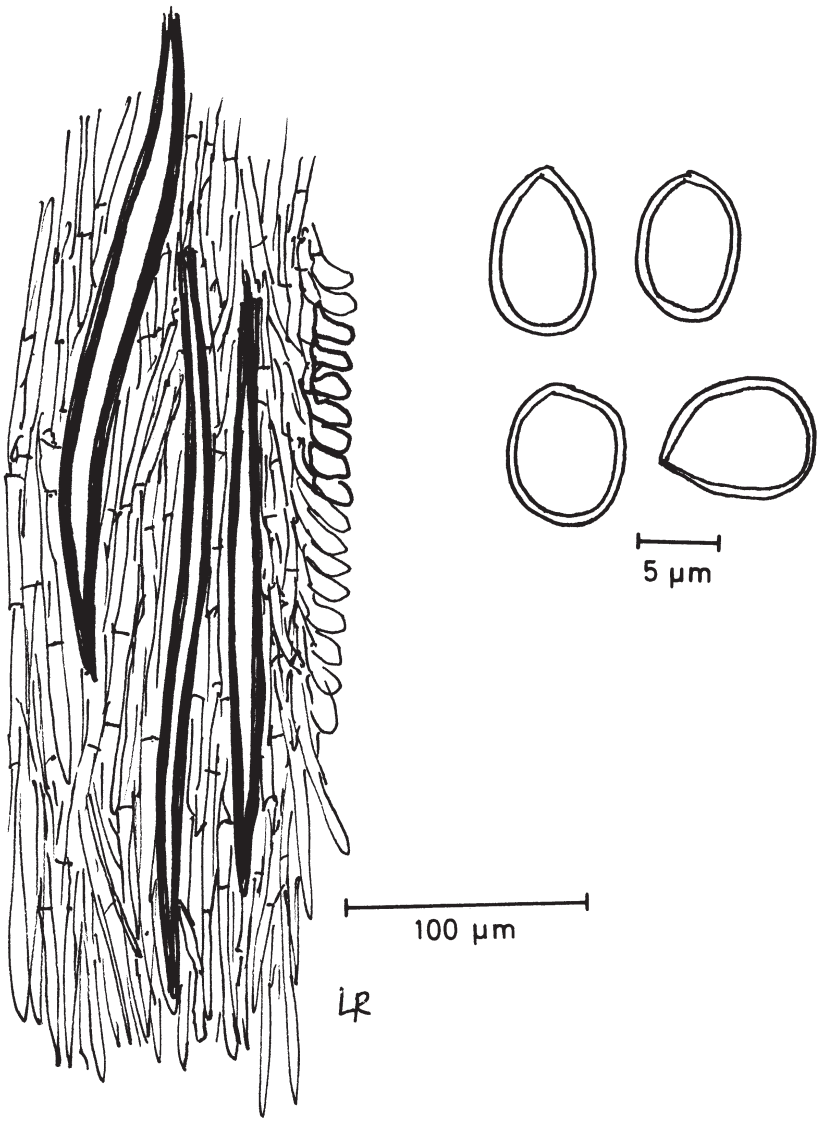

Fig. 42. *Inonotus quercustris*, section through a tube wall setae and basidiospores, from an isotype.

Inonotus quercustris M. Blackwell and Gilbn., Fig. 42
Mycotaxon 23:285, 1985.

Basidiocarps annual, sessile, ungulate to applanate, pilei single to imbricate, up to 20 x 16 x 10 cm, upper surface golden yellow at first, becoming rusty-brown, matted-tomentose to short-hispid with short erect fibrils composed of hyphal aggregates, azonate, usually splotched with darker areas, margin concolorous, rounded to acute, narrowly sterile below, pore surface bright golden lustre when viewed obliquely, the pores angular, 3-5 per mm, dissepiments thin, covered with fine crystals that give them a finely fimbriate appearance under a 30 X lens, becoming lacerate with age, context at first soft and spongy with a high moisture content, in mature specimens becoming firm and fibrous with a softer region next to the tubes, dark reddish brown, with faint concentric zones, tube layer yellowish brown, distinct from context, up to 1 cm thick.

Hyphal system monomitic, hyphae thin-walled, pale golden brown, some with uneven wall thickening, giving them a faintly banded appearance in face view, with occasional branching, 4-8 (10) µm in diam, hyphae of upper context thin- to thick-walled, undulating to wavy in outline, up to 11 µm wide.

Setal hyphae present in trama, mostly parallel with the tubes usually not projecting, but some project above the hymenium and into the tubes, thick-walled, with narrow lumen typically extending nearly to the tip, dark reddish brown, tapering to a point, 8-10 µm in diam at widest point, narrowed to 3-4 µm at the basal end, up to 200 µm long.

Hymenial setae absent.

Basidia broadly ellipsoid, 18-23 x 9-11 µm.

Basidiospores pale golden yellow, ellipsoid, thick-walled, 9-10 x 6-8 µm.

Substrata. Known only from living *Quercus nigra* (water oak).

Distribution. Known only from Louisiana.

Remarks. *Inonotus quercustris* is characterized by the distinctive setal hyphae with a tapered base, the absence of hymenial setae, and the large pigmented spores.

Basidia and basidiospores of *I. quercustris* are similar in size and shape to those of *I. hispidus*, a species which also decays oaks and fruits on living trees in the South-eastern U.S. Basidiocarps of *I. hispidus* generally have a strongly hispid upper surface and differ also in lacking setal hyphae and in having rare to frequent hymenial setae.

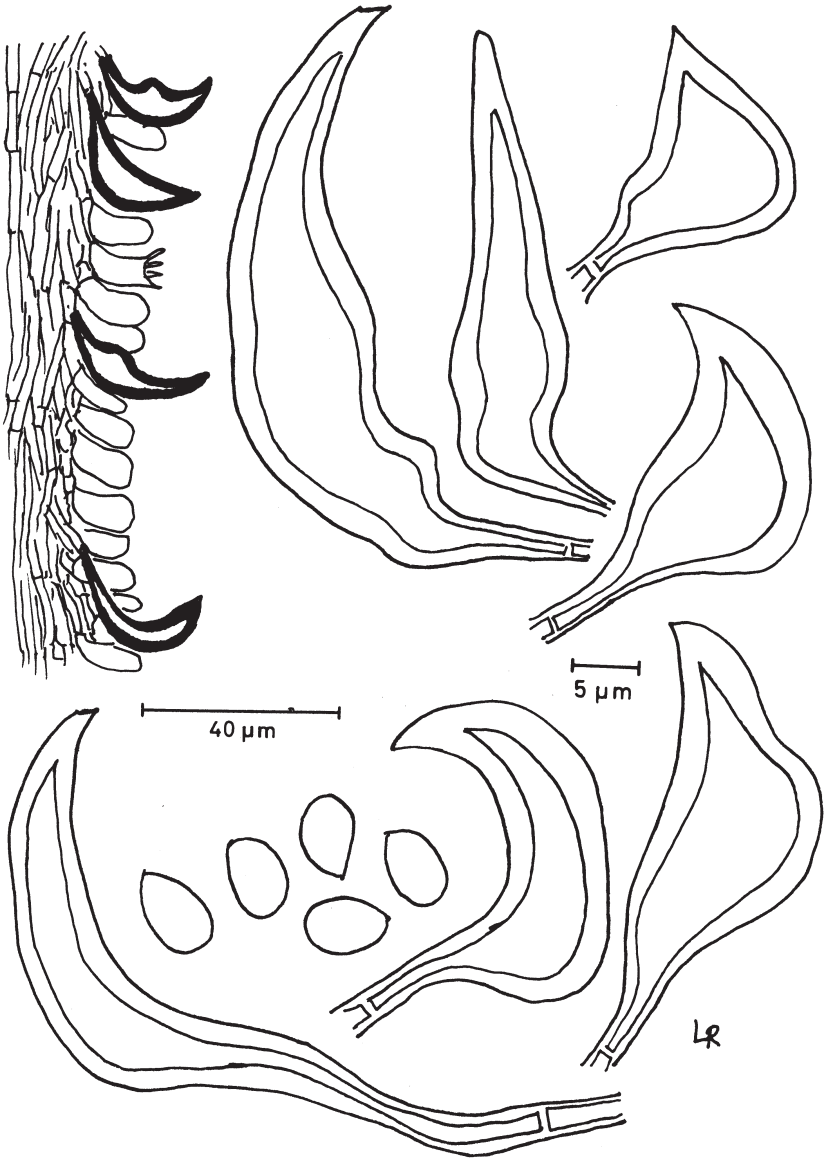

Fig. 43. *Inonotus radiatus*, section through a hymenium, hymenial setae and basidiospores, Norway, Ryvarden 19053.

Inonotus radiatus (Fr.) P. Karsten, Fig. 43
Rev. Mycol. (Tolouse) 3:19, 1881. - *Polyporus radiatus* Fr., Syst. Mycol. 1:369, 1821.
Basidiocarps annual, usually pileate, often imbricate in large clusters and widely effused, individual pilei up to 5 cm wide, 6-8 cm long, 5-20 mm thick, mostly applanate and with a sharp margin, pileus first soft and velutinate, yellow, orange-reddish brown, later glabrous and with an agglutinated thin cuticle, concentrically zoned and radially wrinkled in shades from rust brown to dark brown, pore surface yellowish brown, olivaceous to rusty brown, darkens when touched in fresh condition, often yellowish when turned in incident light, pores angular 3-4 per mm, tubes cinnamon, op to 10 mm deep, context shiny, and radially fibrillose, often concentrically zoned reflecting stage wise growth, cinnamon to reddish brown up to 15 mm thick at the base.
Hyphal system monomitic, generative hyphae, thin to slightly thick-walled, hyaline to pale rusty brown, in the initial tomentum and in the context 3-8 µm wide, in the trama and the subhymenium rarely above 5 µm wide.
Hymenial setae present, most of them hooked although straight ones do occur, acute, ventricose, often bent at base and with an elongated foot or base, 15-40 x 6-14 µm.
Tramal setae present in the bottom of the tubes, straight or slightly bent, up to 110 µm long and 7-20 µm wide, often difficult to find, in some cases totally embedded and look like short setal hyphae, in other cases projecting into the tubes.
Basidiospores ellipsoid, hyaline to yellowish by age, slightly thick-walled at maturity, 5-6(6.5) x 4-4.5 µm. Weakly dextrinoid, but reaction often difficult to observe.
Substrata. On deciduous wood, in Northern Europe, especially common on *Alnus* sp.
Distribution. Widespread throughout the temperate zone, also the Himalayas.
Remarks. *I. radiatus* is normally recognized in the field because of the large number of imbricate basidiocarps. Microscopically the small golden brown spores and the partly hooked setae are diagnostic.

Inonotus rheades (Pers.) Bondartsev. & Singer,
Ann. Mycol. 39:56, 1941. - *Polyporus rheades* Pers., Mycol. Eur. 2:69, 1825.
- *Polyporus vulpinus* Fr., Svenska Vetensk. Akad. Handl. 1852, p. 130, 1852.
Basidiocarps annual, sessile or effused-reflexed, up to 5 x 8 x 2 cm, upper surface pale yellowish brown, tomentose at first, sometimes with a rust coloured deposit of basidiospores, becoming blackened and glabrous with age, margin concolorous, often thin and curled down, pore surface pale yellowish brown at first, becoming dark reddish brown with age, the pores angular, 2-4 per mm, with

dissepiments that become thin an lacerate, context bright yellowish brown, lustrous, becoming darker and rusty brown, faintly zonate, with a hard granular core composed of brown tissue with flecks of white tissue mixed through it, fibrous context sometimes duplex, entire context up to 2 cm thick, tube layer distinct, concolorous with fibrous context, up to 1 cm thick, spore print rusty brown.
Hyphal system monomitic, pale yellowish and thin-walled to dark reddish brown and thick-walled, with parallel arrangement, 3-7 µm in diam, hyphae of granular core pale yellowish, 2-3 µm in diam, others dark reddish-brown, thick-walled, contorted or lobed, up to 10 µmin diam.
Hymenial setae absent.
Basidia clavate, 14-16 x 5-6 µm, usually obscured by masses of basidiospores.
Basidiospores ovoid to broadly ellipsoid, often flattened on one side, pale golden brown, 5-6 x 3.5-4 µm.
Substrata. *Populus* spp., also reported from *Castanea* (Sharma 1995).
Distribution. Throughout the range of aspen in North America, Asia and Europe except for the northernmost areas and along the western coast of Europe.
Remarks. Four species of *Inonotus* in the Northern hemisphere have a granular core in the context. *Inonotus dryophilus* and *I. texanus* have larger spores than *I. rheades* (6-8 x 4.5-6 µm and 7-10 x 4.5-6 µm, respectively) and have completely different host relationships. *Inonotus dryophilus* occurs almost exclusively on *Quercus*, and *I. texanus* is specific on *Prosopsis* and *Acacia*, while *I. mikadoi* from East Asia grows exclusively on *Prunus* spp.

Inonotus rickii (Pat.) Reid. Fig. 44
Kew Bull. 12:141, 1957. - *Xanthochrous rickii* Pat., Bull. Soc. Mycol. Fr. 24:6, 1908. - *Ptychogaster cubensis* Pat., Bull. Soc. Mycol. Fr. 12:133, 1896 (anamorph). - *Polyporus calcuttensis* Bose, Ann. Mycol. 23:179, 1925.
Basidiocarps annual, sessile, applanate to ungulate, single to imbricate, apparently up to several cm wide and at least 5 cm thick, at first soft and fleshy and then becoming firm and finally crumbly and dusty as chlamydospore formation progresses, upper surface at first tomentose, golden brown, becoming rough and dark rusty brown on older specimens, pore surface pale brown, pores angular, 2-3 per mm, context becoming dark rusty brown, conspicuously concentrically zonate, firm or eventually crumbling into a mass of chlamydospores, up to 6 cm thick, tube layer pale brown, up to 8 mm thick, firm but easily sectioned.
Ptychogastric stage developing as a cushion shaped mass of brown tissue, soft and fleshy at first, exuding clear droplets of exudate from the entire surface, moist and velvety to the touch, up to 20 cm wide, 25 cm deep, and 15 cm thick, the entire structure resembling a sessile *Inonotus* basidiocarp but no tube layer ever develops, within a few weeks the body becomes drier and firmer and broken

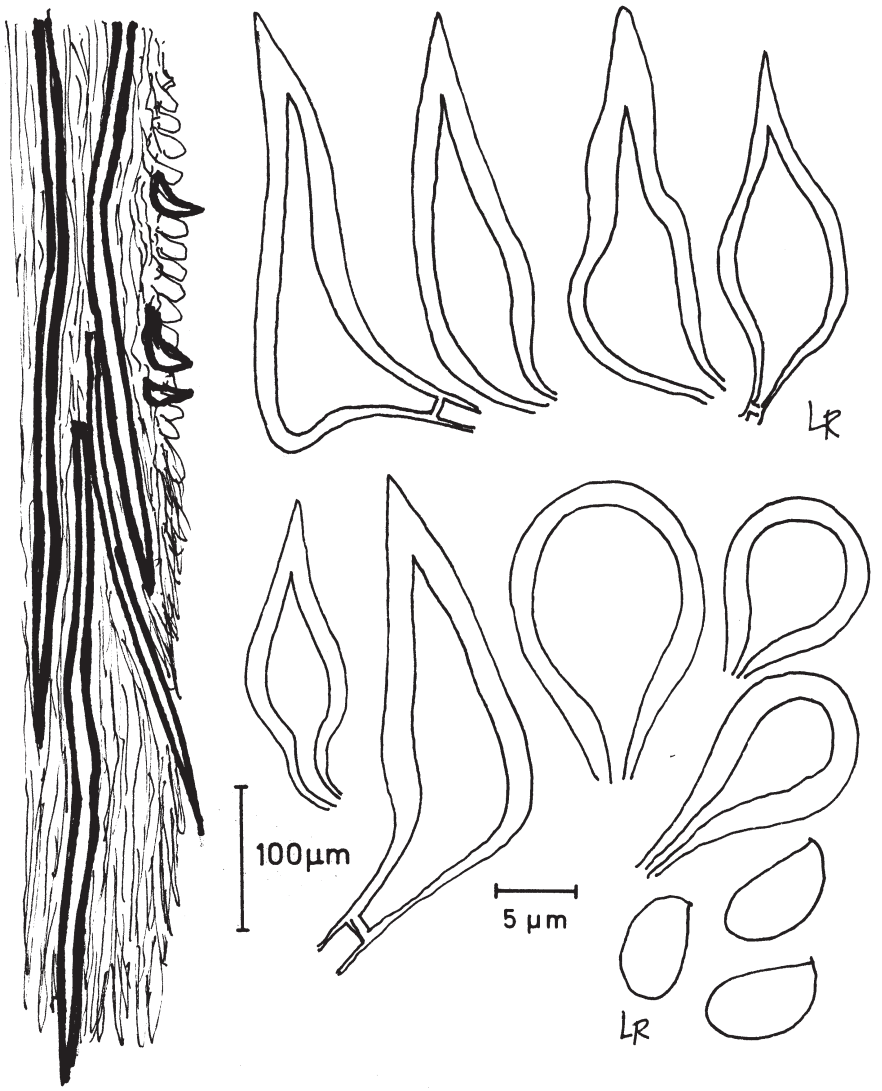

Fig. 44. *Inonotus rickii*, section through a tube wall, hymenial setae, chlamydospores and basidiospores, from the lectotype.

pieces show the crumbly and dusty texture resulting from chlamydospore formation.
Hyphal system monomitic, generative hyphae thin to moderately thick-walled, almost hyaline to yellowish brown, occasionally branched, pale brownish, 3.5-5 µm wide.
Setal hyphae conspicuous in tramal tissue, running parallel to the long axis and occasionally diverging out into the tubes, thick-walled with a narrow, sinuous lumen extending nearly to the tip, tapering to a point, narrow basal portion 3-5 µm in diam, widest portion below the apex up to 15 µm in diam, entire setal hypha up to 250 µm long.
Hymenial setae frequent, straight, subulate to ventricose, thick-walled, dark brown in KOH, rarely forked at the tip, 15-20 x 4-6 µm.
Basidia not seen.
Basidiospores abundant in context tissue, thick-walled, dark reddish brown, 6-8.5 x 4.5-5.5 µm.
Chlamydospores abundant in context tissue, thick-walled, dark reddish brown, irregular in shape, globose to ellipsoid or often with an elongated cylindrical appendage, 10-30 µm in widest diameter, wall up to 6 µm thick.
Substrata. On *Quercus* and *Myrica* in the south-eastern U.S., mainly on *Cercidium* and *Parkinsonia*.
Distribution. In United States known only from Florida, Louisiana, and Arizona and only in the ptychogastric stage. In Europe known from Sicily in Italy and France. Widespread in the tropics India, Bahamas, Peru
Remarks. The ptychogastric stage occur near the base of living trees and is apparently pathogenic, as the infected trees invariably decline and die in a few years after the disease first appear.

Inonotus rodwayii D. A. Reid, Fig. 45
Kew Bull. 12:139, 1957.
Basidiocarps imbricate to single, individual pilei up to 8 cm in diameter, in fused specimens, even wider along the Substrata, 0.5-2 cm thick at the base, upper surface dull becoming radially wrinkled or lined, pore surface greyish-brown and pruinose, pores irregularly angular, 1-2 (4) mm, tubes forming a single layer, up to 10 mm in length, context snuff-brown.
Hyphal system monomitic, generative hyphae 8-12 µm wide, brown with abundant septa, forming a whitish zone beneath the cuticle. In older parts of the basidiocarp there is a distinct cuticle which shows in section as a dark horny line, composed of a brown, gelatinized, irregularly distorted hyphae from which a few non gelatinized hyphal endings protrude.
Setal hyphae abundant, thick-walled, tapering to base, brown, up to 13 µm wide.

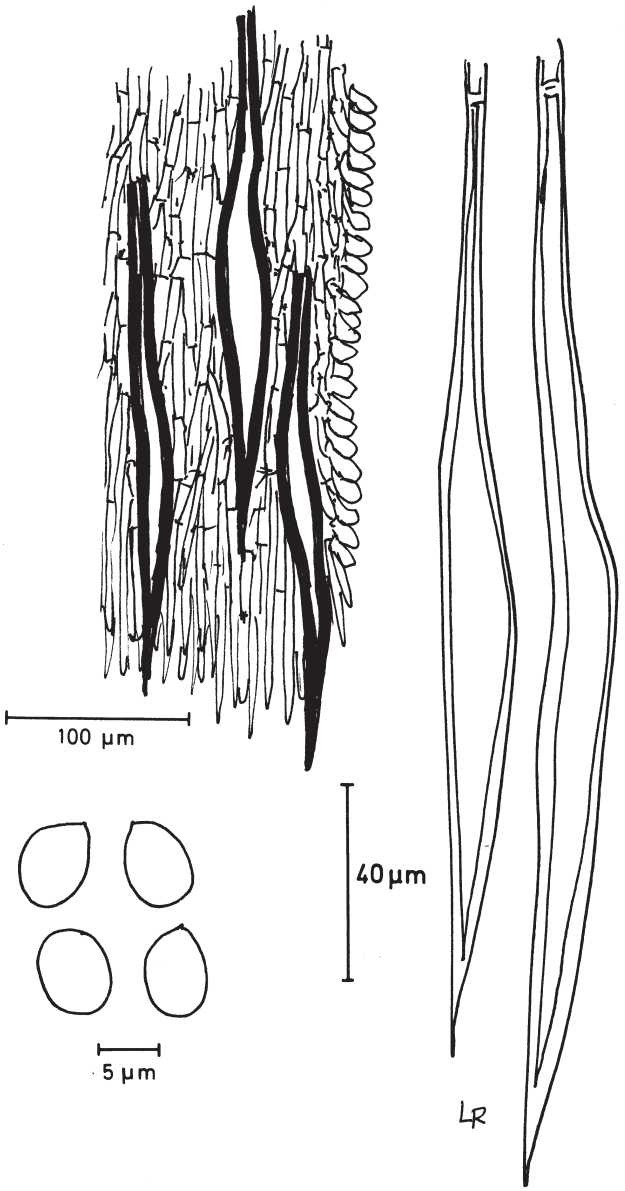

Fig. 45. *Inonotus rodwayii*, section through a tube wall, setal hyphae and basidiospores, New Guinea, W. Bävler.

Hymenial setae abundant, pointed, 16-26 x 6-9 µm.
Basidia broadly clavate, 16-17 x 6-8 µm.
Basidiospores broadly elliptical, pale rusty brown, 6-9 x 4.5-6.5 µm.
Substrata. Known only from *Ficus infectoria*.
Distribution. Known a few localities in Papua, New Guinea, Taiwan and the type locality in Queensland, Australia.
Remarks. The species is recognized by its setal hyphae and the large spores and pores. *I. patouillardii*, and *I. rickii* both have setal hyphae but smaller spores. *I. pacificus* on the other hand has larger basidiospores (9-12 µm long).

Inonotus scaurus (Lloyd) Hattori,
Bull. Nat. Sci. Mus. Tokyo Ser. B, 21:103, 1995. - *Fomes scaurus* Lloyd, Lloyd Mycol. Writ. 4, Letter 44:11, 1913. – *Pyrrhoderma scaurum* (Lloyd) Ryvarden, Mycotaxon 38:97, 1990.
Basidiocarps annual, pileate, dimidiate to flabelliform or semistipitate, up to 10 cm long and wide, 8 mm thick at the base, dense and woody when dry, pileus surface first yellowish brown, velutinate, dull and soft, later becoming smoother, semi glossy and umber brown, sulcate and tuberculate to undulating and when dry with radial furrows, in section with a distinct dark brown zone which becomes almost black by age, pore surface yellowish brown to umber, pores small, hardly visible to the naked eye, 6-7 per mm, tubes concolorous, up to 3 mm long, context dense, duplex, the lower part yellowish brown and with a radial structure, 3-7 mm thick, separated from the upper, thinner part by a thin dark brown to black zone, upper part about 1 mm thick and more rusty brown than the context proper.
Hyphal system monomitic, generative hyphae in the trama hyaline to yellowish brown, thin-walled and easily collapsed, 2-3 µm wide, in the context yellow to rusty brown, thick-walled to almost solid, 3-9 µm wide, extremely sparingly branched.
Hymenial setae absent.
Basidia clavate, 10-15 x 7-9 µm, 4-sterigmate.
Basidiospores globose, thin-walled, hyaline, 5-6 µm in diameter, often difficult to find.
Substrata. On hardwoods.
Distribution. Asian species, known from temperate China (Zhejiang), Japan (Honshu, Hokkaido), and Far East Russia (Primorsk).
Remarks. The hyphal system tends to be dimitic in this species, with long segments of hyphae without septa. The substipitate habit and the lack for setae characterize this species.

Inonotus serranus Robledo, Urcelay et Rajchenb.,
Mycologia 95:348, 2003.
Basidiocarp annual to biannual, effused to effused-reflexed, up to 9 x 7 cm and up to 2 cm thick, reflexed portions forming small pilei, 1 x 0.5 cm, velutinate and tomentose, tomentum thin to 0.8 mm thick, dark chocolate brown, separated from the context by a thin, black line, pore surface dark brown, glancing, becoming yellowish brown towards the margin, pores 4–6 per mm, angular, with thin entire dissepiments, tubes concolorous and continuous with the context, up to 6 mm deep, a black line and context present between each stratum, context brown, corky, poorly developed, up to 3 mm thick.
Hyphal system monomitic, hyphae thin walled and hyaline, or thick-walled and dark brown, 2.4–6(–7) µm wide.
Setae and **setal hyphae** absent.
Basidia broadly clavate to ovoid, 9.6–12.8 x 6.4–7.2 µm.
Basidiospores ellipsoid to ovoid, with a straight side, 5.5–7.2 x 4–5 µm, thick walled, pale golden brown.
Substrate. On trunk of living and dead standing *Polylepis australis*.
Distribution. Known only from the Córdoba Mountains, central Argentina.
Remarks. The reflexed basidiocarp with small pilei, the upper tomentum separated from the context by a black line, the absence of setae, and the substrate, make this species distinct. *Inonotus splitgerberi* (Mont.) Ryvarden is similar by having almost identical microscopical characters, but has almost hyaline basidiospores and distinctly pileate basidiocarps that turn red with KOH.

Fig. 46

Inonotus setuloso-croceus (Clel. & Rodw.) P. K. Buchanan & Ryvarden,
Aust. Syst. Bot. 6:223, 1993. - *Poria setuloso-crocea* Cleland & Rodway, Pap. & Proc. Roy. Soc. Tasmania 1928: 34 (1929).
Basidiocarps resupinate, deep yellow-brown, of irregular shape, forming in fissures in bark, e.g., 70 x 5 mm, up to 4 mm thick, with a pale yellow sterile margin composed of generative and setal hyphae, pores 6-8 per mm, circular with mouths uneven, tubes up to 2 mm long.
Hyphal system monomitic, hyphae either sub-hyaline with thin walls, or pale brown with thickened walls to 1 µm, in trama agglutinated, in context more easily separable and more branched.
Setal hyphae present in context and trama, oriented parallel to tubes, variable in length, up to 250 µm long, 5-14 µm wide, with strongly thickened, dark brown walls 3-5 µm wide, rarely branched, pointed at apex, immersed or sometimes shorter hyphae projecting at base of tubes and also present in the margin.
Hymenial setae typically sparse, though locally abundant, ventricose, 17-30 x

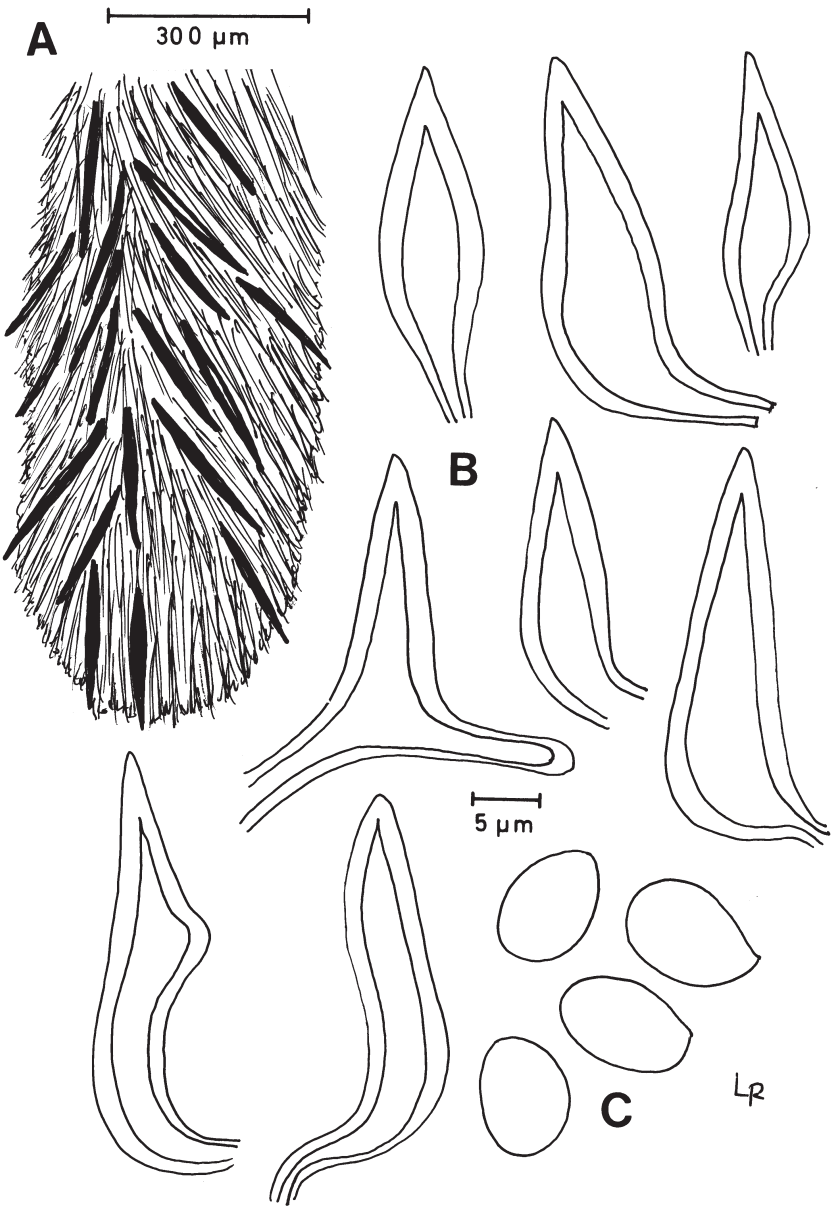

Fig. 46. *Inonotus setuloso-croceus*, section through a tube wall, hymenial setae and basidiospores, Japan, Hattori.

5.5-11.5 µm.
Basidia not seen.
Basidiospores hyaline, broadly ellipsoid to obovoid, thin-walled, mature spores located outside tubes 7-8.5 x 5-6 µm, somewhat smaller spores measured within tubes 5.5-7 x 4-5 µm.
Substrata. Known from *Schinus molle*, *Ecalyptus* spp and other hardwoods.
Distribution. Known from Australia (Victoria, Southern Australia and Queensland) and Japan.
Remarks. The resupinate basidiocarps, tiny pores and large, hyaline spores separate this species from other species with setal hyphae.

Inonotus shoreae (Wakef.) Ryvarden comb. nov.
Basionym: *Polyporus shoreae* Wakef. Kew. Bull. Misch. Inf. P. 72, 1916 (K!).
Basidiocarps annual, pileate, solitary, rarely imbricate, ceraceous when fresh, woody hard and brittle when dry, dimidiate to flabelliform, 15-20 cm long, 10-15 cm wide and 1-2 cm thick, upper surface glabrous with scattered tubercles, dark brown to black with a cuticle developing from the base, paler towards the margin, pore surface grey to yellowish brown, darker when bruised, , pores angular, 2-4 per mm, tubes single layered, concolorous with pore surface, up to 8 mm deep, context golden brown, zonate towards the base, up to 1 cm thick.
Hyphal system monomitic, generative hyphae hyaline to pale rusty brown, thin- to thick-walled, 2-4 µm wide.
Hymenial setae absent
Basidia clavate 8-14 x 5-6 µm.
Basidiospores thin-walled, golden brown, oblong ellipsoid to subglobose, 3.5-5 x 2.5-3 µm.
Substrata. Parasitic on *Shorea* with a white pocket rot.
Distribution. Known from the northern part of the Indian subcontinent.
Remarks. The species is recognized by its host and the small basidiospores.

Inonotus sideroides (Lév.) Ryvarden, comb. nov.
Basionym: *Polyporus sideroides* Lev., Ann. Sci. Nat. Ser. 3, 2:182, 1844 (PC !).
Basidiocarp annual, solitary, laterally stipitate and up to 6 cm wide and 1 cm thick at the base, flabelliform to semicircular, margin thin, acute, entire or lobed, slightly wavy, hard and brittle, upper surface velutinate to more irregular tufted, but soft, deep rusty-brown, no cuticle present, basal part stipe like, expanded towards the pileus, up to 4 cm long and 1 cm thick, round to flattened, cinnamon to rusty-brown and finely tomentose with a very fragile tomentum that is easily crushed and rubbed off with the finger, solid, but in section with darker zones from the base to the pileus, reflecting stages of growth ,pore surface rusty-brown

to pale cinnamon, pores round to entire, 5-7 per mm, tubes 1-3 mm deep, ochraceous in fertile specimens, darker brown in old specimens, context concolorous with the tomentum on the pileus, homogeneous or with some weak darker concentric zones, up to 5 mm thick the base.
Hyphal system monomitic, generative hyphae in a loose structure, straight and rusty-brown with a wide lumen, 4-10 µm wide or narrower and more branched, 3-6 µm in diameter.
Setal hyphae and **hymenial setae** absent
Basidia not seen.
Basidiospores globose, moderately to distinctly thick-walled, yellowish to rusty-brown, 6-9 (10) µm in diameter.
Substrata. Rotten hardwood.
Distribution. Rare species, known from Sri Lanka, Malaysia, China, Thailand, Viet Nam, Indonesia and Seychelles.
Remarks. The species is easy to recognize due to the deep rusty-brown and soft basidiocarp where the hyphae easily rub off, the small pores and globose, rusty-brown spores.

Inonotus splitbergeri (Mont.) Ryvarden,
Svensk Bot. Tidskr. 68:274, 1974. - *Polyporus splitbergeri* Mont. Ann Sci. Nat. ser 2, vol.15:109,1841. - *Phaeoporus ferrugineus* Romell, Bih. K. Sv. Vet.-Akad. Hand. 26, ser. 3, no 16:26, 1901.
Basidiocarps annual small often in imbricate clusters, applanate, often incised or lobed, fan shaped to spatulate with tapering base, fragile, up to 10 x 13 x 1.5 cm, upper surface rusty to dark brown, finely radially striate to adpressed velvety in parts, zonate, pore surface yellow in fresh condition becoming deep rusty brown, pores angular, somewhat elongated radially in parts, (2) 4-6 per mm, tubes concolorous, 6 mm deep, context thin, cinnamon to rusty brown and dense, homogeneous and no cuticle visible in section, the whole basidiocarp vividly deep red for some seconds before becoming black when touched with a drop of KOH.
Hyphal system monomitic, generative hyphae, golden to rusty brown, 2-5 µm wide.
Setal hyphae and **Hymenial setae** absent.
Basidia 8-12 x 4-5 µm.
Basidiospores oblong ellipsoid, pale brown, often collapsed in microscopical preparations, 4-5(6) x 3-4.5 µm,
Substrata. Hardwoods of many kinds.
Distribution. Tropical America from Brazil to Mexico and Puerto Rico.
Remarks. The species is characterized by the dentate pores, the small, almost hyaline spores, lack of all setal characters and the instant red reaction with KOH.

Inonotus subhispidus Pegler & D.Reid,
Trans. Br. mycol. Soc. 47: 170, 1964.
Basidiocarp annual, applanate to ungulate, up to 9 cm wide, 14 cm long and 3.5 cm thick at the base, brittle when dry, upper surface tomentose to hispid, up to 3 mm deep, often tufted to fasciculate, at the base partly worn away leaving a rugulose and glabrous surface, rusty brown to umber brown and persistently so also when dry, margin obtuse, entire pore surface umber to bay, pores angular, thin-walled, 2-3 per mm, tubes distinct from context, non-stratified, brittle and fragile, up to 3 cm deep, context thinner than tubes, up to 1.5 cm thick, fibrous in radial direction, dark brown, lighter towards the margin, spotted by white to yellow flecks, in section with a silky sheen, except for upper more punky tomentum layer.
Hyphal system monomitic, in trama agglutinated, thin-walled, pale rusty brown, parallel, 3-5 µm wide, in context looser and not agglutinated, dark rusty brown, sparingly branched, 3-8 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores fulvous to rusty brown, ellipsoid, thick-walled, 7-9 x 5-6.5 µm.
Substrata. Dead *Tamarix* spp.
Distribution. Known from India, Pakistan and Russia.
Remarks. Superficially this species looks like *I. hispidus*, but does not become black on the surface as in this species. Further, the spores are distinctly ellipsoid while they are larger and subglobose in *I. hispidus* (8-10 x 7.5-9 µm). In *I. hispidus* setae are seen while they are absent in *I. subhispidus*. However, caution should be taken at this point as in some specimens of *I. hispidus*, no setae can be found. The occurrence of hymenial setae is seemingly more variable in *Inonotus* than in other genera of Hymenochaetaceae. The spotted context is also characteristic although spots do occur in *I. hispidus* to a certain degree, but they are less and darker coloured and thus not so conspicuous. Sharma (1995) puts this species in synonymy with *I. hispidus*.

Inonotus subiculosus (Pk.) Erikss. et Strid.. Fig. xx
Ann. Univ. Turku A II, 40:135, 1969. - *Polyporus subiculosus* Pk., N.Y. State Mus. Ann. Rept. 31:37, 1879.
Basidiocarps annual, resupinate, effused up to 10 cm., soft and cottony or felty, easily separable, margin yellowish-brown, soft, loosely matted, fimbriate, up to 2 mm wide, pore surface yellowish-brown, rough, the pores angular to sinuous, 1-3 per mm, with thick dissepiments that are tomentose at first, soon becoming lacerate and splitting so that the pores coalesce, context yellow-brown, soft, cottony, azonate, up to 2 mm thick, tube layer paler yellowish-brown, up to 2 mm thick.

Hyphal system monomitic, generative hypha reddish brown to pale yellowish-brown in KOH, thin-walled, rarely to frequently branched, 4-9 µm in diam, also some thick-walled hyphae, often with light, scattered incrustation, tramal hyphae similar.
Hymenial setae absent.
Basidia clavate, 4-sterigmate, 14-20 x 6-8 µm.
Basidiospores broadly ellipsoid to ovoid, hyaline, 6-8.5 x 4.5-5.5 µm.
Substrata. Dead conifer wood, reported on *Picea, Abies, Pseudotsuga* and *Thuja*. In Sweden also once found on *Betula*.
Distribution. Widely distributed in northern coniferous forest ecosystems but a rare species.
Remarks. The soft, light consistency of the resupinate basidiocarps of *I. subiculosus* and the absence of setae are distinguishing characters. The species is the type for the genus *Inonotopsis* proposed by Parmasto (1973).

Inonotus tamaricis (Pat.) Bond. & Sing. Fig. xx
Ann. Mycol. 39:56,1941. - *Xanthocrous tamaricis* Pat. Bull. Soc. mycol. France 20:51, 1904.
Basidiocarps pileate, annual, solitary, although often in groups, soft when fresh, brittle when dry, up to 9 cm wide and long, 2 to 5 cm thick at the base, upper surface first hispid to villose, rusty to cinnamon brown, becoming glabrous and black with age, pore surface deep rusty brown becoming black in old specimens, pores angular to lacerate, 1-2 per mm, tubes rusty brown, up to 3 cm deep, context zonate with alternating light and dark zones, with a granular spotted core at the base.
Hyphal system monomitic, generative hyphae, yellow to rusty brown, thin to thick-walled, 4-10 µm wide.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores rusty brown to pale umber, thick-walled, subglobose to ellipsoid, 6.2-7.3 x 4.5-6 µm.
Substrata. Dead and living *Tamarix* spp.
Distribution. Southern Europe, North Africa, Syria and Senegal, Southern Asia and east to China (Dai 1995).
Remarks. The host and the granular core are sufficient for a field determination. Undoubtedly it is related to *I. rheades* which however, is restricted to *Populus* and has a boreal distribution. The spores of the latter species are also smaller than those of *I. tamaricis*.

Inonotus tenuicarnis Pegler & D.Reid.,
Trans. Brit. mycol. Soc. 47:172, 1964. - *Inonotus permixtus* Corner, Beih. Nova Hedw. 101:126, 1991.
Basidiocarps pileate, annual, applanate, flabelliform to dimidiate, solitary or imbricate with several pilei from a common base, up to 30 x 18 x 2.5 cm, spongy when fresh, brittle when dry, upper surface reddish brown to umber by age, concentrically zonate, radially striate, glabrous, first soft, with age an agglutinated distinct crust develop from the base, margin entire to lobed, wavy, pore surface whitish brown in actively growing specimens, brown when touched, yellowish brown to umber brown when dry and old, pores angular to irregular, 2-4 mm with thin lacerate dissepiments, tubes brown up to 1 cm deep, context homogeneous, dark cinnamon to rusty brown, spongy and light of weight, up to 2 cm thick.
Hyphal system monomitic, generative hyphae in trama often agglutinated, yellow to rusty brown, in subhymenium frequently branched, 2.5-6 µm wide, in the context not agglutinated, interwoven, 4-9 µm wide and rusty brown.
Setal hyphae and **hymenial setae** absent.
Basidia 8-10 x 5-6 µm.
Basidiospores abundant, rusty brown, broadly ellipsoid, thick-walled, uniguttulate, 5-7 (7.5) x 3.5-4.5 µm.
Substrata. *Castanea sativa* (type), *Betula* and *Quercus* (Sharma 1995).
Distribution. Known from India and Malaya.
Remarks. This species is characterized by the lack of setal organs like in *I. rheades,* which however has a hispid pileus and a granular core in the context.

Inonotus texanus Murrill,
Bull. Torrey Bot. Club 31:597, 1904.
Basidiocarps annual, sessile, ungulate to applanate, up to 6 x 8 x 5 cm, upper surface glabrous or soon becoming so, cracking radially and concentrically into angular scales, remaining light brown or fading to buff, pore surface yellowish-brown at first, becoming dark brown or blackening with age, the pores circular to angular, 1-3 per mm, with thick, tomentose dissepiments that become thin and lacerate with age, context with distinct granular core of intermixed white and brown tissue, fibrous context yellowish-brown, usually very thin, up to 1 cm thick, tube layer concolorous with fibrous context, up to 3.5 cm thick, brittle.
Hyphal system monomitic, hyphae mostly pale yellowish-brown, thin- to moderately thick-walled, 4-9 µm diam, also some gloeoplerous hyphae with refractive golden contents and clavate tips, 4-7 µm in diam, hyphae of granular core of two types, some dark brown, thick-walled, breaking into short fragments, 7-15 µm in diam, others hyaline to pale yellowish, thin- to moderately thick-walled, some inflated and distorted, 2.5-15 µm in diam, tramal hyphae mostly pale yel-

lowish, thin-walled, 3-5 x 5-6.5 µm diam.
Hymenial setae none.
Basidia clavate, 18-20 x 7-8 µm.
Basidiospores, yellowish-brown, becoming thick-walled, ovoid to broadly ellipsoid, 7-10 4.5-6 µm.
Substrata. Only found on *Prosopsis* and *Acacia*.
Distribution. Southwestern U.S.
Remarks. Two other North American species, *I. dryophilus* and *I. rheades*, have a similar granular core. *Inonotus texanus* differs from these in its larger spores, distinctive rimose-scaly nature of the upper surface of basidiocarps, and in its host relationships.

Inonotus tomentosus (Fr.) Teng, Fig. 47
Fungi of China p. 761, 1964. - *Polyporus tomentosus* Fr., Syst. Mycol. 1:351, 1821. - *Trametes circinatus* Fr., Svenska Vetensk. Akad. Handl. for 1848. p. 128, 1849.
Basidiocarps annual, centrally or laterally stipitate to substipitate, stipe up to 3.5 cm long and 1.5 cm thick, pilei centrally depressed, circular to flabelliform, sometimes lobed, solitary or several branching from a common base, up to 11 cm in diam, upper surface yellowish-brown, tomentose, faintly concentrically zonate or azonate, pore surface pale buff at first, becoming darker brown with age, the pores angular, 2-4 per mm, with thick, entire dissepiments that become thin and lacerate with age, context yellowish-brown, up to 4 mm thick, with a soft, spongy upper layer and a firm, fibrous lower layer, tube layer decurrent on stipe, white-stuffed and appearing lighter than the context, up to 3 mm thick.
Hyphal system monomitic, hyphae of upper context pale yellowish to almost hyaline in KOH, thin-walled, 3-9 µm in diam, in the lower context thin- to thick-walled but all pale yellowish, the thin-walled hyphae mostly 3-4 µm in diam, the thick-walled hyphae 5-8 µm in diam, tramal hyphae thin-walled, pale yellowish, 3-6 µm wide.
Hymenial setae abundant, mostly subulate, some ventricose, straight, mostly 50-70 x 7-11 µm but some up to 140 µm long.
Basidia clavate, 2-4 sterigmate, 13-15 x 5-6 µm.
Basidiospores hyaline, ellipsoid, 5-6 x 3-4 µm.
Substrata. Many genera in the Pinaceae. *I. tomentosus* is particularly common on spruce
Distribution. Cosmopolitan in boreal coniferous forest ecosystems.
Remarks. Terrestrial basidiocarps often develop in large numbers from roots in old growth spruce stands. It differs from *I. leporinus* in having straight setae and smaller, thinner basidiocarps.

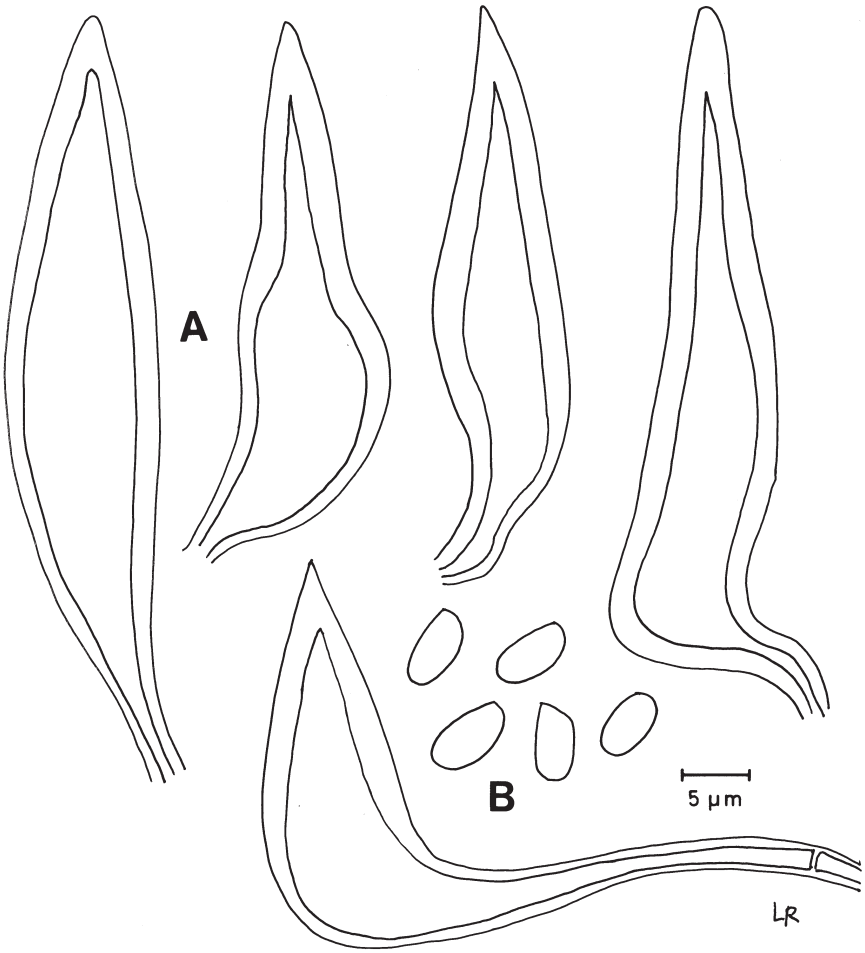

Fig. 47. *Inonotus tomentosus*, hymenial setae and basidiospores, China, Ryvarden 21501.

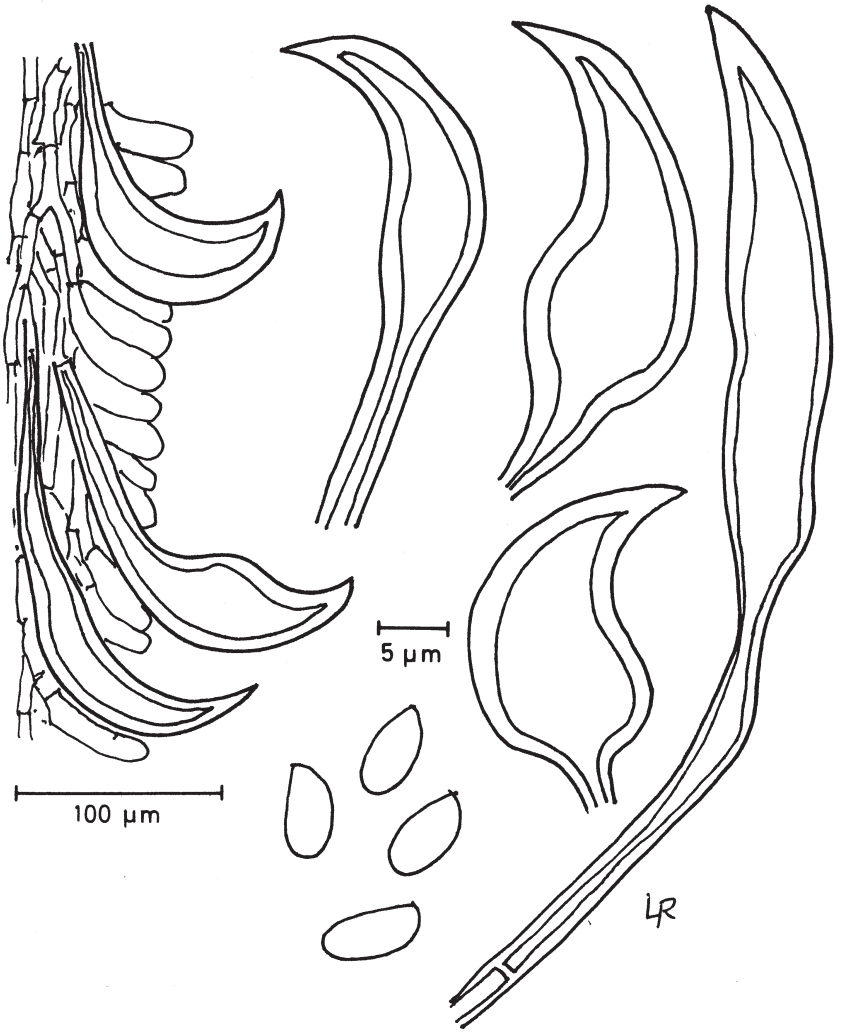

Fig. 48. *Inonotus triqueter*, section through a hymenium, hymenial setae and basidiospores, Germany, Nuss.

Inonotus triqueter (Fr.) P.Karsten, Fig. 48
Rysslands och Finlands Basidsv. 2:73, 1881 - *Trametes triqueter* Fr., Summa veg. scand. p. 323, 1849. - *Polyporus triqueter* Fr., Epicr. p. 474, 1838, nomen illegit. non *P. triqueter* (Pers.) Pers., Mycol. Europ. p. 57, 1825. - *Boletus triqueter* sensu Alb. & Schw. p. 208, 1805, nomen illegit., non *B. triqueter* Pers., Obs. Mycol.1: 86, 1796 (= *Polyporus cuticulari*s Bull.:Fr.).
Basidiocarps annual, usually laterally substipitate, rarely sessile on the butt of dead or living trees or centrally stipitate and on the ground near the base of a standing tree, pileus 3-10 cm diam and 1-5 cm thick, in section usually triquetrous and funnel shaped in terrestrial basidiocarps, when sessile dimidiate with distinctly contracted base, tough when fresh, very hard when dry and often difficult to break, upper surface flat to centrally thickened, tomentose to velvety, with age the hyphae become agglutinated and the surface more glabrous with radial lines, at first whitish-yellow to light-buff, later reddish-brown, stipe 2-5 cm long, 1-2 cm in diam, tapering towards the base, tomentose to hirsute, rusty brown, pore surface buff to yellowish-brown in the end rusty brown, pores at first angular, 3-4 per mm later more angular to semi labyrinthine and up to 1-2 mm wide in places, tubes concolorous with pore surface, up to 5 mm deep, often whitish within and decurrent on the stipe, context duplex with spongy upper layer and firm corky layer next to the tubes, entire context up to l cm thick.
Hyphal system monomitic, hyphae in upper spongy layer thin-walled, pale yellowish to hyaline, rarely branched, 3-6 µm in diam, also some gloeoplerous hyphae with rounded to slightly clavate tips, filled with a strongly refractive material, 5-7 µm in diam, hyphae of lower solid layer pale yellowish, septate, rarely branched, 3-5 µm in diam, mostly non-encrusted but with a gummy, granular incrustation in some areas, tramal hyphae thin-walled, pale yellowish to hyaline, 2.5-6 µm wide.
Hymenial setae usually abundant, subulate, mostly hooked, 50-100 x 12-20 (25) µm, projecting 40-50 µm, often with a horizontal root like extension, up to 200 µm long.
Basidia clavate, 4-sterigmate, 17-20 x 6-7 µm.
Basidiospores cylindrical-ellipsoid to ovoid, hyaline, thin-walled, 5.5-7 x 3-4 µm.
Substrata. In Eurasia restricted to *Pinus*, in North America on other conifers as well.
Distribution. A circumpolar species in the warm parts of the temperate zone such as southern central Europe and north to the south-eastern part of Sweden. In America known south to Cuba.
Remarks. *I. triqueter* may be confused with *I. leporinus* which have the same type of setae and spores but which grow on *Picea*.

Inonotus truncatisporus Corner,
Beih. Nova Hedwigia 101:158, 1991.
Basidiocarps resupinate adnate, widely effused, in type up to 20 cm in longest dimension, up to 5 mm thick, pore surface pale rusty brown to ochraceous in actively growing parts, pores round 4-6 per mm, tubes indistinctly stratified, up to 5 mm deep, subiculum 0.3-1.5 mm thick, rusty brown and with a distinct black line towards the wood.
Hyphal system monomitic, generative hyphae 2-3 µm wide. Corner describe also skeletal hyphae as non-septate hyphae up to 250 µm long with slightly swollen apically rounded ends.
Setal hyphae and **hymenial setae** absent
Basidia barrel shaped 12-16 x 6-7 µm and with four sterigmata.
Basidiospores ellipsoid, almond shaped to slightly truncate, pale yellow, becoming darker in KOH, 5-6.5 x 4-5 µm.
Substrata. Dead hardwoods.
Distribution. Malaysia.
Remarks. Whether this is a true *Inonotus* s. lato as conceived here or *Phellinus* species has to be decided by an examination of the type. Corner gives no explanation why he placed the species in *Inonotus* if he assumed the hyphae to be real skeletal hyphae.

Inonotus ulmicola Corfixen,
Nordic. J. Bot. 10:451, 1990.
Basidiocarp resupinate, annual, widely effused and up to one meter long and 5 mm thick, usually with scattered sterile protuberances, pore surface brown, when fresh with a greyish shine, pores round, 5-6 per mm, margin narrow and brown, subiculum brown, approximately 1 mm thick, fleshy when fresh, hard and brittle when dry, tube layer rusty brown, hard and woody when dried, up to 4 mm thick, black rimose sterile conks absent on the living host.
Hyphal system monomitic, subicular hyphae agglutinated, parallel to interwoven, 3-6 µm wide, thin-walled, yellow to pale rusty brown, tramal hyphae similar.
Setal hyphae present, up to 230 µm long, embedded in trama and not projecting, thick-walled, non septate, dark brown, 7-15 µm wide.
Hymenial setae present, straight, acute, ventricose, 13-28 x 5-10 µm, tramal setae in the dissepiments slender, 18-45 x 4-6 µm.
Basidia barrel shaped, 4-sterigmate, 12-14 x 7-8 µm.
Basidiospores subglobose to ellipsoid, hyaline to pale yellow, 7-10.5 x 5.5-7.5 µm.
Substrata. Only known from *Ulmus* where the basidiocarp develops under the

bark which finally breaks open to expose the pore surface.
Distribution. Recorded from Southern Norway, Sweden, Denmark and Germany, but is probably common through Central Europe where *Ulmus* is widespread. All previous reports of *I. obliquus* from *Ulmus* may refer to *I. ulmicola.* *I. obliquus* has also been reported from *Ulmus* in North America, so *I. ulmicola* may have a wide distribution.
Remarks. The host is distinctive although the black sterile conks like those seen on *Betula* attacked by *I. obliquus*, are not seen in connection with *I. ulmicola.*

Inonotus ungulatus Ryvarden species nov.
Fructificatio pileata, pileus ferruginosus ad nigrus, pori facies umbrina, pori angulatirotundi, 4-5 per mm, tubi et contextus ferruginosus, systema hypharum monomiticum, hyphae generatoriae afibulatae, ferruginosus ad aureum, basidiosporae ellipsoideae, 5-6 x 4-5 µm, setae nulla.
Holotype: Australia, North South Wales, Nortons Basin, west of Wallacia, 5. July 1983, P. Hind 21/83. Holotype: NSW, isotype in ARZ and O.
Basidiocarp annual, solitary or imbricate, sessile and broadly attached forming composite structures, individual pilei up to 4 cm wide and 8 cm long and 1.5 cm thick at the base, in composite basidiocarps, the fused context may be up to 4 cm thick at the base, woody when dry, individual pilei more or less applanate when fresh, slightly deflexed when dry, upper surface glabrous, slightly zoned and radially lined, reddish brown, becoming blackish from base with a thin black cuticle in section, in the type covered with a brown deposit of basidiospores, margin sharp, pore surface in pore surface shiny, yellowish brown due as collected when actively growing, in old specimens probably pale brown pores angular, 4-5 per mm, tubes up to 10 mm deep brown, context rusty brown and shiny in section, up to 15 mm thick in individual pilei and with a small, but distinct mycelial core at the base, in the type with a diameter of about 1 cm.
Hyphal system monomitic, generative hyphae with simple septa, pale yellow to rusty brown, 4-6 µm wide in the context, generally narrower in the trama, 3-4 um wide.
Setal hyphae and **hymenial setae** absent.
Basidia not seen.
Basidiospores ellipsoid, abundantly present, pale yellowish brown, thick-walled, 5-6 x 4-5 µm.
Substrata. Dead hardwood stump.
Distribution. Known only from the type locality.
Remarks. The species is characterized by the thin black cuticle on the pileus, the mycelial core at the base of the context, the lack of setal organs and the thick-walled ellipsoid spores. I. pirisporus may be related, but has no cuticle and no mycelial core, angular pores, 2-4 per mm and the basidiospores are piriform.

Inonotus vallatus (Berk.) Nunez. & Ryvarden, Fig. 49
Synopsis Fung. 13:89, 2000. - *Polyporus vallatus* Berk., Hook. J. Bot. 6:138, 1854. - *Coltricia benguetensis* Murr. Bull. Torr. Bot. Cl. 35:391, 1908. - *Polyporus orientalis* Lloyd, Lloyd Mycol. Writ. 3:193, 1912.
Basidiocarps annual, single or several may be fused, centrally to laterally stipitate with a tapering stipe, pileus circular, 3-6 cm wide, up to 8 mm thick, margin entire or deeply lobed, consistency hard, upper surface cinnamon to fulvous, very finely adpressed tomentose to almost glabrous, azonate or weakly zonate towards the margin, with age becoming glabrous and weakly wrinkled with a very thin dark brown cuticle, stipe short and stout, expanded towards the pores, 8-10 mm thick at the base, adpressed velutinate, cinnamon to husky brown, hard and homogeneous, pore surface fulvous to rusty brown, margin narrow and sterile, pores partly decurrent on the pileus, pores angular and entire, (4)4.5-6 per mm, tube up to 2 mm deep, concolorous with the pore surface, context thin and homogeneous, but with a thin black line, cinnamon to fulvous, up to 4 mm thick at the centre.
Hyphal system monomitic, hyphae hyaline-yellowish to rusty-brown with slightly thickened walls, on the pileus straight, rusty-brown and 4-12 µm wide with a few septa, in the context and trama, 4-6 µm wide and more yellowish, sparingly branched.
Hymenial setae scanty to abundant, dark brown and thick-walled, variable, simple or dichotomously split, acute with straight or slightly hooked tips, mostly ventricose with a swollen and variably elongated base which occasionally can be slightly swollen, 20-40 x 7-15 µm, the elongated base up to 60 µm long, but normally quite short.
Setal hyphae absent.
Basidia 20-25 x 6-8 µm.
Basidiospores broadly ellipsoid, slightly thick-walled and light rusty-brown (in KOH) at least in mature and dried specimens, 6.5-8 x 5-6 µm.
Substrata. Rare species, growing on buried roots of coniferous trees.
Distribution. India (Assam, Khasia mountains, type locality), Nepal, China, Japan and the Philippines.
Remarks. *Inonotus tomentosus* is undoubtedly the closest relative also growing from buried roots of conifers and often having a semistipitate to fan shaped basidiocarp. However, the latter has much larger setae and narrower and paler spores.

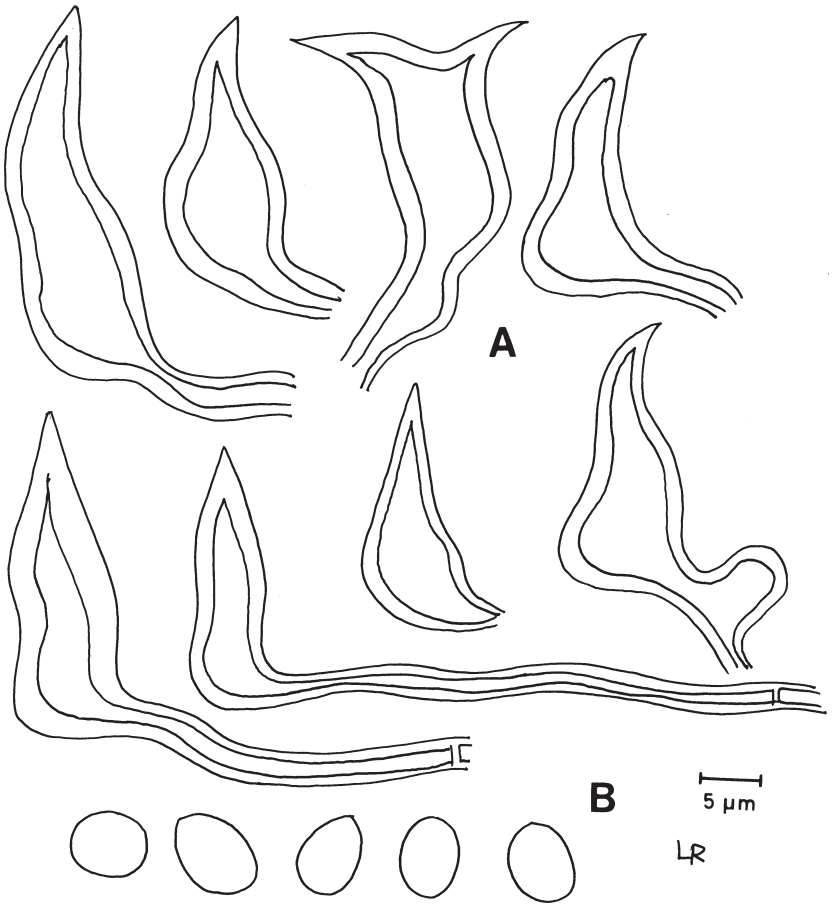

Fig. 49. *Inonotus vallatus*, hymenial setae and basidiospores, Nepal, Ryvarden 22367.

Inonotus venezuelicus Ryvarden,
Mycotaxon 28: 529, 1987.
Basidiocarps resupinate, annual, effused, oblique, adnate, hard and brittle, margin distinct, dark brown, 1-3 mm wide, along upper edge simulating a sloping pileus, pore surface dark brown, glancing in incident light, pores round to angular, 3-4 per mm, tube layer up to 10 mm thick, dark rusty brown, context dense, rusty brown and very thin.
Hyphal system monomitic, hyphae hyaline to rusty brown, thin-walled to thick-walled, 2-6 µm in diameter, moderately branched.
Basidia broadly clavate, 12-15 x 6-7.5 µm, 4 sterigmate.
Hymenial setae absent.
Basidiospores ellipsoid to ovoid, 5-6 x 4.5-5 µm, rusty brown.
Substrata. Dead hardwood.
Distribution. Known from Brazil, Venezuela and Panama.
Remarks. There are rather few resupinate *Inonotus* species in the neotropics, and this habit, the lack of setae and the rusty brown spores characterize this species.

Inonotus victoriensis (Lloyd) Pegler, Fig. 50
Trans. Br. mycol. Soc. 47:180, 1964. - *Polyporus victoriensis* Lloyd, Lloyd Mycol. Writ. 6: 1095, 1921.
Basidiocarps solitary large, sessile, subungulate, up to 12 cm wide, 20 cm long and 7.5 cm thick, upper surface pale grey to ochraceous with a distinct crust, up to 700 µm thick, smooth when fresh, wrinkled when dry, pore surface cinnamon brown becoming black, pores 1-3 per mm, angular, tubes up to 15 mm deep, concolorous with pore surface, context pale umber to ochraceous, hard fibrous up to 40 mm thick.
Hyphal system monomitic, hyphae in the cortex much branched, 3-6 µm wide.
Setal hyphae absent.
Hymenial setae abundant, thick-walled, subulate to ventricose, 12-28 x 7-12 µm.
Basidia not seen.
Basidiospores hyaline, ellipsoid, 7-8.5 x 5-6.5 µm.
Substrata. Known only from *Eucalyptus* stumps.
Distribution. South Australia.
Remarks. The distinct glabrous crust, the hyaline spores and the small setae are diagnostic.

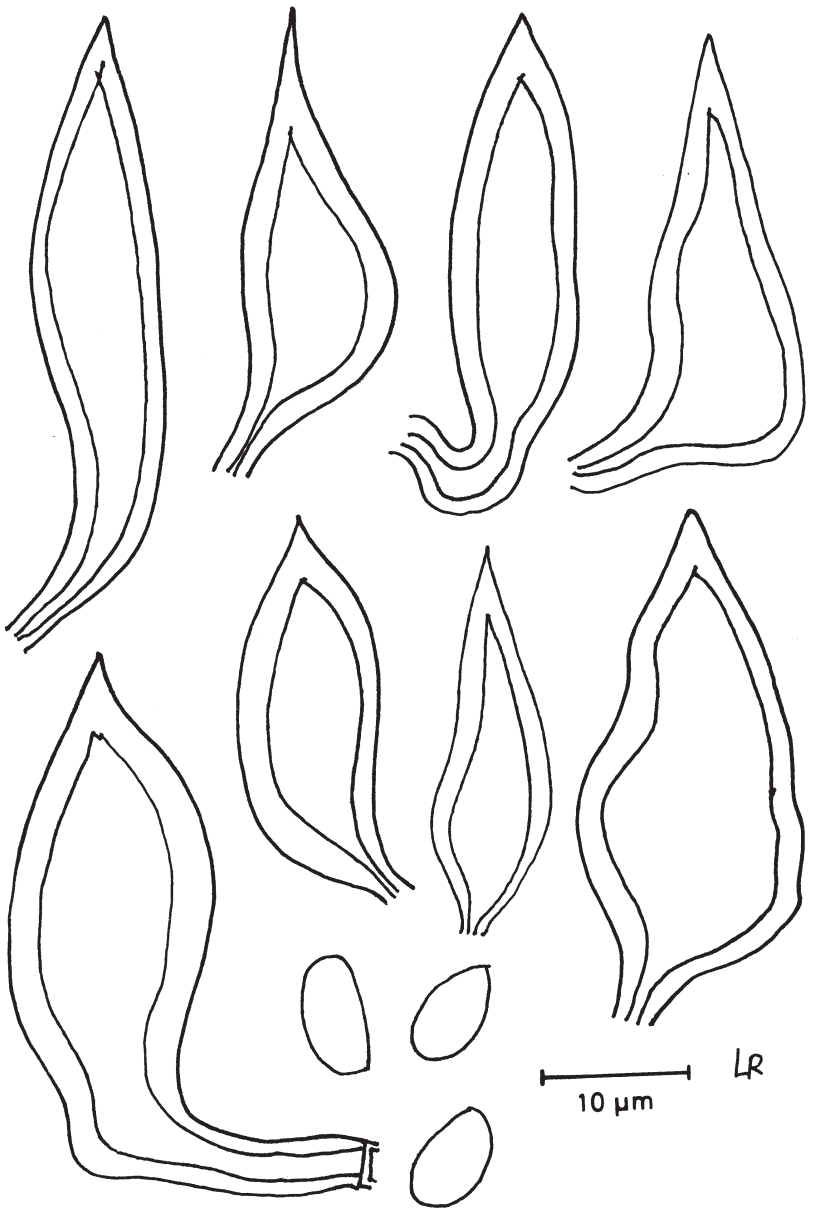

Fig. 50. *Inonotus victoriensis*, hymenial setae and basidiospores, Australia, F. Bodens

Fig. 51. *Inonotus xanthoporus*, hymenial setae and basidospores. From the holotype.

Inonotus xanthoporus Ryvarden, Fig. 51
Mycotaxon 71:345, 1999.
Basidiocarps annual effused reflexed, pileus semi-circular, up to 4 cm wide and 6 cm wide at base, applanate, slightly undulate, tough and hard. Upper surface rusty to dark brown, strongly scrupose with raised radial fibres to adpressed tomentose at the margin, azonate. Pore surface yellow, becoming cherry red with KOH, pores round to angular, 5-6 per mm, tubes pale cinnamon, and 4 mm deep. Context cinnamon to pale rusty brown and dense, homogeneous and no cuticle visible in section, but in the upper part the hyphal orientation is vertical in contrast to that in the part next to the tubes.
Hyphal system monomitic, generative hyphae thin to thick-walled, golden to rusty brown, 3-7 µm wide.
Setal hyphae absent.
Hymenial setae numerous, dark brown, subulate 30-40 x 4-7 µm.
Basidia 10-12 x 5-6 µm with 4 sterigmata.
Basidiospores oblong ellipsoid, slightly thick-walled, hyaline with large shiny oil drop, negative in Melzer's reagent, 4-5 x 3-3.5 µm.
Substrate. On unknown dead hardwood.
Distribution. Known Costa Rica, Venezuela and Brazil.
Remarks. *I. pseudoradiatus* is macroscopically very similar and seems to be related, although no spores have been seen in the type. Its hymenial setae are however much wider, i.e. 10-15 µm and thus, they are kept separate for the time being.

NOMENCLATOR

The following list includes all specific epithets combined with inonotus with an indication of their status. Names written with bold face are those accepted in this book.

adnatus, I Ryvarden
adversus, I. Corner = type not seen, apparently a *Phellinus* sp.
afromontanus, I. Ryvarden
agathidis, **I**. Corner
albertinii I. (Lloyd) Buchanan & Ryvarden
albomarginatus I. Corner ?
amplectans, I. Murrill = *Phylloporia frutica* (Berk.) Ryvarden
andersonii, I. (Ellis & Everhart) Cerny
arizonicus, **I**. Gilbn.
australensis , I. Ryvarden
austropusillus I. Ryvarden
baumii, I. (Pilat) Wagner & Fischer = *Phellinus baumii* Pilat
boninensis, **I.** Hattori & Ryvarden
brevisporus I. (Thind & Chat.) Sharma
calcuttensis I. (Bose) Ahmad = *I. rickii* (Pat.) D.A. Reid,
chihshanyenus, I. Chang & Chou
chinensis, I. Pilát = *Phellinus chinensis* (Pilát) Pilát.
chondromyelus, I. Pegler
cichoriaceus, I. (Berk.) C.G. Cunningh. = *Cyclomyces tabacinus* (Fr.) Pat.
circinatus, I. (Fr.) Teng = *I. tomentosus* (Fr.) Teng
clemensiae, I. Murrill
corrosus, I. Murrill = *Phylloporia chrysita* (Berk. & M. A. Curtis) Ryvarden
corruscans, I. (Fr.) P. Karsten = *I. dryophilus* (Berk.) Murrill
costaricensis, I. Ryvarden
cremeicinctus, I. Corner = type not seen, apparently a *Phellinus* sp
croeceus, I. (Pers.) P. Karsten = *Hapalopilus croceus* (Pers.) Donk
crocitinctus, I. (Berk. & Curt.) Ryvarden
crustosus, I. (Speg.) Wright. & Deschamps
cuticularis, I. (Bull.:Fr.) P. Karsten
demidoffii, I. (Lev.) Pilat = *Pyrofomes demidoffii* (Lev.) Kotl. & Pouzar
dentatus, I. Decock & Ryvarden
dentiporus, I. Ryvarden
discipes, I. (Berk.) C.G. Cunn. = *Phellinus discipes* (Berk.) Ryvarden
diverticuloseta, I. Pegler.

dryadeus, I. (Pers.:Fr.) Murrill
dryophilus, I. (Berk.) Murrill
duostratosus, I. (Lloyd) Buchanan & Ryvarden
elmerianus, I. Murrill = *Phylloporia chrysita* (Berk. & M.A. Curtis) Ryvarden
euphoriae I. (Pat.) Ryvarden
exilisporus, I. Dai & Niemelä
farlowii, I. (Lloyd) Gilbn.
fibrillosus, I. P. Karsten = *Pycnoporellus fulgens* (Fr.) Donk
fimbriatus, I. Gomez & Ryvarden
flammans, I. (Berk.) Ryvarden
flavidus, I. (Berk.) Ryvarden
flavidus, I. (Berk.) Chang, 1996, nomen illegit., non (Berk.) Ryvarden.
formosanus, I. Chang & Chou
fragilissimus, I. (Mont.) Ryvarden = *Coltricia fragilissima* (Mont.) Ryvarden
fruticus, I. = Phylloporia frutica (Berk. & M. A. Curtis) Ryvarden
fulvomellus, I. Murrill
fuscus, I. = Cyclomyces fuscus Fr.
fushanianus, I. Chang**.**
gilvoides, I. (Lloyd) Teng = *Phellinis viticola* (Schw.) Donk
glomeratus, I. (Peck) Murrill
hamusetulus, I. Ryvarden
hastifer, I. Pouz.
hemmesii, I. Gilb. & Ryvarden
heinrichii, I. (Pilát) Bond. & Sing. = *Phellinus sulphurascens* Pilát
herbergii, I. (Rostock.) P. Karsten = *Phaeolus schweinitzii* (Fr.) Pat.
hirsutus, I. (Scop.:Fr.) Murrill = *Trametes hirsuta* (Scop.:Fr.) Pilát.
hisingeri, I. (P. Karsten) P. Karsten = *I. rheades* (Pers.) Bondartsev & Singer
hispidans, I. Cunningham = *I. albertinii* (Lloyd) Buchanan & Ryvarden
hispidus I. (Bull.:Fr.) P. Karsten
howellii, I. Cooke & Bonar = *I. luteo-umbrinus* (Rom.) Ryvarden
hypococcineus, I. (Berk.) P. Karsten = *Hapalopilus croceus* (Pers.) Donk
iliensis, I. Kravtz.
indicus, I (Massee) M. Pieri & B. Rivoire = *I. euphoriae* (Pat.) Ryvarden
indurescens, I. Dai & Zhou
iodinus, I. (Mont.) C.G. Cunningh. = *Cyclomyces iodinus* (Mont.) Pat.
insolens, I. Corner = ?
irpicoides, I. (Karsten) Sacc. = *Climacocystis borealis* (Fr.) Kotl. & Pouzar
jamaicensis, I. Murrill
japonicus, I. Ryvarden
juniperinus, I. Murrill

kanehirae, I. (Yasuda) Imaz. = *Phellinus kanehirae* (Yasuda) Ryvarden
krawtzewii, I. (Pilát) Pilát = *Phellinus krawtzewii* Pilat
kusanoi, I. (Murrill) S. C. Teng = *Lenzites vespacea* (Pers.) Ryvarden
leeii I.Murrill = *Chromosporium vitellinum* Sacc. & Ellis
leporinus I. (Fr.) P. Karsten
leprosus, I. (Fr.) Murrill = *Hexagonia leprosa* (Fr.) Ryvarden
levis, I. P. Karsten.
linteus, I. (Berk. & M. A. Curtis) Teixeira = *Phellinus linteus* (Berk. & M. A. Curtis) Teng
lloydii, I. (Cleland) Buchanan & Ryvarden
longisetulosus, I. (Bondartseva. & Herrera) Bondartseva. & Herrera = *Phellinus longisetulosus* Bondartseva. & Herrera
l**udovicianus I**. (Pat.) Murrill
lurida, I. (Lev.) Teng = *Daedalea incana* Berk.
luteocontextus, I. D.A. Reid
luteoumbrinus, I. (Romell) Ryvarden
marginatus, I. Ryvarden
melleomarginatus, I. Bond. & Ljub. = *Phellinus xeranticus* (Berk.) Pegler
micantissimus, I. (Rick) Rajchenb.
microsporus, I. Ryvarden
mikadoi, I. (Lloyd) Nunez & Ryvarden
munzii, I. (Lloyd) Gilbn.
neotropicus, I. Ryvarden
nidulans, I. (Fr.) P. Karsten = *Hapalopilus nidulans* (Fr.) P. Karsten
niduspici, I. Pilát
nodulosus, I. (Fr.) P. Karsten
nothofagi, I. G.H. Cunningh.
novoguinensis, I. Ryvarden
obliquus, I. (Pers.:Fr.) Pilát
ochroporus, I. (van der Byl) Pegler
orientalis I. (Lloyd) Teng. = *I. vallatus* (Berk.) Nunez & Ryvarden
pachyphloeus I. (Pat.) Wagner & Fischer = *Phellinus pachyphloeus* Pat.
palmicola, I. Ryvarden
papyrinus, I. Ryvarden
patouillardii I. (Rick) Imazeki
pegleri, I. Ryvarden
perchocolatus, I. Corner
peristrophes, I. Ahmad = *Phylloporia bibulosa* (Lloyd) Ryvarden
permixtus, I. Corner = I. tenuicarnis Pegler & D.A. Reid
perplexus, (Peck) Murrill = *I. cuticularis* (Bull.:Fr.) P. Karsten

pertenuis, I. Murrill
pini, I. (Brot.) Maire = *Phellinus pini* (Fr.) Ames
pirisporus, I. Pegler
plorans, I. (Pat.) Bond. & Sing.
polymorphus, I. (Rostk.) Pilát. = *I. nodulosus* (Fr.) P. Karsten.
poncei, I. (Lloyd) Ryvarden
porrectus, I. Murrill
pruinosus, I. Bondartsev
pseudoglomeratus, I. Ryvarden
pseudohispidus, I. Kravt. = *I. levis* P. Karsten
pseudoobliquus, I. (Pilát) Pilát = *Protomerulius caryae* (Schw.) Ryvarden,
pseudoradiatus, I. (Pat.) Ryvarden
pusillus, I. Murrill
quercustris, I. Blackwell & Gilbn.
radiatus, I. (Fr.) P. Karsten
rheades, I.. (Pers.) Bond. & Singer
rickii, I. (Pat.) D.A. Reid
rodwayi, I. D.A. Reid
rutilans, I. (Pers.) P. Karsten = *Hapalopilus nidulans* (Pers.) P. Karsten
scaurus, I. (Lloyd) Hattori
sciurinus, I. Imaz. = *I. flavidus* (Berk.) Ryvarden
separabilis, I. Corner = type not seen, apparently a *Phellinus* sp.
serranus, I. Robledo, Urecelay & Rajchenberg
setiporus, I, (Berk.) Cunningh. = *Cyclomyces setiporus* (Berk.) Pat.
setuloso-croceus I. (Cleland. & Rodw.) Buchanan & Ryvarden
shichiana, I. (Teng. & Ling) C. Teng = *Daedalea shichiana* Teng & Ling
sinensis, I. (Lloyd) Teng. = nomen illegit., based on *Polyporus sinensis* Lloyd 1923, non *P. sinensis* Fr. 1821.
shoreae, I. (Wakef.) Ryvarden
spiculosus, I. (Campb. & Davids.) Nikol. = *Phellinus spiculosus* (Campb. & Davids.) Niemelä splitgerberi, I. (Mont.) Ryvarden
spongia, *I. (*Fr.) P. Karsten = *Phaeolus schweinitzii* (Fr.) Pat.
subhispidus, I. Pegler & D.A. Reid.
subiculosus, I. (Peck) Eriksson & Strid
substygius, I. (Berk. & Br.) Teng. invalid name, basionym not published.
s*ulphurascens, I.* (Pilat) M. J. Larsen et al. = *Phellinus sulphurascens* Pilat
sulphureopulverulentus, I. P. Karsten = *Phaeolus schweinitzii* (Fr.) Pat.
tabacinus, I (Mont.) Cunning. = *Cyclomyces tabacinus* (Mont.) Pat.
tamaricis, I. (Pat.) Bond. & Singer
tenuicarnis, I. Pegler & D.A. Reid

texanus, I. Murrill
tinctorius, I. (Quel.) Maire = *I. hispidus* (Fr.) P. Karsten
tomentosus, I. (Fr.) Teng
triqueter I. (Fr.) P. Karsten
tropicalis, I. M.J. Larsen & Lombard) Wagner & Fischer = *Phellinus tropicalis* M.J.Larsen & Lombard
truncatisporus, I. Corner
*ufensis, I***.** P. Karsten = *Gloeophyllum protractum* (Fr.) Imazeki
ulmicola I. Corfixen
unicolor, I. (Schw.) P. Karsten = *Spongipellis unicolor* (Schw.) Murrill
vallatus I. (Berk.) Nunez. & Ryvarden
vaninii, I. (Lubj.) Wagner & Fischer = *Phellinus vainii* Lubj.
venezuelicus, I. Ryvarden
victorensis, I. (Lloyd) Pegler
vulpinus, I. (Fr.) P. Karsten = *I. rheades* (Pers.) Bondartsev & Singer
weirianus I. (Bres.) Wagner & Fischer = *Phellinus weirianus* Bres.
weirii, I. (Murrill) Kotl. & Pouzar = *Phellinus weirii* (Murrill) Gilbn.
wilsonii, I. Murrill = *Phylloporia chrysita* (Berk. & M. A. Curtis) Ryvarden
xanthoporus, I. Ryvarden
xeranticus, I. (Berk.) Imaz. & Aoshima = *Phellinus xeranticus* (Berk.) Pegler

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RYGGTITTEL

The genus Inonotus - a synops

Fungiflora