

Supplement to the monograph of the genus *Psilocybe**

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A revision of 29 species and varieties and more than 80 records of *Psilocybe* after 1980 and not considered in Guzmán's monograph (1983) are discussed. In addition, *P. chlapanensis*, *P. meridensis*, *P. moseri*, *P. natarajanii* and *P. subtropicalis* are described as new. *P. aquamarina*, *P. ramulosum*, *P. paulensis*, *P. septentrionalis*, *Naematoloma gigaspora* and *N. guzmanii* are proposed as new combinations. Several new records and nomenclatural observations are discussed and a revision of the classification in sections of the genus, as well as an update of the keys of sections and species of Guzmán's monograph are provided.

Keywords: Agaricales, Basidiomycota, *Psilocybe*, taxonomy.

The interest in *Psilocybe* after the discovery of hallucinogenic mushrooms in Mexico during 1956-1958 (Heim & Wasson, 1958; Singer & Smith, 1958) was enormous. Extensive research work was carried out on the identification, distribution, chemistry, physiology, culture and use of the different species. Guzmán (1983) summarized all existing knowledge in a monograph, but since then several papers describing new species or new records have been published.

Redhead (1985) correctly pointed out in Guzmán's monograph some nomenclature problems linked with the names of some species such as *P. callosa* but some of Redhead's comments were of rather subjective nature or at least questionable.

Singer (1986) did not accept the sections proposed by Guzmán (1983). He also incorrectly related *P. coprophila* to *P. subcoprophila* stating that they had both hexagonal and subellipsoid spores, but the spores of *P. coprophila* are subhexagonal in face view and subellipsoid in side view, while those of *P. subcoprophila* are only subellipsoid in both views. Moreover, Singer recognized *P. bolivarii* Guzmán, that was considered by Guzmán (1983) as conspecific with *P. zapotecorum* Heim *emend.* Guzmán based in the study of the types. In addition, he accepted *P. palmigena* (Berk. & Curt.) Sacc., but this fungus belongs to *Psathyrella* according to the study of the type (Guzmán, 1983).

* This contribution is dedicated to Prof. Dr. M. Moser on occasion of his 70th anniversary.

The present paper discusses critically the knowledge of the genus *Psilocybe*. New species are described and the status of some others is revised. New records are reported and some nomenclatural issues are discussed. In addition, the keys of sections and of species presented in Guzmán's (1983) monograph are updated. This paper is dedicated to Dr. Meinhand Moser in appreciation of his valuable work in agarics. Moser's key (1983) to European and North American species of *Psilocybe* are still useful and fully adequate.

Materials and methods

All the available bibliography on *Psilocybe* after 1980 and not considered in Guzmán's monograph was studied to critically evaluate new taxa described and new records. In addition, collections of *Psilocybe* from Guatemala, Colombia, Venezuela, Spain, Kenya, Japan and Tasmania, as well as selected collections from Mexico at XAL, ENCB and IBUG Herbaria were examined. All the microscopic observations were made on sections mounted in 5% KOH solution, or occasionally in Melzer's reagent or cotton blue lactophenol.

Taxa of *Psilocybe* described after 1980 and not considered in Guzmán's (1983) monograph

Tab. 1 shows the 29 species and varieties of *Psilocybe* described or proposed after 1980, and not considered by Guzmán (1983). Of these, *P. pseudo-aztecorum* belongs to Sect. Aztecorum; *P. banderillensis* var. *paulensis* to Sect. Brunneocystidiata; *P. alpestris*, *P. februaria*, *P. magica* and *P. montana* f. *plana* to Sect. *Psilocybe*; *P. trufemii* to Sect. Singeriana; *P. antioquiensis*, *P. samuiensis*, *P. subacutipilea* and also probably *P. pericystis* to Sect. Mexicana; *P. rostrata* to Sect. Stuntzii; *P. bohemica* and *P. indica* to Sect. Semilanceata; *P. laetissima* (= *P. calongei*) and probably *P. glutinosa* to Sect. Atrobrunnea; *P. goniospora*, *P. guatapensis* and *P. heliconiae* to Sect. Cordispora; and *P. aucklandii*, *P. barrerae*, *P. microcystidia*, *P. sanctorum* and *P. zapotecorum* var. *ramulosum* to Sect. Zapotecorum. On the other hand, *P. fasciculare*, *P. gigaspora* and *P. guzmanii* belong to the genus *Naematoloma*, and *P. inucta* to *Stropharia*. Among the new species of *Psilocybe* reported after 1983, those of the Sect. Zapotecorum are the most abundant with 5 well recognized taxa, one from New Zeland, two from Brazil, and two from Mexico.

Psilocybe bohemica was described by Sebek (1983) based on those Czech collections identified as *P. coprinifacies* (Rolland) Pouzar and *P. maire* Singer, the later known only from North of Africa and the former considered by Guzmán (1983) to be a doubtful species because the type was not found and the species seems to belong to *Stropharia* or *Panaeolus*. The caerulescent

Tab. 1. New species and varieties of *Psilocybe* described or proposed after 1980, and not considered by Guzmán (1983).

Taxon	Reference	Geographic origin
<i>P. alpestris</i> Singer	Fieldiana Bot 21 (1402): 108 (1989)	Austria
<i>P. antioquiensis</i> Guzmán & al.	Mycotaxon 51: 225 (1994)	Colombia
<i>P. aucklandii</i> Guzmán, King & Bandala	Mycol. Res. 95: 507 (1991)	New Zealand
<i>P. banderillensis</i> var. <i>paulensis</i> Guzmán & Bononi	Mycotaxon 19: 347 (1984)	Brazil
<i>P. barrerae</i> Cifuentes & Guzmán	Bol. Soc. Mex. Mic. 16: 52 (1981)	Mexico
<i>P. bohémica</i> Sebek	Ceská Mykol. 37: 177 (1983)	Czechoslovakia
<i>P. calongei</i> Moreno & Esteve-Raventós	Trans. Brit. Mycol. Soc. 90: 411 (1988)	Spain
<i>P. fasciculare</i> (Hudson) Kiihner	Bull. Soc. Linn. Lyon 49: 899 (1980)	Europe
<i>P. februararia</i> Singer	Fieldiana Bot 21 (1402): 108 (1989)	Bolivia
<i>P. gigaspora</i> Natarajan & Raman	Bibl. Mycol. 89: 100 (1983)	India
<i>P. glutinosa</i> Arnolds	Bibl. Mycol. 90: 442 (1982)	Holland
<i>P. goniospora</i> (Berk. & Br.) Singer [= <i>P. lonchophora</i> (Berk. & Br.) Horak ex Guzmán]	Kew Bull. Add. Ser. 12, p. 410 (1986)	Sri Lanka
<i>P. guatapensis</i> Guzmán & al.	Mycotaxon 51: 228 (1994)	Colombia
<i>P. guzmanii</i> Natarajan & Raman	Bibl. Mycol. 89: 102 (1983)	India
<i>P. heliconiae</i> Guzmán & al.	Mycotaxon 51: 229 (1994)	Colombia
<i>P. indica</i> Sathe & Daniel	Maharashtra Ass. Cult Sc. Monograph 1: 100 (1980)	India.
<i>P. inuncta</i> (Fr.) Kiihner	Bull. Soc. Linn. Lyon 49: 899 (1980)	Europe
<i>P. laetissima</i> Hausknecht & Singer	Plant Syst. Evol. 151: 295 (1986)	Germany
<i>P. magica</i> Svrcek	Ceská Mykol. 43: 82 (1989)	Czechoslovakia
<i>P. microcystidiata</i> Guzmán & Bononi	Mycotaxon 19: 345 (1984)	Brazil
<i>P. montana f. plana</i> Arnolds, prov.	Bibl. Mycol. 90: 446 (1982)	Holland
<i>P. pericystis</i> Singer	Fieldiana Bot. 21 (1402): 109 (1989)	Brazil
<i>P. pseudoaztecorum</i> Natarajan & Roman	Mycologia 77: 158 (1985)	India
<i>P. rostrata</i> (Fetch) Pegler	Kew Bull. Add. Ser. 12, p. 409 (1986)	Sri Lanka
<i>P. samuiensis</i> Guzmán & al.	Mycotaxon 46: 156 (1993)	Thailand
<i>P. sanctorum</i> Guzmán	Bol. Soc. Mex. Mic. 17: 90 (1982)	Mexico
<i>P. subacutipilea</i> Guzmán & al.	Mycotaxon 51: 230 (1994)	Colombia
<i>P. trufemii</i> Guzmán & Bononi	Mycotaxon 19: 344 (1984)	Brazil
<i>P. zapotecorwn</i> var. <i>ramulosum</i> Guzmán & Bononi	Mycotaxon 19: 346 (1984)	Brazil

specimens identified in Europe as *Psilocybe coprinifacies* or *P. maire* are hallucinogenic according to Pouzar (1953) and agree with Sebek's species. Gartz & Müller (1989) and Wurts & al. (1984) made chemical studies on Sebek's species and confirmed the presence of psilocybin, psilocin and baeocystidin in the first and only psilocybin and psilocin in the latter. Some authors (e.g. Bresinsky & Besl, 1990) considered *P. bohémica* as a synonym of *P. cyanescens*, to which it is related (see key).

The study of the type of *P. calongei* (Moreno & Esteve-Reventós, 1988a). Moreno 9906 (Figs. 46-47), Hiimera, Madrid, Spain, Oct. 12, 1986 (Alcalá de Henares University Herbarium; isotype at XAL) has demonstrated that this taxon is identical with *P. laetissima* Hausknecht & Singer (1986), a species with subellipsoid, thick-walled spores, (9.5-) 10.5-13 x 6.5-7(-8) x (6-) 6.5-7 µm (wall up to 1 µm thick), without pleurocystidia; cheilocystidia 24—44(-48) x 6.5-8(-9) µm, hyaline, lageniform or irregularly cylindrical and papillate: trama hymenial with hyphae 4-16 µm wide, hyaline or yellow; hypodermium subcellular, with subglobose elements 4-20 µm wide, hyaline or with yellow or brownish pigment incrusting on the walls. All these features, mainly the subellipsoid, thick-walled spores, indicate that *P. laetissima* belongs to Sect. *Atrobrunnea* and it is close to *P. sabulosa* Peck, but that species has spores (11-)12-16.5(-19) µm long. Hausknecht & Singer (1986) have claimed that this species belongs to Sect. *Merdariae*, in which, however, taxa with subhexagonal spores, not found in *P. laetissima*, are accommodated.

P. glutinosa, according to its description (Arnolds, 1982), may belong to Sect. *Atrobrunnea*; it is close to *P. sabulosa* but differs in the very viscid pileus and small basidiomata. *P. montana* f. *plana* seems to be conspecific with the typical *P. montana*. Arnolds (1982) only differentiated this form because of the plane pileus, common in old specimens of *P. montana*. *Psilocybe fascicularis* and *P. inucta* (Kühner, 1980), are typical species of *Naematoloma* and *Stropharia*, respectively, following modern concepts (Singer, 1986; Guzmán, 1983). In fact, Kühner's concept of the genus *Psilocybe* includes the genera *Naematoloma* and *Stropharia*.

Psilocybe indica from India is a caerulescent fungus with collybioid habit and ellipsoid, thick-walled spores, with both pleurocystidia and cheilocystidia (both 26.5-37 x 10.5-13.5 µm) (Sathe & Daniel, 1980). *P. indica* together with *P. cubensis*, *P. pseudoaztecorum* and *P. aztecorum* var. *bonetii* (Natarajan & Raman, 1983; 1985) from India are the only four fungi with psychotropic properties known from that country. However, *P. aztecorum* var. *bonetii sensu* Natarajan and Raman is another species and its position will be discussed below. *P. aztecorum* var. *aztecorum* reported from Costa Rica by Sáens & al. (1983) may be another species.

Psilocybe rostrata was recognized by Pegler (1986) based on the study of the type of *Stropharia rostrata* Petch from Sri Lanka, a fungus that has no pleurocystidia. It is a caerulescent fungus with a permanent annulus, spores 7.5-9.5 x 5-6 µm, with "slightly thickened wall", "ovoid to ellipsoid" and cheilocystidia 13-17 x 2.5-5 µm, fusoid to lageniform (Pegler, 1986). It grows on elephant dung and it belongs to Sect. *Stuntzii* Guzmán, together with

the tropical species *P. subaeruginascens* and *P. aerugineomaculans*.

Psilocybe pericystis from Amazonia, according to Singer (1989), is close to *P. acutipilea* (Speg.) Guzmán, a species, however not recognized by Singer (1986). Spegazzini's species belongs to Sect. Mexicana according to Guzmán (1983). It is thus probably that Singer's fungus belongs to this section and has psychotropic properties. *P. pericystis* is one of the eleven hallucinogenic species known from Brazil (Guzmán, 1983), together with *P. banderillensis* var. *paulensis* and *P. zapotecorum* var. *ramulosum* described by Guzmán & al. (1984) from São Paulo State.

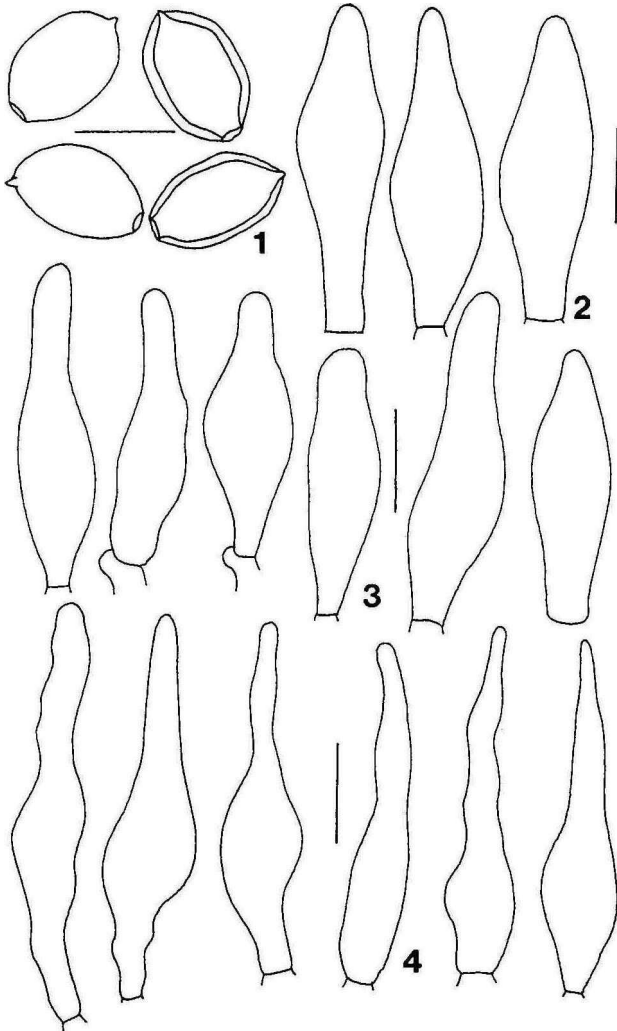
New records of *Psilocybe* reported after 1980

Tab. 2 shows the new records of *Psilocybe* reported from different parts of the world and not considered in Guzmán's monograph.

Guzmán & al. (1988) reported for first time *Psilocybe subyungensis* from Mexico (State of Tamaulipas), a species known only from Venezuela; *P. barrerae*, *P. caerulescens* var. *caerulescens*, *P. cordispora*, *P. cubensis*, *P. fagicola* var. *mesocystidiata*, *P. galindoi*, *P. herrerae*, *P. mexicana*, *P. subyungensis*, *P. yungensis* and *P. zapotecorum* were also reported from new localities in Mexico.

Psilocybe angustipleurocystidiata (Figs. 56-59), described from Mexico (State of Morelos) (Guzmán, 1983), was reported by Mora & Guzmán (1983) from the same locality. These authors also provided the first illustrations of the microscopic features. This fungus was later recorded from the State of Mexico (Guzmán & al., 1988) and only afterwards (Guzmán, 1990, p. 102) the first drawing of the basidiomata was published. It is now reported here for the first time from the State of Veracruz (Mexico), where it is apparently common in subtropical forests. Five new collections are recorded: road Xalapa to Perote, near Acajete, Jun. 21, 1980, Jacobs 116; Jul. 8, 1980, Jacobs 179; same road, near Piletas, Jul. 5, 1984, Guzmán 24455; Cofre de Perote Region, Municipio Ixhuacan, Ejido Los Laureles, Oct. 7, 1983, Garcia s.n.; Oct. 12, 1983, Garcia s.n. (all in XAL). The form of the basidiomata in this species is variable, with a pileus conic or subumbonate to convex, and slightly umbilicate, and stipe equal to subbulbous. The collections of Garcia were made at 2400 m elevation, in a *Pinus-Alnus* forest. This habitat is the same as for *P. muliercula* Singer & Smith, a related species without pleurocystidia, known only from coniferous forests of central Mexico. Jacobs' collections are from a subtropical forest, at 1800 m, and in all the cases growing on red clay soils in eroded places outside of the forest. These species belong to Sect. Zapotecorum.

Psilocybe coprophila (Figs. 1-3) is a wide-spread fimicolous fungus, almost cosmopolitan, but absent in the Arctic and Antarctic regions, as well as at high elevations or in alpine regions, where it is replaced by *P. argentina* (Figs. 4-5), a close species with larger spores, (11-)12-15(-17) μm long vs. (9-)10-12(-14) μm long in *P. coprophila* (Guzmán, 1983). On the other hand,



Figs. 1—4. *Psilocybe coprophila* and *P. argentina*- 1-3. *P. coprophila*.- 1. Spores.- 2. Pleurocystidia.- 3. Cheilocystidia (all from Guzmán 29516).-4. *P. argentina*, cheilocystidia (from Sampieri 264).- Scale bar = 10 μ m.

Natarajan & Raman (1983) reported these two species from Tamil Nadu State in India, in the region of Ootacamund, a mountainous zone up to 2500 m, with spores 12.6-15.4 μ m long and 11.2-15 μ m long, respectively; both seem to belong to *P. argentina*. The reports of Pegler & d. (1981), Horak (1982) and Gulden & d. (1985) of *P. coprophila* from the Antarctic, Arctic and Alpine regions are most probably mis-identifications of *P. argentina*. The study of several collections from Mexico and South America, as well as from the U.S. and Europe confirmed that specimens gathered in low-lands have small

spores, in contrast to those collected at high elevations. Besides differences in spore size, the form of cheilocystidia is apparently another difference between these two species, because *P. coprophila* has cheilocystidia with a short and thick neck, whereas those of *P. argentina* are provided with a long, narrow and flexuous neck, as shown in Figs. 3 and 5. Following records of *P. argentina* are new from Venezuela: Guzmán 30820 and 30821, State of Merida, Sierra de Santo Domingo, Valle de Mucabaji, May 22, 1993 (Herb. Univ. de los Andes, Fac. Farmacia 8002-A, 8002-B and XAL).

P. cubensis is a wide-spread subtropical species and *P. subcubensis* (Figs. 6-7) a pantropical species. Both fungi are frequently confused because they are very similar. Guzmán (1983) stated that the populations from the tropics have smaller spores (11-13 μm long.), in contrast to the subtropical populations which have larger spores (13-15 μm long.). Guzmán's observations have been confirmed by Margot & Watling (1981) who have reported similar trends in collections from Australia and by Velazquez & al. (1989) and Navarro & Betancourt (1992) in collections from Colombia and Puerto Rico, respectively. Margot & Watling (1981) in spite of having observed two populations of "*P. cubensis*" in Australia, one with spores (11-)12-15.5 μm long and another with spores 13.3-17.7 μm long, did not consider the presence of *P. subcubensis* in Australia to be likely, and they wrote: "The small-spored material matches exactly the recently described *P. subcubensis* Guzmán, but it is doubtful whether the data above support the recognition of this taxon in Australia, although listed by Guzmán (1978) from there". Here I also present the first record of *P. subcubensis* from Thailand, based on five collections made by Alien (dl in Herb. Alien at Hawaii and in XAL).

Psilocybe falklandica (Horde, 1982) and *P. longinqua* (Guzmán, 1983) are doubtful species known only from the Antarctic region. "*Psilocybe macquariensis*" reported by Horak (1982) from the Antarctic, belongs to *Galerina macquariensis* Smith & Singer (Horak, 1982: p. 87). *Psilocybe scocholmica* was considered by Parker-Rhodes as an apparent hybrid between *P. coprophila* and *P. bulbacea* (Watling & Gregory, 1987). *P. velifera* seems to belong to Sect. *Psilocybe* and it was considered by Singer (1986) as a good species.

Psilocybe lazoi Sing, was considered by Guzmán (1983) conspecific with *P. zapotecorum* based in the study of the type (Lazo PU-151 at NY), but Singer (1986) stated that the type is at SGO, and that the specimen at NY is another species. Singer considered *P. lazoi* to be a non-caerulescent species with pleurocystidia of the chrysocystidia type, and not conspecific with *P. zapotecorum*. *P. albofimbriata* was considered by Guzmán (1983) as conspecific with *P. farinacea* Rick ex Guzmán based in the study of the type, but Singer (1986) pointed out that it is an independent species and if the two are the same, the correct name must be *P. albofimbriata*.

Psilocybe sp. reported by Guzmán & al. (1993a) is probably new and belongs to Sect. *Semilanceata*, but the poor herbarium material made impossible its formal description. *Psilocybe* sp. reported by Margot & Watling (1981) is also probably new and belongs to the same section. Recently Stijve & Meijer

(1993) reported 11 species of *Psilocybe* from Brazil (State of Parana) (see Tab. 2). All of them are first records for the State of Parana, but *P. caerulescens* var. *caerulescens*, *P. hoogshagenii* var. *hoogshagenii*, *P. subyungensis*, *P. uruguayensis* and *P. venezuelana* are reported for the first time from Brazil. The material of *P. caerulescens* studied by these authors seems to be a complex of at least two species, because they described some specimens with spores 6.5-7 x 5-6 µm and others with 7-9 x 6-7 µm, and cheilocystidia 25-30 x 6-8 µm for both types, that do not fit with the concept of *P. caerulescens*. *P. subyungensis* does not fit with Guzmán's concept either, because the Brazilian fungus does not have pleurocystidia, and the cheilocystidia reported are larger than those of the type.

Imazeki & al. (1988) presented good colour plates of *P. argentipes*, *P. subaeruginascens*, *P. venenata* (as *P. fasciatá*) and *P. coprophila* from Japan, and Bresinsky & Besl (1990) a good colour plate of *P. semilanceata* from Europe, as well as a key for the European hallucinogenic species [*P. callosa*, *P. cyanescens* (= *P. bohemicá*), *P. fimetaria*, *P. liniformans* var. *liniformans*, *P. pelliculosa* and *P. silvatica*].

Tab. 2.- New records or new localities of *Psilocybe* not considered by Guzmán (1983).

<i>P. acutipilea</i> (Speg.) Guzmán	Brazil (Guzmán & al., 1984)
<i>P. albofimbriata</i> (Rick) Singer	Brazil (Singer, 1986)
<i>P. alnetorum</i> (Singer) Singer	(= <i>Naematoloma</i> , Guzmán). Brazil (Steijve & Meijer, 1993)
<i>P. angustipleurocystidiata</i> Guzmán	Mexico (Guzmán, 1990; Guzmán & al., 1988)
<i>P. argentina</i> (Speg.) Singer	Colombia (Pulido, 1983), India (Natarajan & Rarnan, 1983), Estonia (Urbonas & al., 1986), the Netherlands (Arnolds, 1982, as <i>P. cf. merdicola</i> Huijs.) and Peru (Yokoyama, 1987)
<i>P. atrobrunnea</i> (Lasch) Gillet	Estonia (Urbonas & al., 1986) and Switzerland (Monthoux, 1987)
<i>P. atrorufa</i> (Schaeff. : Fr.) Quál.	reported by Horak (1982) (see <i>P. montaná</i>)
<i>P. australiana</i> Guzmán & Wading	Australia (Margot & Watling, 1981), New Zealand (Guzmán & al., 1993a) and Tasmania (Chang & Mills, 1992)
<i>P. aitecorum</i> Heim emend. Guzmán var. <i>aztecorum</i>	Costa Rica (Sáens & al., 1983) and India (Natarajan & Raman, 1983; 1985)
<i>P. aztecorum</i> var. <i>bonetii</i> (Guzmán) Guzmán	India (Natarajan & Raman, 1983)
<i>P. barrerae</i> Cifuentes & Guzmán	Mexico (Guzmán, 1982; Guzmán & al., 1988)
<i>P. bohemicá</i> Sebek	Czechoslovakia (Sebek, 1985)
<i>P. bulbosa</i> (Peck) Smith	Canada (Redhead, 1984)
<i>P. bullacea</i> (Bull. : Fr.) Kummer	Estonia (Urbonas & al., 1986), Germany (Derbsch & Schmitt, 1987) and Poland (Wojewoda & Lawrynowicz, 1986)

- P. caeruleoannulata* Singer ex Guzmán
P. caerulescens Murrill var. *caerulescens*
- P. caespitosa* (Berkeley) Sacc.
- P. calongei* Moreno & Esteve-Raventós
P. chionophila: see *P. semistriata*
P. coprophila (Bull. : Fr.) Kummer
- P. cordispora* Heim
P. crobula (Fr.) M. Lange ex Singer
- P. cubensis* (Earle) Singer
- P. cyanescens* Wakefield
- P. eucalypta* Guzmán & Watling
- P. fagicola* var. *mesocystidiata* Guzmán
P. falklandica Cotton
P. fuegiana (Horak) Singer
P. galindoi Guzmán
P. herrerae Guzmán
P. hoogshagenii Heim var. *hoogshagenii*
- Brazil (Stijve & Meijer, 1993)
Brazil (Stijve & Meijer, 1993), Martinique (Pegler, 1983), Mexico (Guzmán & al., 1988)
(= *Psathyrella* s. Guzmán), India (Lakhanpal, 1993)
Spain (Illana & al., 1989) (= *P. laetissima*)
- Brazil (Stijve & Meijer, 1993), Australia (Margot & Watling, 1981), Balears Islands (Menorca) (Listosella & Aguasca, 1980), Balears Islands (Mallorca) (Aguasca & al., 1992), Colombia (Pulido, 1983), Estonia (Urbonas & al., 1986), Germany (Derbsch & Schmitt, 1987), India (Lakhanpal, 1993; Natarajan & Raman, 1983), Italy (Quadraccia & Lunghini, 1990), Korea (Lee & Hong, 1985), Mexico (Ayala & Guzmán, 1984; Mora & al., 1992), New Zealand (Guzmán & al., 1993), Peru (Yokoyama, 1987),
Poland (Wojewoda & Lawrynowics, 1986), Spain (Ortega & Buendia, 1986; Malencon & Bertault, 1976) and from Alpine, Artic and and Antartic regions (Gulden & al., 1985; Pegler & al., 1981; Horak, 1982)
Mexico (Guzmán & al., 1988)
Estonia (Urbonas & al., 1986), Germany (Derbsch & Schmitt, 1987), Great Britain (Watling & Gregory, 1987), India (Natarajan & Raman, 1983), Italy (Aguasca & al., 1992), and Sri Lanka (Pegler, 1986)
Australia (Margot & Watling, 1981), Brazil (Stijve & Meijer, 1993), Colombia (Pulido, 1983), Costa Rica (Sáenz & al., 1983), Dominicana (Rodriguez-Gallart, 1989), Guadeloupe and Martinique (Pegler, 1983), India (Natarajan & Raman, 1983), Mexico (Acosta & Guzmán, 1984; Guzmán, 1982; Guzmán & al., 1988; Mora & al., 1992) and Puerto Rico (Navarro & Betancourt, 1992)
Australia (Margot & Watling, 1981), Czechoslovakia (Sebek, 1985), Italy (Grilli, 1990; Samorini, 1993)
Australia (Chang & Mills, 1992, Margot & Watling, 1981) and New Zealand (Guzmán & al., 1993a)
Mexico (Guzmán & al., 1988)
Antartic region (Horak, 1982)
Peru (Yokoyama, 1987)
Mexico (Guzmán & al., 1988)
Mexico (Guzmán & al., 1988)
Brazil (Stijve & Meijer, 1993)

- P. inquilina* (Fr. : Fr.) Bres. Australia (Margot & Watling, 1981), Estonia (Kalamees, 1989; Urbonas & al., 1986), Germany (Derbsch & Schmitt, 1987), Great Britain (Watling & Gregory, 1987), the Netherlands (Arnolds, 1982) and Antarctic region (Horak, 1982)
- P. lazoi* Singer Chile (Singer, 1986)
- P. longinqua* Singer Antarctic region (Horak, 1982)
- "*P. macquarensis*" Antarctic region (Horak, 1982)
- P. maire* Singer Czechoslovakia (Kubicka, 1985) and Germany (Derbsch & Schmitt, 1987)
- P. maulensis* Singer ined. (Singer, 1986)
- P. merdaria* (Fr.) Ricken Australia (Miller & Hilton, 1986), Chile (Valenzuela & al., 1992), France (Bon, 1989), Germany (Derbsch & Schmitt, 1987), Poland (Wojewoda & Lawrynowics, 1986), Spain (Malenson & Bertault, 1976; Moreno & Esteve-Raventós, 1988; Moreno & al. 1990), Antarctic region (Horak, 1982) and Alpine, Arctic and Antarctic regions (Gulden & al., 1985)
- P. merdicola*: see *P. argentina*
- P. mexicana* Heim Mexico (Guzmán & al., 1988)
- P. cf. mexicana* Heim Costa Rica (Sáenz & al., 1983)
- P. montana* (Pers. : Fr.) Kummer. [= *P. atrorufa* (Schaeff. : Fr.) Quel] Alaska (Miller & al., 1982), Australia (Margot & Watling, 1981), Colombia (Pulido, 1983), Estonia (Urbonas & al., 1986), Mexico (Mora & al., 1992), Poland (Wojewoda & Lawrynowicz, 1986), the Netherlands (Arnolds, 1982), Arctic region (Horak, 1982) and Alpine, Arctic and Antarctic regions (Gulden & al., 1985)
- P. muscorum* (Orton) Moser Germany (Derbsch & Schmitt, 1987), Estonia (Urbonas & al., 1986), India (Natarajan & Ramón, 1983), and the Netherlands (Arnolds, 1982)
- P. paupera* Singer Brazil (Steijve & Meijer, 1993), Estonia (Urbonas & al., 1986), Germany (Derbsch & Schmitt, 1987) and Poland (Wojewoda & Lawrynowics, 1986)
- P. phyllogena* (Peck) Peck [some reports as *P. rhombispora* (Britzelm.) Sacc.] France (Courtecuisse, 1985), Estonia (Urbonas & al., 1986), Germany (Derbsch & Schmitt, 1987), Great Britain (Watling & Gregory, 1987) and Poland (Wojewoda & Lawrynowicz, 1986)
- P. aff. phyllogena* (Peck) Peck Colombia (Pulido, 1983)
- P. physaloides* (Bull, ex Marat) Quel Estonia (Urbonas & al., 1986), Poland (Wojewoda & Lawrynowics, 1986)
- P. pintonii* Guzmán Colombia (Pulido, 1983)
- P. plutonia* (Berkely & Curtis) Sacc. Martinique and Guadeloupe (Pegler, 1983)
- P. rhombispora*: see *P. phyllogena*
- P. sabulosa* Peck (as *P. squarrosipes*) India (Natarajan & Raman, 1983)

- P. scocholmica* Parker-Rhodes
P. semilanceata (Fr. : Secretan) Kummer
P. semistriata (Peck) Guzmán
P. serbica Moser & Horak
P. sierrae Singer
P. squarrosipes: see *P. sabulosa*
P. strictipes Singer & Smith
P. subaeruginosa Cleland
P. subcoprophila (Britzelm.) Sacc.
P. subcubensis Guzmán
P. subyungensis Guzmán
P. cf. subyungensis Guzmán
P. tasmaniana Guzmán & Wading
P. tenax see *P. semistriata*
P. uruguayensis Singer ex Guzmán
P. vanhoeffenii (Hennings) Sacc.
P. velifera (Favre) Singer
P. venezuelana Dennis
P. cf. venezuelana Dennis
P. yungensis Singer & Smith
P. zapotecorum Heim emend. Guzmán
Psilocybe sp.
Psilocybe sp.
Psilocybe sp.
- Great Britain (Watling & Gregory, 1987)
Australia (Margot & Watling, 1981), Canada (Redhead, 1989), Czechoslovakia (Kubicka, 1985; Kutan & Kotlaba, 1988; Sebek, 1985), Bulgaria (Kutan & Kotlaba, 1988), Estonia (Ürbonas & al., 1986), Italy (Samorini, 1993), Tasmania (Chang & Mills, 1992) and New Zealand (Guzmán & al., 1993a)
France (as *P. chionophild*) (Bon, 1989), Poland [as *P. tenax* (Fr.) Kiihn. & Romag. *sensu* Fábry], (Wojewoda & Lawrynowics, 1986) and Switzerland (as *P. chionophila* Lamoure) (Gulden & al., 1985)
Czechoslovakia (Sebeck, 1985)
Chile (Singer, 1986)
Czechoslovakia (Sebek, 1985, as *P. callosa*), Great Britain (Watling & Gregory, 1987)
Australia (Margot & Watling, 1981; Chang & Mills, 1992)
Scotland (Watling, 1987)
Australia (Margot & Watling, 1981), Colombia (Velazquez & al., 1989), Puerto Rico (Navarro & Betancourt, 1992)
Mexico (Guzmán & al., 1988)
Brazil (Steijve & Meijer, 1993)
New Zealand (Chang & Mills, 1992)
Brazil (Steijve & Meijer, 1993)
Antartic region (Horak, 1982)
Europe (Singer, 1986)
Martinique and Guadeloupe (Pegler, 1983)
Brazil (Steijve & Meijer, 1993)
Martinique (Pegler, 1983), Mexico (Guzmán & al., 1988)
Brazil (Steijve & Meijer, 1993), Colombia (Pulido, 1983) and Mexico (Guzmán & al., 1988; Mora & al., 1992)
Australia (Margot & Watling, 1981)
Finland (Metsanheimo, 1987)
New Zealand (Guzmán & al., 1993a)
-

New species of *Psilocybe*

Psilocybe chiapanensis Guzmán sp. nov.- Figs. 8-11.

Differt a *Psilocybe yungensis* Singer et Smith et *P. subyungensis* Guzmán ob copiosa pleurocystidia 11-14.5(-16) x (4-)5-6.5(-7) μm , ventricosa, rostrata brevi collo praedita, cheilocystidiaque ex duobus typibus: a) analoga pleurocystidiis, et b) (16-)17-22.5 x 5-8 μm , ventricosis. Species lignicola.

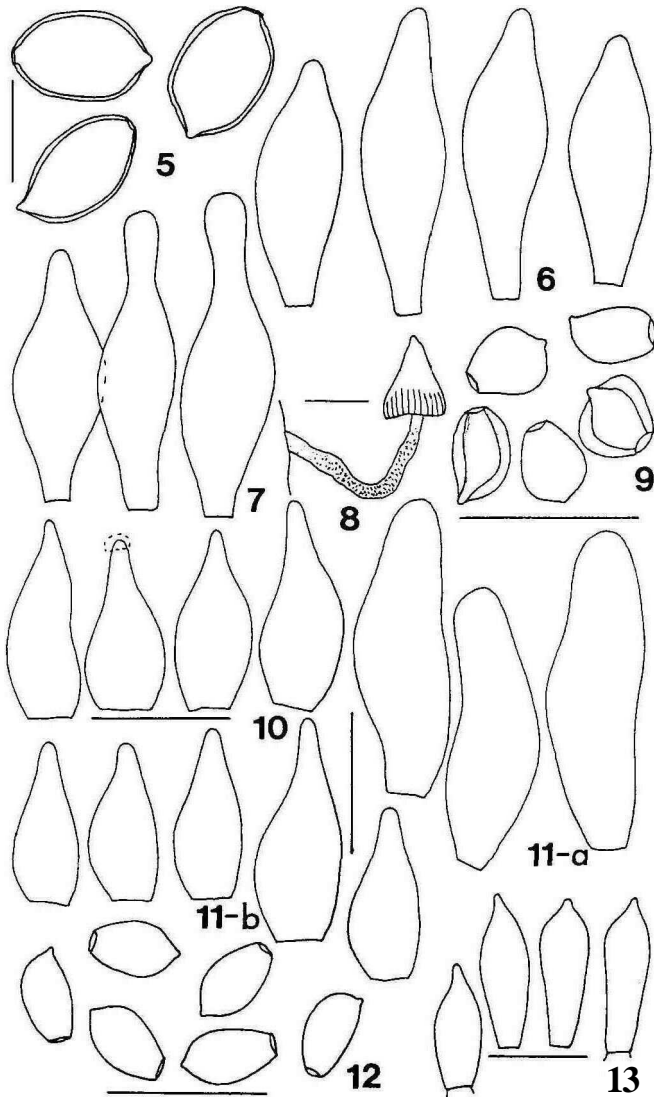
In zona subtropicali. Mexico, prope Chiapas, regie Tapachula, Union de Juárez, Ejido Santo Domingo, Guzmán 30739, holotypus XAL.

Pileus approx. 10 mm in diam and approx. 13 mm high, campanulate subpapillate, sublubricous, even to slightly striate toward the margin, grayish leather to brownish straw-yellow, hygrophanous.- Lamellae adnate, brownish violet, uniform in colour.- Stipe approx. 40 x 3 mm, cylindric, sinuous, hollow, whitish to reddish brown, covered by floccose appressed white scales, mainly in the middle part.- Both pileus and stipe staining blue to blackish where injured.- Context whitish to concolourous with the pileus.- Odor and taste farinaceous.- Spores (4-)4.5-5(-5.5) x 4-5 x 3-4 μm , subrhomboid in face view, subellipsoid in side view, with a thick wdl up to 1 μm , brownish yellow, with a broad germ pore at one end and an acute short appendage at the other.- Basidia (12-)14.5-21 x 5-7 μm , 4-spored, clavate ventricose, hyaline.- Pleurocystidia 11-14.5(-16) x (4-)5-6.5(-7) μm , common, hyaline, ventricose rostrate, with a short apex.- Cheilocystidia of two types, a) as the pleurocystidia (10.5-)12-16(-17.5) x 5.5-6.5 μm , hyaline, and b) (16-)17-22.5 x 5-8 μm , ventricose, regular or irregularly in form, hyaline.- Subhymenium with globose elements 3-5 μm in diam, hyaline or yellowish.- Gill trama regular, formed by yellowish or hyaline hyphae, 3-12 μm wide, thin or thick-walled (up to 1.5 μm).- Epicutis subgelatinized, formed by repent hyphae 2.5-5.5 μm wide, with some hyaline ascending elements, 12-32 x 6-8 μm .- Hypodermium with subglobose elements 4-16 μm in diam, yellowish to yellow-brown, wall up to 1.5 μm thick.-Clamp connections present.

Habitat.- Solitary on logs, in coffee plantations remaining of subtropical cloud (mesophytic) forests. Known only from the type locality.

Material examined.- MEXICO: State of Chiapas, Region of Tapachula, Municipio Union de Juárez, Ejido Santo Domingo, Oct. 4, 1993, Guzmán 30739 (Holotype, XAL).

This species is close to *P. yungensis* Singer & Smith and *P. subyungensis* Guzmán by similar pileus form, spores size and the lignicolous habitat, but differs by more abundant pleurocystidia (scanty in those species) and in their size (14-25 μm long in *P. yungensis*; 9-11 μm long in *P. subyungensis*), and in the size and variability of the cheilocystidia [14-33(-40) μm long in *P. yungensis*; 16.5-25 μm long in *P. subyungensis*].



Figs. 5-13. *Psilocybe argentina*, *P. subcubensis*, *P. chiapanensis* and *P. moseri*.- 5. *P. argentina*, spores (Sampieri 264).-6-7. *P. subcubensis*-6. Pleurocystidia.-7. Cheilocystidia (both from Alien "A").- 8-11. *P. chiapanensis*.- 8. Basidioma.- 9. Spores.- 10. Pleurocystidia.- 11a. Cheilocystidia type 1.- 11b. Cheilocystidia type 2 (all from the type).- 12-13. *P. moseri*. 12. Spores.- 13. Pleurocystidia (both from the type).- Scale bar = 10 μ m, except in 8 = 10 mm.

***Psilocybe meridensis* Guzmán, sp. nov.-Figs. 17-21.**

Pileus (10-) 15-30 mm latus, conicus vel convexus vel subcampanulatus, subpapillatus vel

umbonatus, oleosus, laevis, fulvus vel rufobrunneus, hygrophanus, celeriter subcaeruleus vel nigricans. Lamellae adnatae vel sinuatae, flavido-griseae vel brunneolo-violaceae, subcaeruleae vel nigricantes tactu. Stipes 40—80 x 3-5 mm, albidus vel rufobrunneus, subcaeruleus vel nigricans. Annulus subfibrillosus vel submembranaceus, frequenter duplex. Contextus flavidus vel albidus, vel subcaeruleus ad nigricans. Sapor mordax. Sporae (5.5-)6-7(-8) x 3—4 μm , subellipsoideae frontaliter et lateraliter, tenuitunicatae. Pleurocystidia (16-)17.5-27(-28) x (4-)5-8(-9) μm , hyalina, subfusioidea vel sublageniformia. Cheilocystidia (14.5-)16-28(-31) x (4-)5—6.5 μm , hyalina, ventricosa sublageniformia, collo simplici vel subramoso. Epicutis pilearum subgelatinosa. Hyphae fibulatae.

Ad terram, in subtropicali sylva. Venezuela, prope Márída, Parque Sierra Nevada, Teleférico, La Montana, Marcano et Guzmán (Guzmán 30806), holotypus Univ. Los Andes, Márída, Farmacia Herbarium 8001, isotypus XAL.

Pileus (10-)15-30 mm diam, conical to convex or subcampanulate, subpapillate or subumbonate, lubricous, even, slightly striate at the margin, yellowish brown or reddish brown, becoming paler towards the margin, readily turning blue-green to blackish when bruised or old.- Lamellae adnate or sinuate, yellowish gray to brownish violet or dark brown sepia, edges whitish and subfloccoses; turning blue-green to blackish when bruised.- Stipe 40-80 x 3-5 mm, equally cylindrical or slightly thickened at the base, somewhat flexuous, hollow, whitish to irregularly reddish brown or blackish, readily turning blue-green when injured, covered by whitish floccose little scales, mainly toward the base.- Veil well developed, cortinate and white, forming a complex subfibrillose or submembranous annulus, frequently double.-Context pallid yellow in the pileus and stipe, whitish toward the pileus surface, readily turning blue-green to blackish when cut. Dried basidiomata are completely blackish to black.- Odor something special but fungus-like, not farinaceous.- Taste slightly fungal, subfarinaceous to pungent.- Spore print violaceous brown.- Spores (5.5-)6-7(-8) x 3-4 x 3-3.5(-4) μm , subellipsoid or subovoid both in face and side view, brownish yellow, thin-walled, with a broad germ pore at one end and an acute short appendage at the other.- Basidia (16-)17.5-24 x (4-)5-6 μm , 4-spored, clavate ventricose, hyaline.- Pleurocystidia (16-)17.5-27(-28) x (4-)5-8(-9) μm , common, hyaline, subfusoid with acute apex or sublageniform with a short neck.- Cheilocystidia (14.5-)16-28(-31) x (4-)5-6.5 μm , abundant, hyaline, ventricose sublageniform, frequently with a middle constriction with a short or long neck, sometimes bifurcate.- Subhymenium not well differentiated.- Gill trama regular, formed by hyaline to pale yellow hyphae, thin-walled, 2.5-13 μm wide.- Epicutis subgelatinized, formed by 2.5-4 μm hyaline to pale yellow parallel hyphae.- Hypodermium with hyaline or pale yellow hyphae or subglobose elements, 5-17 μm wide, thin to thick-walled.- Clamp connections present.

Habitat.- Gregarious on soil, in a subtropical forest ("bosque ombrofilo montano siempre verde") with *Cyathea* and *Blechnum*, at 2400 m of elevation. Known only from the type locality.

Material examined.- VENEZUELA: Márída State, Parque Sierra Nevada, Teleférico de Márída, La Montana Station, May 23, 1993, Marcano & Guzmán s.n. (Guzmán 30806)

(Holotype Herb. Univ. de Los Andes, Fac. Farmacia 8001; isotype XAL).

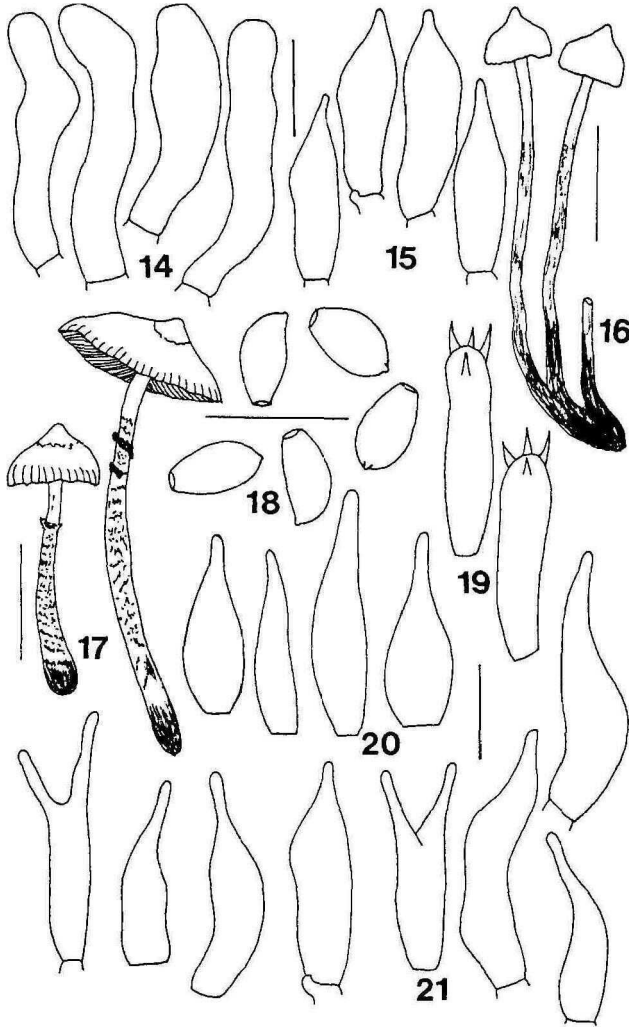
The presence of an annulus relates this species to *P. argentipes* Yokoyama from Japan and *P. graveolens* Peck from U.S., but the former has no pleurocystidia and the latter has broader spores [4.5-5(-6) μm] and hyaline to brownish pleurocystidia. Its habit is similar to that of *P. zapotecorum* and *P. angustipleurocystidiata*, but those species have no annulus, and the pleurocystidia are vesiculose submucronate or subfusiform, 5.5-14 μm wide in the former, and 3-6.5 μm wide in the latter. The strong blue-green to blackish or black reaction in all parts of the basidiome, including the gills, as well as the pungent taste, are two conspicuous features of *P. meridensis*.

***Psilocybe moseri* Guzmán, sp. nov.- Figs. 12-16.**

Pileus 10-13 mm latus, suboleosus, subcampanulatus vel subpapillatus, laevis, hygrophanus, luteus fuscus vel spadiceus, summe subcaeruleus. Lamellae adnatae, brunneolae vel fuscoviolaceae, ad margines albae. Stipes 75-80 x 2-3 mm, flexuosus, albidus vel subfuscus, subcaeruleus, longis pseudorhizis praeditus. Sporae (4-)5-5.5(-6.5) x (3-)3-3.5 x 2.5-3 μm , subellipsoideae frontaliter et lateraliter, tenuitunicatae. Pleurocystidia 12-16(-17) x (4-)5-5.5 μm , hyalina, vesiculosa, mucronata, communia. Cheilocystidia duobus typis, a) (17-)18.5-34.5(-37) x (4-)5.5-7(-8) μm , inaequalia cylindracea vel vesiculosa cylindracea, hyalina, communia, et b) 12-21.5(-22.5) x 4-5.5(-6.5) μm , vesiculosa vel mucronata, hyalina, rara. Epicutis pileanum subgelatinosa. Hyphae fibulatae.

Ad terram, in tropical! sylva. Mexico, prope Chiapas, Ocozocuatla ad Apic-Pac (Presa Malpaso), Laguna Bcflgica, *Guzmán 30723*, holotypus XAL.

Pileus 10-13 mm in diam, subcampanulate to subpapillate, sublubricous, glabrous, even, dark buff to brownish, hygrophanous, very bluish.- Lamellae adnate, pale brown to blackish violet, with whitish edges.- Stipe 75-80 x 2-3 μm , flexible, smooth, silky, whitish to brownish, very bluish, subbulbous and with a thick, irregular long pseudorhiza.- Veil absent in ripe specimens.- Context whitish to rufous brown, subfleshy in the pileus, fibrous in the stipe, staining blue when cut.- Odor and taste strongly farinaceous.- Spores (4-)5-5.5(-6.5) x (3-)3-3.5 x 2.5-3 μm , ellipsoid both in face or side view, thin-walled (no more than 0.5 μm thick), pallid brownish, with a distinct and broad germ pore and an apical short appendage.- Basidia (14.5-)16-21 x 4-5.5 μm , 4-spored, hyaline, vesiculose, cylindric or subclavate.- Pleurocystidia 12-16(-17) x (4-)5-5.5 μm , hyaline, common, vesiculose and mucronate.- Cheilocystidia of two types, a) (17-)18.5-34.5(-37) x (4-)5.5-7(-8) μm , irregularly cylindric or subvesiculose, hyaline, common, and b) 12-21.5(-22.5) x 4-5.5(-6.5) μm , vesiculose mucronate, hyaline and rare.- Subhymenium not well differentiated.- Gill trama regular, with hyaline 3.5-12(-16) μm wide hyphae.- Epicutis formed by a subgelatinized layer, with 1.5-4 μm hyphae in diam.- Hypodermium subcellular, with 4-16(-20) μm wide elements, brownish and thick-walled (up to 1.5 μm).- Clamp connections present.



Figs. 14-21.- *Psilocybe moseri* and *P. meridensis*- 14-16. *P. moseri*.- 14. Cheilocystidia type 1.- 15. Cheilocystidia type 2.- 16. Basidiomata (all from the type).- 17-21. *P. meridensis*.- 17. Basidiomata.- 18. Spores.- 19. Basidia.- 20. Pleurocystidia.- 21. Cheilocystidia (all from the type).- Scale bar = 10 μ m except in 16 & 17 = 20 mm.

Etymology.- This species is named in honor of Dr. Meinhard Moser (Innsbruck).

Habitat.- Gregarious and caespitose on soil, in a tropical rain forest, 500 m elevation. Known only from the type locality.

Material examined.- MEXICO: State of Chiapas, road Ocozocuatla to Apic-Pac

(Malpaso Dam), Laguna Bálgica, Sept. 26, 1993, Guzmán 30723 (Holotype, XAL).

This species belongs to Sect. *Zapotecorum* because of its thin-walled spores and for the bluing reaction. The peculiar pleurocystidia, the two types of cheilocystidia, the pseudorrhiza, as well as the smaller spores, separate *P. moseri* from all the species considered by Guzmán & al. (1988) in this section. *P. moseri* is the species with the smallest spores in the section and the only tropical one (the others are from the subtropical highlands or from coniferous forests), which confirms the observations by Guzmán (1979) that the tropical species of *Psilocybe* have small spores in comparison with the alpine species. For instance, *P. uxpanapensis* Guzmán from the tropics, has spores that are (5-)5.5-6.5(-7.5) μm long as compared with *P. aztecorum* from alpine regions with 12-14 μm long spores.

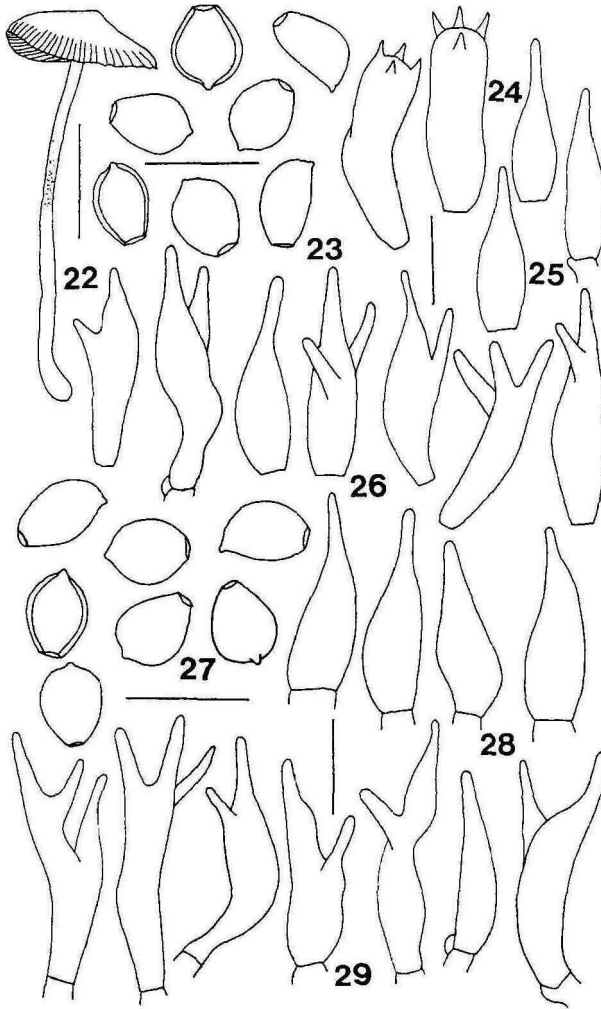
***Psilocybe subtropicalis* Guzmán, sp. nov.- Figs. 22-37.**

Pileus 20-26 mm latus, subconvexus vel subcampanulatus vel subpapillatus, laevis vel striatus, suboleosus, hygrophanus, rufrobrunneus vel nigricans. Lamellae adnate vel annexae, brunneolae vel fuscoviolaceae, marginis albae. Stipes 40-80 x 1-3 mm, albidus vel concolor pileo, subcaeruleus, subbulbosa basi. Sporae (5.5-)6.5-7(-8) x 5-5.5(-6) μm , frontaliter subrhomboidae, lateraliter subellipsoideae. Pleurocystidia (12-)13-21(-22.5) x (4-)5-6(-7) μm , hyalina. Cheilocystidia (16-)20-28(-32)(-42) x 5-6.5(-7) μm , hyalina. Epicutis pilei subgelatinosa. Hyphae fibulatae.

Ad terram, in regione subtropicali. Mexico, prope Veracruz, Xalapa-Coatepec, Parque Ecológico Clavijero, Montoya 910, holotypus XAL.

Pileus 20-26 mm in diam, subconvex to subcampanulate, subpapillate, sublubricous to dry, glabrous, even to striate toward the margin, reddish brown to brown, hygrophanous, fading to straw colour, staining dark blue to blackish when moist, almost black when dry mainly toward the margin.- Lamellae adnate or adnexed, pale brown to cinnamon brown or blackish violet, with whitish edges.- Stipe 40-80 x 1-3 mm, cylindrical, whitish to concolourous with the pileus, hollow, caeruleous, covered with floccose appressed white fibrils, with a subbulbous hollow base, up to 10 mm in diam in dry, without pseudorrhiza.- Veil absent in the adult.- Context whitish, fleshy in the pileus, subfleshy in the stipe, staining blue when cut.- Odor and taste slightly farinaceous.- Spores (5.5-)6.5-7(-8) x 5-5.5(-6) x 4-5.5 μm , subrhomboid in face view, subellipsoid in side view, with a thick wall (up to 1.5 μm thick), brownish yellow, with a broad germ pore at one end and an acute short appendage at the distal end.- Basidia 17.5-26.5 x 5.5-8 μm , 4-spored, clavate or subcylindrical, hyaline.- Pleurocystidia (12-)13-21(-22.5) x (4-)5-6(-7) μm , ventricose subacuminata or ventricose rostrate, hyaline, more or less common.- Cheilocystidia (16-)20-28(-32)(-42) x 5-6.5(-7) μm , ventricose or subcylindrical, irregularly branching mainly at the top, hyaline, abundant.- Subhymenium formed by subglobose elements, 3-4.8 μm diam, hyaline or yellowish.- Gill trama regular, formed by hyaline thin-walled hyphae, 3.2-24 μm wide.- Epicutis subgelatinized, formed by

hydine repent hyphae 2.4-4 μm wide.- Hypodermium with subglobose elements mixed with hyphae 3-12 μm in diam, hyaline or incrustated with brown yellowish pigment.-Clamp connections present.



Figs. 22-29.- *Psilocybe subtropical!**.- 22. Basidioma.- 23. Spores.- 24. Basidia.- 25. Pleurocystidia.- 26. Cheilocystidia.- 27. Spores.- 28. Pleurocystidia.- 29. Cheilocystidia (22-26 from the type; 27-29 from Sampieri 987).- Scale bar = 10 μm , except in 22 = 20 mm.

Habitat.- In small groups on soil, in open places of subtropical (mesophytic) forests. Known from Guatemala and Mexico.

Material examined.-GUATEMALA: approx. 25km south of Guatemala City, Santa Elena Barillas, Jun. 28, 1990, Sommerkamp 371 (Herb. Univ. San Carlos Guatemala &

XAL).- MEXICO: State of Veracruz, old road Xalapa to Coatepec, km 2.5, Parque Ecológico F.J. Clavijero, Oct. 6, 1986, Montoya 910 (Holotype, XAL). Huatusco to Elotepec road, Rancho San Rafael, Aug. 26, 1984, Sampieri 987 (XAL). Totutla to Xalapa road, near Axocoapan, Jun. 29, 1984, Chacón 2259; Sept. 26, 1985, Chacón 3150 (both in XAL).

The subbulbous, hollow base of the stipe, the mycenoid habit, the branched cheilocystidia and narrow pleurocystidia are the most typical features of this caerulescent species. *Psilocybe herrerae* Guzmán is a close taxon, but differs in the more branched cheilocystidia and thicker pleurocystidia (6-9 μm), and in the presence of pseudorhiza (Guzmán, 1983). Due to the form and size of the spores, this species belongs to Sect. *Cordispora*. *P. subtropicalis* is widely distributed in subtropical forests. *Psilocybe mexicana* grows also in the same Guatemaltecan locality.

***Psilocybe natarajanii* Guzmán, sp. nov.**

= *P. aztecorum* var. *bonetii* (Guzmán) Guzmán sensu Natarajan & Raman, *Bibl. Mycol.* 89: 108. 1983.

A *Psilocybe aztecorum* var. *bonetii* (Guzmán) Guzmán differt pleurocystidiis 21-28 x 7-10 μm , mucronatis.

India, prope Tiger Shola, Kodaikanal, Tamil Nadu, Natarajan & Raman, holotypus Herbarium BUBL 2623.

This species differs from *Psilocybe aztecorum* var. *bonetii* known only from Mexico, in the size and form of the pleurocystidia. *Psilocybe natarajanii* has mucronate pleurocystidia 21-28 x 7-10 μm , instead of the 20-45 x 5-8 μm , lageniform pleurocystidia with a long neck found in the Mexican fungus. *P. natarajanii* is known only from the type locality. This species is close to *P. pseudoaztecorum* (Natarajan & Raman, 1985) (= *P. aztecorum* var. *aztecorum* sensu Natarajan & Raman, 1983), but differs in the smaller spores, 12.5-17 μm long in *P. pseudoaztecorum* vs. 10-12.5(-14) μm in *P. natarajanii*. The above description is compiled from Natarajan & Raman (1983), because no herbarium material was studied.

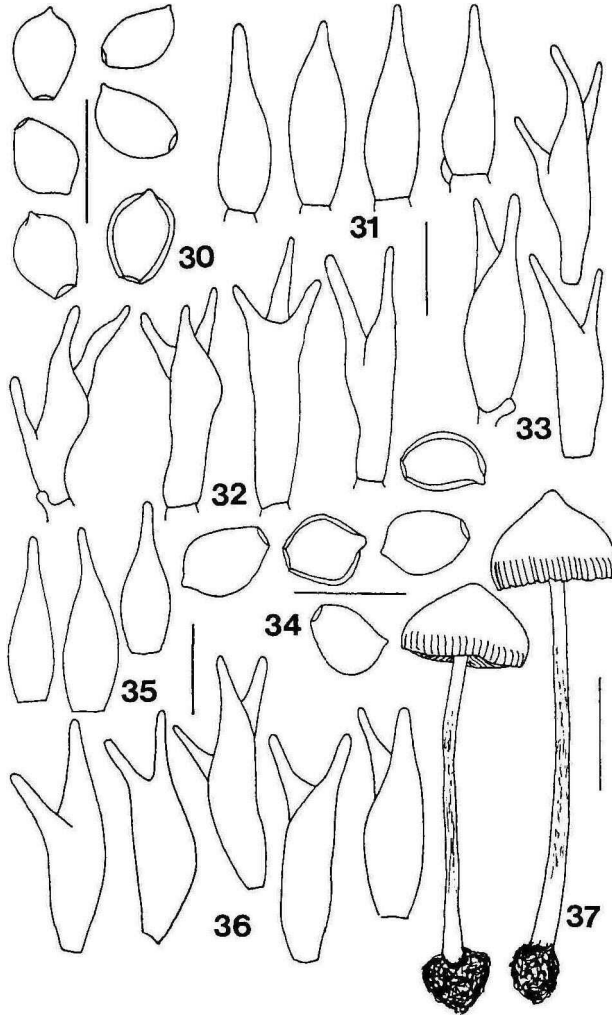
New combinations

***Psilocybe aquamarina* (Pegler) Guzmán, comb. nov.- Figs. 38-39.**

» *Stropharia aquamarina* Pegler, *Kew Bull. Add. Ser.* 6: 462. 1977.

The study of the holotype [Pegler 370 (K), from Africa: Kenya, Central Province, South Nyeri Distr., S side of Mt. Kenya, Castle Forest Station, near Thiba River, on soil] shows a fungus with spores (9-)9.5-11(-12) x 6.5-7(-7.5) x (5-)5.5-6 μm , subrhomboid in face view and subellipsoid in side view, without pleurocystidia, cheilocystidia (20-)22.5-34(-36) x 7-11(-12) μm , fu-

soid ventricose or vesiculose submucronate and gelatinized pileus with hyaline hyphae 1.5-2.5(-3) μm wide. The basidiomata (two) are of the same colour as in *P. cubensis*, with pileus convex subumbonate and stipe with an annulus persistent. Blue tones are seen in the annulus and in some parts of the stipe. Pegler (1977) related this species to *P. aerugineomaculans* Höhnelt, which differs in the size of the cheilocystidia, as well as in habitat. The absence of pleurocystidia places this fungus in the genus *Psilocybe*, and its annulus and possibly a blue reaction relate it to Sect. *Stuntzii* Guzmán.



Figs. 30-37.- *Psilocybe subtropicalis*- 30. Spores.- 31. Pleurocystidia.- 32 & 33. Cheilocystidia.- 34. Spores.- 35. Pleurocystidia.- 36. Cheilocystidia.- 37. Basidiomata (30-32 from Chacón 3150; 33 from Chacón 2259; 34-37 from Sommerkamp 371).- Scale bar = 10 μm , except in 37 - 20 mm.

Psilocybe ramulosa (Guzmán & Bononi) Guzmán, comb. et stat. nov.

- *P. zapotecorum* var. *ramulosum* Guzmán & Bononi, Mycotaxon 19: 346. 1984.

This species is close to *P. zapotecorum* but the size of the spores, 6-6.5(-7.5) x 3.5-4 µm in *P. ramulosa* vs. 6.5-7(-9) x 4-4.5(-5.5) µm in *P. zapotecorum*, the pleurocystidia variable to lageniform vs. never lageniform, and the cheilocystidia frequently profusely branched vs. never branched separate both fungi well. *P. ramulosa* is known only from the State of Sao Paulo, Brazil (Guzmán & al., 1984).

Psilocybe paulensis (Guzmán & Bononi) Guzmán, comb. et stat. nov.

- *P. banderillensis* var. *paulensis* Guzmán & Bononi, Mycotaxon 19: 347. 1984.

This fungus differs from *P. banderillensis* by the more ventricose or subfusiform to obscurely sublageniform pleurocystidia. *P. paulensis* is known only from the State of Sao Paulo, Brazil (Guzmán & al., 1984).

Psilocybe septentrionalis (Guzmán) Guzmán, comb. et stat. nov.

- *P. subaeruginascens* Hohnel var. *septentrionalis* Guzmán, Beih. Nova Hedwigia 74: 219. 1983.

After revision of the notes of the type of this fungus and those of *P. subaeruginascens*, I now consider it necessary to separate both varieties in two different species, according to the size of spores, pleurocystidia and cheilocystidia, and to their distribution. While *P. subaeruginascens* is a tropical and subtropical species, *P. septentrionalis* is a temperate species, known only from northern Japan.

Naematoloma gigaspora (Natarajan & Raman) Guzmán, comb. nov.

- *Psilocybe gigaspora* Natarajan & Raman, South Indian Agaricales, Bibl. Mycol. 89: 100. 1983.

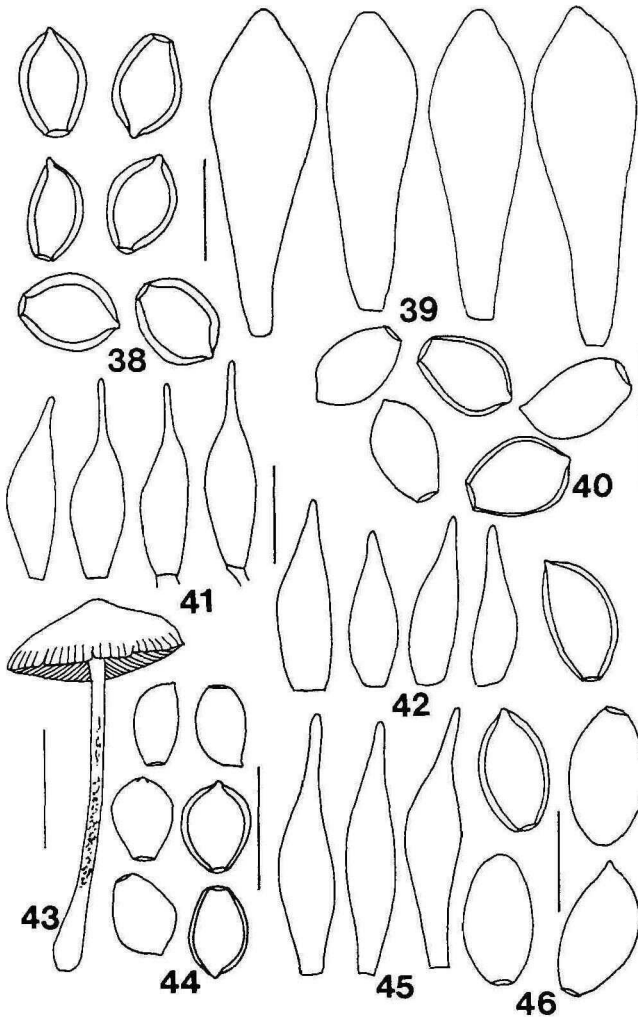
This new combination is based on the presence of chrysocystidia in this fungus ("with hyaline amorphous body in the centre": Natarajan & Raman, 1983). The genus *Psilocybe sensu* Guzmán (1983) has no chrysocystidia. Natarajan & Raman (1983) figures show well defined chrysocystidia on the pleurocystidia.

Naematoloma guzmanii (Natarajan & Raman) Guzmán, comb. nov.

- *Psilocybe guzmanii* Natarajan & Raman, South Indian Agaricales, Bibl. Mycol. 89: 102. 1983.

Same observations as for the species above. Both taxa belong to Sect.

Psilocyboides of *Naematoloma*, according to Guzmán (1980).



Figs. 38-46.- *Psilocybe aquamarina*, *P. mammillata*, *P. caerulea* var. *ombrophila* and *P. laetissima*.-38-39. *P. aquamarina*-38. Spores.-39. Cheilocystidia (both from the type).-40-42. *P. mammillata*.- 40. Spores.- 41. Cheilocystidia.- 42. Pleurocystidia (all from Contreras 2).- 43-45. *P. caerulea* var. *ombrophila*- 43. Basidioma.- 44. Spores.- 45. Cheilocystidia (all from Anell 165).- 46. *P. laetissima*, spores (from the type of *P. calongei*).- Scale bar = 10 μ m, except in 43 = 20 mm.

New records of *Psilocybe*

Psilocybe barrerae from Mexico.

This species is known only from Mexico from the States of Guerrero, Hidalgo, and Mexico (Cifuentes & Guzmán, 1981; Cifuentes & al., 1993; Guzmán & al., 1988). It is recorded now from the State of Veracruz: Guzmán 24452 (XAL), Region of Piletas, Xalapa road to Perote, July 5, 1984, in a subtropical (mesophytic) forest.

Psilocybe caerulescens var. *ombrophila* from Colombia and from a new locality in Mexico.-Figs. 43-45.

Psilocybe caerulescens var. *ombrophila* (Heim) Guzmán, a hallucinogenic fungus, was so far known only from Mexico from several localities in the State of Oaxaca and one locality in the State of Veracruz (Guzmán, 1983).

The main features that separate this variety from the type are the basidiomes less robust as in var. *caerulescens* (the studied material has pilei about 8-35 mm in diam and slender stipes up to 5 mm wide), and grow in forest or in open places under shrubs.

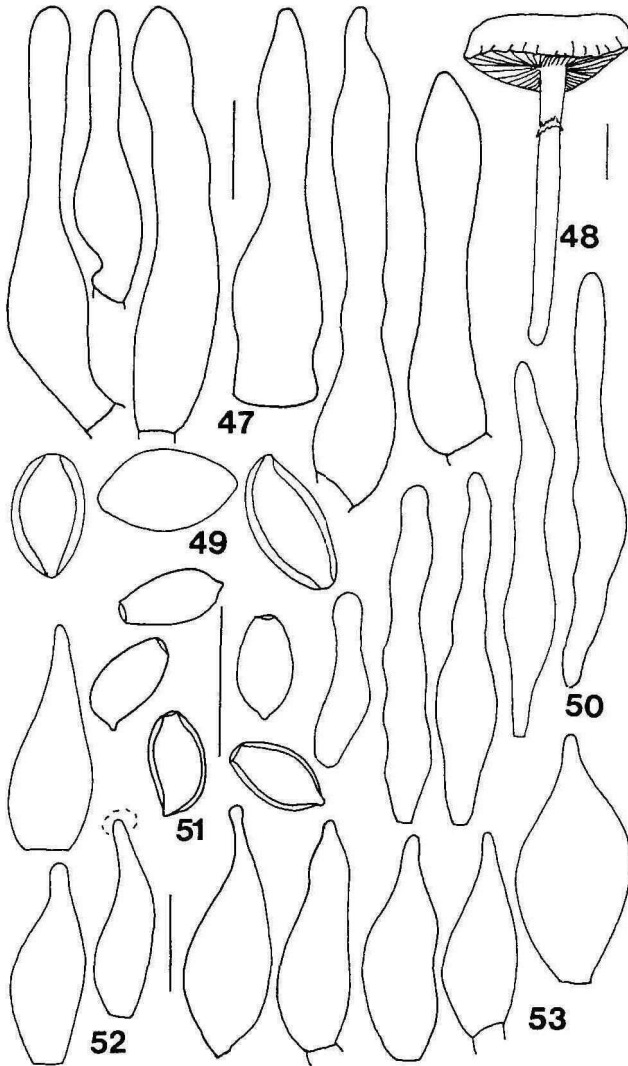
Additional collections.-MEXICO: State of Veracruz, Anell 165 (XAL), Jun. 25, 1984, Parque Ecológico F.J. Clavijero, south of Xalapa, in a mesophytic forest.- COLOMBIA: Muneton 7, Department of Antioquia, Municipio de Force, near Medellín road to Amalfi, zone of Puente Gabino, in a meadow under shrubs, March 28, 1993; Tobón & Pineda 319, Department of Antioquia, Municipio El Retiro, 2 km SE of El Retiro, vereda El Chuzcal, in a forest, both in a subtropical region, Oct. 17, 1982 (both collections at HUA and XAL).

Psilocybe hoogshagenii var. *hoogshagenii* from Colombia.

This fungus was described from the State of Oaxaca at Mexico (Heim & Wasson, 1958), and subsequently reported from several other localities in Mexico and from Argentina (Guzmán, 1983). The record from Argentina is based on a collection (at BAFC) identified by Singer as *P. lapotecorum*. *P. hoogshagenii* var. *hoogshagenii* is now reported from Colombia: Tobón & Pineda 316 (HUA; XAL), Department of Antioquia, Municipio El Retiro, 2 km SE of El Retiro, vereda El Chuzcal, Oct. 17, 1982, gregarious on muddy clay soil, in a subtropical forest. This material agrees well with the description by Guzmán (1983). The main features of this caerulescent species, observed in the Colombian material, are the acute papillate pileus, the thick-walled rhomboid or subrhomboid spores in face view, (5.5-)6.5-8(-9) x 5-5.5 x 4-5 μ m and the presence of abundant pleurocystidia, 15-24 x 7-9 μ m, ventricose or clavate, some mucronate, as well as lageniform cheilocystidia, 18-25 x 5-6 μ m. *P. hoogshagenii* var. *convexa* Guzmán (= *P. semperviva* Heim & Cailleux) is known only from Mexico and differs in the absence of the acute papilla on the pileus.

Psilocybe inquilina from Mexico.

Psilocybe inquilina (Fr. : Fr.) Bres. was known only from Europe, the U.S. and Argentina (Guzmán, 1983). It is reported here for first time from Mexico: Fanti 549 (IBUG), State of Jalisco, 15 km SW of San Cristobal de la Barranca, El Escalon, in a subtropical vegetation. The studied material has spores 8.5-9(-10) x 6-7 μ m, subrhomboid in face view or subellipsoid in side view, more or less thick-walled (up to 0.5 μ m), without pleurocystidia, and with cheilocystidia (19-)20-26 x 5-7 μ m, lageniform or sublageniform.



Figs. 47-53.- *Psilocybe laetissima*, *P. luteonitens* and *P. sanctorum*.- 47. *P. laetissima*, cheilocystidia (from the type of *P. calongei*).- 48-50. *P. luteonitens*- 48. Basidioma.- 49. Spores.- 50. Cheilocystidia (all from Mattei F-851).- 51-53. *P. sanctorum*- 51.- Spores.- 52. Pleurocystidia.- 53. Cheilocystidia (all from Chacón 2529).- Scale bar = 10 μ m, except in 48 = 20 mm.

Psilocybe luteonitens from Mexico.- Figs. 48-50.

Psilocybe luteonitens (Vahl : Fr.) Parker-Rodes was known only from Europe and the U.S. (Guzmán, 1983). Presented here are the first two records of this species from Mexico, both in the State of Mexico: Mattei F-850 (XAL), 13 km SE of Valle de Bravo, road to Temascaltepec,

Valle de la Cuadrilla, July 1984, and Mattel F-851 (XAL), road Toluca to Los Saucos, 5 km from junction to Valle de Bravo, Comal de Piedra, Sept. 25, 1985. Both collections were gathered in meadows associated with *Pinus* forest, at 2000-2850 m elevation. The studied material agrees with Guzmán (1983), except that the specimen Mattel F-851 has pilei up to 60 mm wide, while the normal size in the species is 10-25(—40) mm diam.

Psilocybe mammillata from Mexico.- Figs. 40-42.

Psilocybe mammillata (Murrill) Smith was known from Bolivia, Jamaica (type locality), the U.S. (Florida) and Mexico (State of Oaxaca) (Guzmán, 1983). It is reported now from the State of Veracruz: Huayacocotla region, La Selva, subtropical (mesophytic) forest at 1800 m of elevation, Jul. 24, 1982, Contreras 3 (XAL). The material studied has spores 6.4-7(-8) x 5-5.5 x 4-5.5 μm ; pleurocystidia are very rare, 12-20(-21.5) x 4-5.6 μm , hyaline, and cheilocystidia are 17-22.5 x 5-5.5 μm .

Psilocybe mexicana from Guatemala.

This fungus was described from Mexico in 1956 and then found in Guatemala by Lowy in 1977, in Santa Elena Barillas, about 25 km south of Guatemala City (Guzmán, 1983), a place explored by the author in 1985 where he found scarce collections of *P. mexicana*. Presented here is a new record of *P. mexicana* from Guatemala, from the Region of Alta Verapaz, Finca Guax: Sommerkamp 372, Jun. 29, 1990 (Herb. Univ. San Carlos de Guatemala; XAL), in meadows as for the other collections.

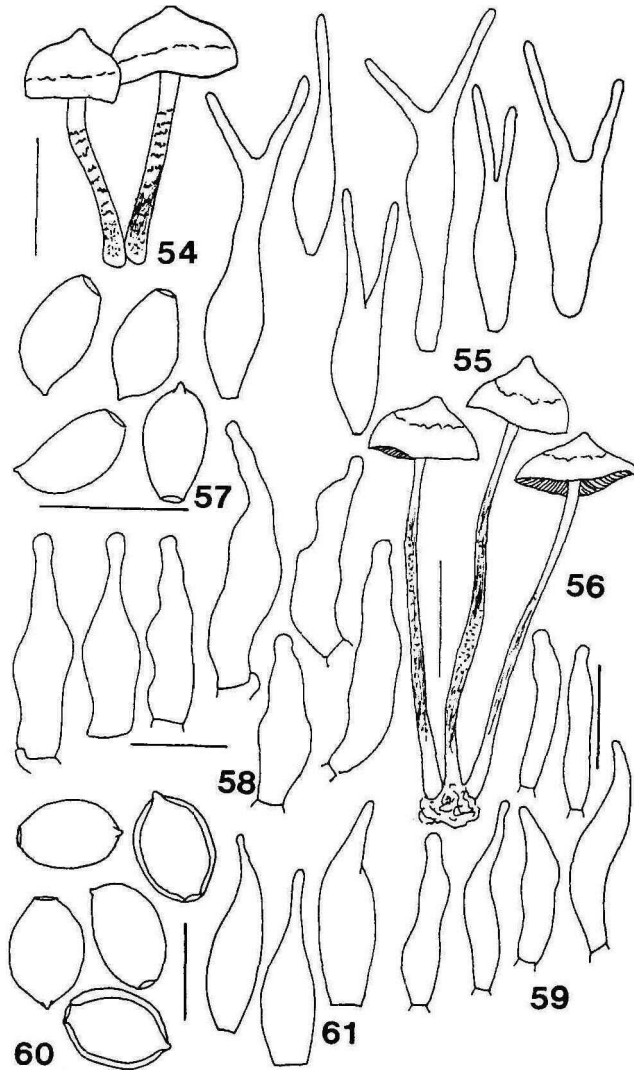
Psilocybe montana from Japan.

This is a widespread fungus in temperate zones, always on soil covered by mosses and reported from many parts of the world, even from Alaska (Miller & al., 1982). It is apparently rare in Japan. Guzmán (1983) and Imazeki *Si* al. (1988) did not report *P. montana* from Japan. A collection, Matsuda 82-1 (Herb. Matsuda; XAL), Niigata City, among mosses in a pine forest in a sand dune region, was kindly sent to me by Matsuda. The material agrees well with the current concept of the species.

Psilocybe muscorum from Venezuela.- Figs. 67-68.

This species was so far known only from Europe (Guzmán, 1983) and was only recently reported from India (Natarajan & Raman, 1983). It is characterized by a viscid pileus, thin-walled subellipsoid or slightly rhomboid spores in face view, by the absence of pleurocystidia, and by the sublageniform cheilocystidia with a long neck. The fungus grows on soil among mosses and lichens, more rarely in grasslands.

The first record of this species from South America [Venezuela, Mérida State, Parque Sierra Nevada, Teleférico de Mágina, La Aguada Station, May 23, 1993, Marcano & Guzmán s.n. (Guzmán 30819) (Herb. Univ. de Los Andes, Fac. Farmacia 8007; XAL), growing among *Polytrichum* in an alpine zone, at 3600 m elevation] has spores (8-)9-9.5(-10.5) x 5-5.5 x 4-5 μm which are thin-walled, the pleurocystidia are absent, the cheilocystidia are 20-48 x 5-9 μm , lageniform with a long neck, with a well developed ixocutis; the subhymenium and gill trama are strongly pigmented with a yellow pigment irregularly incrusting on the walls, even some incrusting hyphae ascending to the hymenium resembling collapsed chrysocystidia, as observed in *P. montana* and *P. coprophila* (Guzmán, 1983).



Figs. 54-61.- *Psilocybe sanctorum*, *P. cyanofibrillosa*, *P. angustipleurocystidiata* and *P. panaeoliformis*.- 54. *P. sanctorum*, basidioma (Chacón 2529).- 55. *P. cyanofibrillosa*, cheilocystidia.- 56-59. *P. angustipleurocystidiata*.- 56. Basidiomata.- 57. Spores.- 58. Cheilocystidia.- 59. Pleurocystidia (56-58 from Jacobs 179; 59 from García, Oct. 12, 1983).- 60-61. *P. panaeoliformis* - 60. Spores.- 61. Pleurocystidia (both from Tapia 925).- Scale bar = 10 μ m, except in 54 & 56 = 20 mm.

Psilocybe panaeoliformis from Mexico.- Figs. 60-63.

This fimicolous or subfimicolous species was described by Murrill from the Mississippi region, U.S., and then reported from Texas and Alabama, U.S. and from Russia (Guzmán,

1983). The first record of *P. panaeoliformis* from Mexico [State of Veracruz, 8 km NW of Xalapa, road to San Andres Tlalnehuayocan, Dec. 2, 1991, Tapia 925 (XAL), on rich soil, in a subtropical meadow] agrees well with Guzmán's description, except that it presents scattered pleurocystidia, which are $17.5\text{--}22.5 \times 5\text{--}6.5 \mu\text{m}$, hyaline, ventricose, with a short simple neck. The cheilocystidia are $16\text{--}26.5\text{--}(28) \times 5\text{--}7 \mu\text{m}$, hyaline and ventricose with a short neck, simple or branched. The spores are $(7\text{--})9.5\text{--}12\text{--}(13) \times 6.5\text{--}8 \mu\text{m}$ with a thick-wall, subhexagonal or subovate in face view, subellipsoid in side view. Smith (1948) and Guzmán (1983) reported "pleurocystidia none seen", which means they are probably not common, as in all members of the Sect. *Coprophila*, in which these structures are not conspicuous or important from the taxonomic point of view.

Psilocybe peruviana from Colombia.- Figs. 69-71.

Psilocybe peruviana Singer was known only from the type locality in Peru, growing in a moss carpet (Guzmán, 1983). The first record of this fungus from Colombia [Tobón & al. 417 (HUA; XAL), Department of Antioquia, Municipio de Medellín, Estación Experimental Piedras Blancas, vereda Mazo, Dec. 21, 1982, on mosses in a *Quercus* forest] agrees with the type, except that the pleurocystidia are narrower, $14.5\text{--}26.4 \times (6.5\text{--})7\text{--}9.5 \mu\text{m}$ vs. $16\text{--}32 \times 10\text{--}13.5 \mu\text{m}$ in Singer's species. The spores are $6.5\text{--}8\text{--}(9) \times 5\text{--}5.5 \times 4.5\text{--}5 \mu\text{m}$, subellipsoid or obscurely subrhomboid in face view, wall up to $1 \mu\text{m}$ thick. The cheilocystidia are sublageniform, $24\text{--}38 \times 5\text{--}8 \mu\text{m}$. The Colombian material apparently belongs to a new taxon, but for the moment it is convenient to consider it conspecific with *P. peruviana*, because the material in the studied specimen is rather scarce.

Psilocybe sanctorum in Mexico.- Figs. 51-54.

Psilocybe sanctorum was known only from the type locality in Mexico, in the State of Mexico, in grassland on the border of a *Pinus-Quercus-Populus* forest (Guzmán, 1982). It is now recorded for first time from the State of Veracruz [Chacón 2529 (XAL), 5 km W from Coatepec, Aug. 22, 1984, in a subtropical (mesophytic) forest]. This material differs from the type by the pileus which is not so papillate. This demonstrates the variation of the basidiomata in this species, a feature typical of several other species of Sect. *Zapotecorum*.

Psilocybe semilanceata in Spain.- Figs. 64-66.

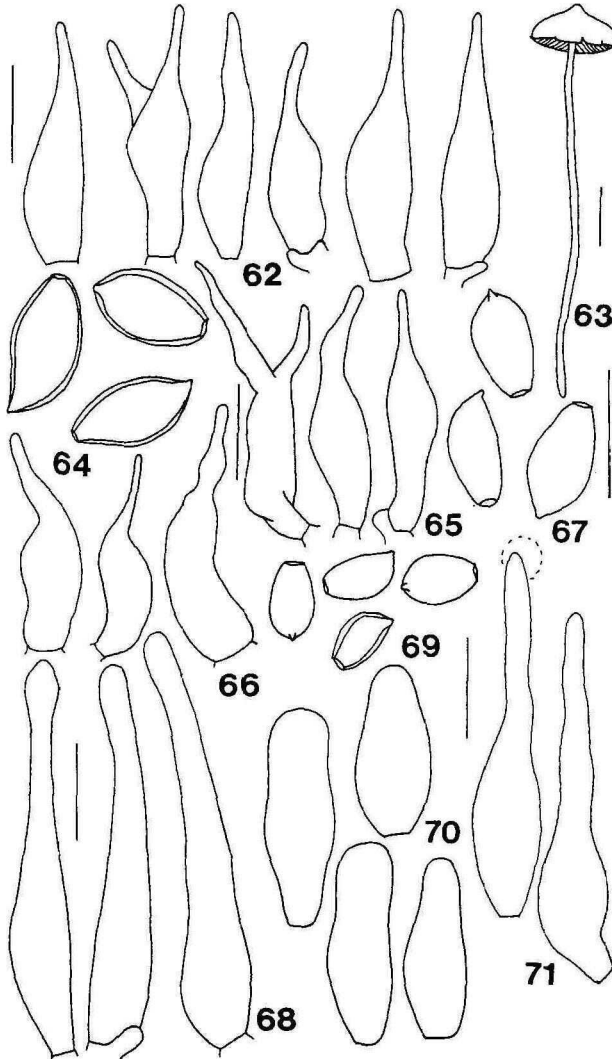
This psychoactive fungus is rare in Spain (Moreno & al., 1986). Recently Samorini (1994) reported it from the Department of Cataluna (ME of Spain, roadway 230 to Viella, E of Pont de Suert, Station Boi-Taull, Oct. 15, 1993, Samorini A and B (both with several specimens) (Herb. Samorini at Bologna, Italy, and XAL). Samorini's collections are caerulescents and have spores which are $(11\text{--})12\text{--}15 \times 7\text{--}9 \mu\text{m}$, ellipsoid or subellipsoid, both in face and side view, thick-walled; the cheilocystidia are $(12\text{--})20\text{--}32 \times 5\text{--}7\text{--}(8) \mu\text{m}$, lageniform with a long neck, sometimes two, and the pleurocystidia scarce, $16\text{--}28 \times (4\text{--})5.5\text{--}8 \mu\text{m}$, lageniform with a long and flexuous neck.

Nomenclatural remarks on some species

Psilocybe cyanofibrillosa.- Fig. 55.

Psilocybe cyanofibrillosa Guzmán & Stamets was described from the State of Washington

(U.S.) (Stamets & al., 1980). One of the main features not considered at that time (Guzmán, 1983), are the cheilocystidia, frequently with two irregular long necks, that separate this fungus from its close relative *P. subflmetaria* Guzmán & Smith, which has cheilocystidia with a long neck. Another difference separating both species is the diameter of the pileus, 14–35 mm in the former and 8–12(–20) mm in the latter, as observed in both types (Stamets 79–8 and Guzmán 16677, respectively, both at ENCB).



Figs. 62-71.- *Psilocybe panaeoliformis*, *P. semilanceata*, *P. muscorum* and *P. peruviana*.- 62-63. *P. panaeoliformis*.- 62. Cheilocystidia.- 63. Basidioma (from Tapia 925).- 64-66. *P. semilanceata*, 64.- spores.- 65. Cheilocystidia.- 66. Pleurocystidia (all from Samorini B).- 67-68. *P. muscorum*.- 67. Spores.- 68. Cheilocystidia (both from Guzmán 30819).- 69-71. *P. peruviana*- 69. Spores.- 70. Pleurocystidia.- 71. Cheilocystidia (all from Tobón & al. 417).- Scale bar = 10 μ m, except in 63 = 10 mm.

Psilocybe jacobsii

Psilocybe jacobsii Guzmán was described in the Sect. Cordispora from Mexico (Guzmán, 1983), based on its well developed annulus. After examination of the type (at ENCB) and the relating notes, it is considered that it is a good representative of the Sect. Stuntzii. The thick-walled subrhomboid spores and the annulus are common features in that section.

Psilocybe phyllogena, *P. modesta* and *P. rhombispora*

Guzmán (1983) stated that *Psilocybe modesta* (Peck) Smith and *P. rhombispora* (Britzelmayr) Sacc. are conspecific with *P. phyllogena* (Peck) Peck, but Courtecuisse (1985) observed that *Agaricus phyllogenus* Pers. (non *A. phyllogenus* Peck) is conspecific with *Mycena metata* (Fr.: Fr.) Kummer, making the name *Psilocybe phyllogena* illegitimate. Courtecuisse proposed to use *P. modesta* as the valid name for this fungus, following the priority principle.

Psilocybe strictipes

Psilocybe strictipes is the correct name of *P. callosa* (Fr.: Fr.) Quál. *sensu auct., sensu* Guzmán (1983), according to Redhead (1985) and Watling & Gregory (1987), because *Agaricus callosus* Fr. is synonymous of *Panaeoluspapilionaceus* (Bull.: Fr.) Quálet.

Psilocybe subfimetaria vs. *P. sierrae*

Psilocybe subfimentaria was described from the NW of North America and Chile (Guzmán & Smith, 1978). The record from Chile was based on the collection Singer M-7214 at SGO named "*Psilocybe maulensis* Sing, ined." Singer (1986) stated that collection to be the type of *P. sierrae* Sing., although in his original description Singer (1969) did not mention the number of the collection or the unpublished name. When Guzmán & Smith (1978) studied Singer's material, they considered it to be conspecific with the North American specimens named *P. subfimetaria*. A comparative study between the types of *P. subfimetaria* and *P. sierrae* shows that they are identical, thus making *P. subfimetaria* a synonym of *P. sierrae*. The distribution of this fungus is bipolar or circumboreal and it occurs on the coastal regions of the Pacific Northwest and in Chile.

Psilocybe bulbosa Peck and *P. tuxtlenensis* Guzmán

These two species are close and probably conspecific. Spores, pleurocystidia and cheilocystidia are very similar in both species. The only differences between them are the shape of the pileus and the habitat. *P. bulbosa* has a convex to plane pileus and grows on dead stems or herbs in New York State (U.S.), whereas *P. tuxtlenensis* has a conic to subumbonate pileus and grows on rotting wood in a tropical rain forest in the State of Veracruz (Mexico) (Guzmán, 1983). Both fungi are known only from the type materials and it is preferable to keep both species separate, until more material is available.

Psilocybe collybioides vs. *P. barrerae*

Comparison of the author's notes on the type of *P. collybioides* Singer & Smith from Argentina (at MICH) and on the type of *P. barrerae* Cifuentes & Guzmán from Mexico (at

ENCB), it was found that both species are very close. The material of *P. collybioides*, however, is very scarce (only two collections) and semisterile. Probably *P. barrerae* is conspecific with *P. collybioides*, but until more material is available, it is wiser to consider both fungi as separate taxa. *P. collybioides* is known only from Argentina (Singer & Smith, 1958) and *P. barrerae* only from Mexico (Cifuentes & Guzmán, 1981).

Psilocybe aerugineomaculans vs. *P. subaeruginascens*

These are two independent species, based on the author's notes on the types (at FH) of these two psychotropic fungi (Singer & Smith, 1958), although until now they were considered conspecific (Guzmán, 1983). *P. aerugineomaculans* has no pleurocystidia, the pileus is gelatinized and the fungus is lignicolous, while *P. subaeruginascens* presents pleurocystidia, non-gelatinized pileus and is fimicolous. Material from Japan considered by Guzmán (1983) as *P. subaeruginascens* in fact agrees well with that species. *P. aquamarina* (discussed above) is very close to *P. aerugineomaculans*; the length of the cheilocystidia, the habitat, as well as their distribution, are apparently the only features that separate both species.

Psilocybe aztecorum var. *bonetii*

When Guzmán (1978) studied the variation of several populations of *P. aztecorum* Heim, he considered *P. bonetii* Guzmán to be a variety of Heim's species, because all features are the same but for the size of the spores, a little smaller in *P. bonetii*, and its habitat, pine forest between 2,500–3,300 m elevation for the latter vs. alpine regions at 3,300–4,000 m of elevation for the former. On the other hand, if *P. subaztecorum*, *P. natarajanii*, *P. cubensis* and *P. subcubensis* are separated only because of the spore size, it may be necessary to consider *P. bonetii* an independent species. As only few collections of *P. bonetii* are available, it is better to give this taxon the variety rank until more collections are seen.

P. aztecorum var. *bonetii sensu* Natarajan & Raman corresponds to *P. natarajanii* (see above).

A revision of the classification in Sections of the genus *Psilocybe*

Singer (1986) did not accept the sections proposed by Guzmán (1983) in the genus *Psilocybe*. He continued to use the complex Sect. *Caerulescentes* Sing., although Smith (1977) suggested that "the section *Caerulescentes* will eventually be abandoned and its species distributed on other features such as degree of veil development, presence or absence of an ixocutis on the pileus, etc., to arrive at a more natural classification."

Guzmán divided Sect. *Caerulescentes* in 9 sections, based on the shape and size of the spores, on the cystidia and on the degree of veil development. The classification in 18 sections of the genus *Psilocybe* presented by Guzmán (1983) was based on a careful analysis of the main taxonomic features (shape and size of the spores, thickness of the spore wall, presence of veil or annulus, colour of both pleurocystidia and cheilocystidia, presence or absence of pleurocystidia, and bluing reaction of the basidiomata) in an attempt to find a natural arrangement.

Section *Cyanescens*

Guzmán (1983) included in this section fungi with subellipsoid thick-walled spores and with pleurocystidia, and separated them from those of Sect. *Semilanceata* Guzmán which have no pleurocystidia and thick-walled spores. After revision of the status of *P. maire* Singer and of *P. serbica* Moser & Horak and *P. bohémica* Sebek, which differ in the presence or absence of often scarce pleurocystidia, Sect. *Cyanescens* Guzmán is now considered a synonym of Sect. *Semilanceata*.

Sections *Psilocybe* and *Pratensis*

Guzmán (1983) proposed Sect. *Psilocybe* to accommodate species with rhomboid or subrhomboid small spores (no more than 10 µm long), thick or thin-walled, and Sect. *Pratensis* for taxa with subellipsoid or slightly rhomboid and thin-walled spores. In both Sections species lack pleurocystidia. To separate the two sections more clearly, it is preferable to assign to Sect. *Psilocybe* only species with thick-walled spores, and to Sect. *Pratensis* those with thin-walled spores. Thus *P. inquilina* (Fr.: Fr.) Bresadola, *P. nothofagensis* Guzmán & Horak, *P. physaloides* (Bull.: Mer.) Quelet and *P. smithiana* Guzmán of the Sect. *Psilocybe* must be transferred to Sect. *Pratensis*. On the other hand, *P. omnium-sanctorum* Singer of the Sect. *Psilocybe* is placed now in Sect. *Atrobrunnea* Guzmán because of its ellipsoid thick-walled spores.

Section *Cubensis*

Redhead (1985) and Singer (1986) pointed out that *Psilocybe cubensis* is the type of Sect. *Caerulescentes* Sing. Therefore, *P. cubensis* cannot be the type of Sect. *Cubensis* Guzmán. Sect. *Caerulescentes* is not recognized, because it forms a complex of several sections of the genus; the only feature shared by all taxa of that section is the blueing reaction in the basidiomata. *P. subcubensis* Guzmán is considered the type of the Sect. *Cubensis*.

Updated key to the Sections

Only those sections to which species were added are presented. Therefore, the sections *Blattariopsis*, *Merdaria*, *Squamosa*, *Subaeruginosa* and *Cubensis* are not considered here.

- | | | |
|----|--|---|
| 1a | Cheilocystidia and pleurocystidia with an homogenous brown or chocolate brown content. Spores thick-walled (up to 1 µm)..... | 2 |
| 1b | Cheilocystidia and pleurocystidia (if present) hyaline. Spores thin- or thick-walled | 4 |

- 2a Spores up to 8 μm long, rhomboid or subrhomboid in face view. Tropical or subtropical species, staining blue.....Sect. *Brunneocystidiata*
- 2b Spores longer than 8 μm 3
- 3a Spores subellipsoid both in face and side view. Stipe without annulus. Australian and South American species. Staining blue or not.....
.....Sect. *Subaeruginosa*
- 3b Spores subhexagonal in face view. Stipe with annulus. South American species. Not staining blue.....Sect. *Blattariopsis*
- 4a Spores rhomboid, subrhomboid or subhexagonal in face view, thick-walled..... 5
- 4b Spores ellipsoid, subellipsoid or ovoid, in face and side view, thick or thin-walled..... 11
- 5a Spores rhomboid or subrhomboid in face view (obscurely ovoid), mostly up to 10 μm (rarely up to 12 or 14 μm) long..... 6
- 5b Spores subhexagonal in face view, mostly longer than 10 μm 9
- 6a. No bluing reaction. Temperate species, with or without annulus and without pleurocystidia. Pileus mostly 5-15 mm, rarely up to 20 or 30 mm diam.....Sect. *Psilocybe*
- 6b Staining blue or fading to blackish when old or dried. In temperate or subtropical regions.....?
- 7a With annulus. Temperate or subtropical species.....Sect. *Stuntzii*
- 7b Without annulus..... 8
- 8a Spores longer than 8 μm . Subtropical species, rare in the tropics.....
.....Sect. *Mexicana*
- 8b Spores not longer than 8 or 9 μm . Subtropical species, rare in the tropics, one species in alpine zones of South America.....
..... Sect. *Cordispora*
- 9a Without annulus. Not staining blue. On dung or rich soil.....
..... Sect. *Coprophila*
- 9b With annulus.....10
- 10a Staining blue. Tropical or subtropical species..... Sect. *Cubensis*
- 10b Not staining blue. Temperate or subtropical species Sect. *Merdaria*
- 11a Spores thin-walled..... 12
- 11b Spores thick-walled.....14
- 12a Pleurocystidia absent. Temperate, non-staining speciesSect. *Pratensis*
- 12b Pleurocystidia present..... 13

- 13a Staining species. Subtropical, rarely tropical distribution.....
 **Sect. Zapotecorum**
- 13b Non-staining species. Tropical or subtropical distribution.....
**Sect. Singeriana**
- 14a Non-staining temperate species.....15
- 14b Staining temperate species.....16
- 15a Annulus present. Spores longer than 11 μm . Pleurocystidia absent.....
 Sect. Squamosa
- 15b Annulus absent. Pleurocystidia absent or present..... Sect. Atrobrunnea
- 16a Strongly hygrophanous pileus, drying whitish. Spores asymmetric in
 side view. Pleurocystidia scarce or, rarely, common.....Sect. Aztecorum
- 16b Moderately hygrophanous pileus, non drying whitish. Spores not asym-
 metric in side view. Pleurocystidia absent or present.....
Sect. Semilanceata

Sect. Atrobrunnea Sing.

- 1a Spores longer than 10 μm2
- 1b Spores shorter than 10 μm7
- 2a Only in *Sphagnum* bogs. Known from eastern U.S. and central and
 northern Europe.....*P. atrobrunnea*
- 2b On other substrates..... 3
- 3a On sand or sandy soil. Spores (11-)12-16.5(-19) μm long. Known from
 the U.S. and Argentina..... *P. sabulosa*
- 3b On other substrates..... 4
- 4a On soil..... 5
- 4b On dung..... 6
- 5a Pileus glutinous, small (up to 7 mm in diam). Spores 10-14(-14.5) μm
 long. Species known only from the Netherlands..... *P. glutinosa*
- 5b Pileus not glutinous, larger (up to 35 mm in diam). Spores (9.5-)10.5-13
 μm long. Species known only from Austria, Hungary, Germany and
 Spain.....*P. laetissima*(-*P. calongei*)
- 6a Cheilocystidia 4-8 μm wide. Spores (12-)13-14(-18.5) x (5-) 6.5-8(-
 9) μm . Known only from NW U.S..... *P. angustispora*
- 6b Cheilocystidia 9-10(-12) μm wide. Spores (13-)14-18(-19)(-22) x

- (6.5-)8-9(-10) µm. Widespread fungus in temperate and cold regions
.....*P. subcoprophila*
- 7a Pleurocystidia absent..... 8
- 7b Pleurocystidia present..... 9
- 8a On humus. Spores (7-)8-9(-10) µm, cheilocystidia 17.5-28.5 µm long.
Known only from NW of Mexico.....*P. borealis*
- 8b On rotten wood. Spores (6-)6.5-8(-8.5) µm, cheilocystidia 16–44 µm
long. Known only from Chile and Argentina.....*P. omnium-sanctorum*
- 9a Pleurocystidia large, 34-60 µm long, thin or thick-walled. Known only
from Mexico..... *P. clavatum*
- 9b Pleurocystidia smaller, thin-walled.....10
- 10a Cheilocystidia 10-25 µm long. On rotting wood or debris. Known only
from Chile..... *P. chilensis*
- 10b Cheilocystidia 25-27 µm long. On mosses. Known only from Peru and
probably also from Colombia..... *P. peruviana*

Sect. Aztecorum Guzmán

- 1a Pleurocystidia common, mucronate..... 2
- 1b Pleurocystidia rare or absent; when present lageniform with a long
neck..... 4
- 2a Cheilocystidia lageniform with a long neck and subglobose base.
Spores (7-)9-11(-14) µm long. Known only from the NE of North
America.....*P. quebecensis*
- 2b Cheilocystidia sublageniform with a short neck and narrow base. Known
only from India..... 3
- 3a Spores 12.5-17 µm long.....*P. subaztecorum*
- 3b Spores 10-12.5(-14) µm long..... *P. natarajanii*
- 4a Pileus viscid, dark chestnut brown, brownish vinaceous red, brownish
orange or olive brown, fading to whitish. Known only from NW North
America.....*P. baeocystis*
- 4b Pileus lubricous, yellowish brown or brown-gray, fading to whitish.... 5
- 5a Spores (10.5) 12-14(-17) µm long. Known only from alpine zones of
Mexico.....*P. aztecorum* var. *aztecorum*
- 5b Spores (9-)10-13(-14) µm. Known only from pine forests of Mexico...
.....*P. aztecorum* var. *bonetii*

Sect. Brunneocystidiata Guzmán

Here only *Psilocybe paulensis* and *P. banderillensis* are presented. The other 9 species are keyed out in Guzmán (1983).

- 1a Pleurocystidia ventricose mucronate or sublageniform. Known only from Mexico.....*P. banderillensis*
 1b Pleurocystidia ventricose, subfusiform or obscurely sublageniform, not mucronate. Known only from São Paulo State (Brazil)..... *P. paulensis*

Sect. Cordispora Guzmán

- 1a Pleurocystidia absent..... 2
 1b Pleurocystidia present (common or scanty).....14
- 2a Cheilocystidia up to 28 or 35 µm long..... 3
 2b Cheilocystidia shorter..... 5
- 3a Stipe bulbous. On soil, known only from Colombia.....*P. guatapensis*
 3b Stipe not bulbous..... 4
- 4a Cheilocystidia 25-35 µm long, not branched. Pileus conic to subumbonate. On soil, known only from Mexico.....*P. cordispora*
 4b Cheilocystidia 16-28(-33) µm long, frequently branched. Pileus convex to subcampanulate. On muddy soil, known only from Jamaica.....
 *P. fuliginosa*
- 5a Habit collybioid..... 6
 5b Habit mycenoid..... 8
- 6a On rotting wood. Pileus 6-22 mm diam. Known only from Sri Lanka...
 *P. ochreízta*
 6b On soil. Pileus up to 40 or 70 mm diam..... 7
- 7a Basidiomata robust. Pileus 30-70(-100) mm diam. Stipe 8-10(-12) mm thick. In sun-exposed localities of the subtropical regions. Known from the SE of the U.S. to Venezuela, including Mexico, and in the Caribbean zone..... *P. caerulescens* var. *caerulescens*
 7b Basidiomata slender. Pileus (8-)15-40(-50) mm diam. Stipe 2-5(-8) mm thick. In shaded places in subtropical forests or under shrubs. Known from Mexico and Colombia..... *P. caerulescens* var. *ombrophila*
- 8a Stipe with a pseudorhiza..... 9
 8b Stipe without pseudorhiza.....11

- 9a Known only from the high alpine mountains ("paramos") of Colombia. Spores (6.5-)7-8(-9) μm long. Pileus convex to campanulate, not papillate.....*P. columbiaana*
- 9b Known from subtropical forests in Mexico. Pileus conic to subumbonate and papillate..... 10
- 10a Spores 5-6(-6.5) μm long.....*P. xalapensis*
- 10b Spores (6-)6.5-7.5(-8.5) μm long..... *P. wassoniorum*
- 11a Cheilocystidia hyaline to brownish toward the base.....12
- 11b Cheilocystidia always hyaline..... 13
- 12a Cheilocystidia polymorphous, fusoid ventricose-rostrate, clavate, stragulate or mucronate. Known only from Panama..... *P. dumontii*
- 12b Cheilocystidia uniform in shape (sublageniform). Known only from Brazil.....*P. furtadoana*
- 13a Cheilocystidia 4-5.5 μm wide. Known from the Caribbean zone, Florida (U.S.), Mexico and Bolivia..... *P. mammillata*
- 13b Cheilocystidia 6.5-13 μm wide. Known only from New Guinea.....
.....*P. papuana*
- 14a Pleurocystidia scanty..... 15
- 14b Pleurocystidia common.....19
- 15a Stipe with a long pseudorhiza.....16
- 15b Stipe without pseudorhiza.....17
- 16a Cheilocystidia 6-13 μm long. Restricted to the *Fagus* forests of Mexico *P. fagicola* var. *fagicola*
- 16b Cheilocystidia 9-15 μm long. Wide distribution in the subtropical forests of Mexico.....*P. fagicola* var. *mesocystidiata*
- 17a Terricolous in subtropical meadows. Pileus convex. Known only from Argentina.....*P. wrightii*
- 17b Lignicolous in subtropical forests. Pileus conic to campanulate and papillate..... 18
- 18a Cheilocystidia branched. Known from Mexico and Venezuela.....
.....*P. subyungensis*
- 18b Cheilocystidia unbranched. Known from Mexico to Argentina and Martinique..... *P. yungensis*
- 19a Stipe with a hollow bulbous base, more than 10 mm diam. Known from subtropical forests of Mexico and Guatemala..... *P. subtropicalis*
- 19b Stipe without a bulbous base.....20

- 20a Pleurocystidia ventricose, rostrate, fusoid, mucronate or sublageniform21
- 20b Pleurocystidia irregular in shape and/or branched.....27
- 21a Cheilocystidia of two types: ventricose, rostrate, (10.5-) 12-16 (-17.5) μm long, and ventricose, regular or irregular in form, (16-)17-22.5 μm long. On rotten wood in subtropical forests. Known only from Mexico (Chiapas).....*P. chiapanensis*
- 21b Shape of cheilocystidia uniform.....22
- 22a Cheilocystidia up to 14 μm long. Known only from *Araucaria* and *Podocarpus* forests of Brazil..... *P. brasiliensis*
- 22b Cheilocystidia longer.....23
- 23a Pleurocystidia up to 7 or 9 μm wide.....24
- 23b Pleurocystidia wider.....25
- 24a Pleurocystidia 16-24 x 6.5-9 μm , ventricose mucronate or lageniform. On rotten wood. Known only from a tropical *Quercus* forest of Mexico*P. schultesii*
- 24b Pleurocystidia (11-)14-17 x 5-7(-9) μm , ventricose or fusoid, not mucronate or lageniform. On soil. Known only from a tropical region of Colombia.....*P. heliconiae*
- 25a On rotten wood. Cheilocystidia up to 8 μm wide. Spores 5.5-6.5(-7) μm long. Known only from Sri Lanka..... *P. goniospora*
.....(=*P. lonchophord*)
- 25b On soil. Cheilocystidia up to 6.5 μm wide.....26
- 26a Pileus with an acute papilla. On muddy soil, in subtropical forests. Known from Mexico and Argentina.. *P. hoogshagenii* var. *hoogshagenii*
- 26b Pileus not acute papillate. On soil in meadows. Known only from subtropical Mexico..... *P. hoogshagenii* var. *convexa*
- 27a Stipe without pseudorhiza. Cheilocystidia unbranched. Known from the Caribbean region, Venezuela and Brazil.....*P. plutonia*
- 27b Stipe with a pseudorhiza. Cheilocystidia branched. Known only from subtropical forests of Mexico.....*P. herrerae*

Sect. *Mexicana* Guzmán

- 1a Mycenoid habit..... 2
- 1b Collybioid habit..... 9

- 2a With a pseudorhiza..... 3
 2b Without pseudorhiza..... 4
- 3a Spores 9-12(-14) μm long. Known only from subtropical Mexico.....
*P. galindoi*
(=*P. galindii*)
- 3b Spores 8-10(-11) μm long. Species known only from a subtropical region of Colombia.....*P. antioquiensis*
- 4a Caespitose. Known only from a subtropical meadow in Colombia.....
*P. subacutipilea*
- 4b Non-caespitose..... 5
- 5a Cheilocystidia 45-67 μm long. Spores 7-10 μm wide. Known only from Amazonia (Brazil).....*P. pericystis*
- 5b Cheilocystidia up to 35 μm long..... 6
- 6a Pleurocystidia 16-20 μm long, scattered. Cheilocystidia 18.5-28(-30) μm . Spores 10.5-13 μm long. Species known only from Thailand.....
*P. samuiensis*
- 6b Pleurocystidia absent or a few similar to Cheilocystidia. Spores smaller than 10.5-13 μm . Known only from Latin America..... 7
- 7a Cheilocystidia 11-22 x 3-5.5 μm . Known only from a tropical *Quercus* forest of SE Mexico..... *P. arandii*
- 7b Cheilocystidia larger than above..... 8
- 8a Cheilocystidia 15-28 μm , with a neck 8-10 μm long. Known only from Southern Brazil.....*P. acutipilea*
- 8b Cheilocystidia 13-28(-34) μm , with a short neck, up to 3 μm long. Common in subtropical meadows of Mexico and Guatemala.....
*P. mexicana*
- 9a Cheilocystidia 16-22 μm long. Pileus up to 24 mm diam. Known only from Florida (U.S.).....*P. tampanensis*
- 9b Cheilocystidia 22-23 μm long. Pileus more than 24 mm diam. Known only from southern Brazil.....*P. albofimbriata*
 (= *P. farinaceá*)

Sect. *Pratensis* Guzmán

- 1a Spores longer than 10 μm 2
 2b Spores smaller..... 3
- 2a Cheilocystidia sublageniform, non mucronate. Spores (9-)9.5-11(-12.5)

- 2b μm long. Known only from Europe*P. pratensis*
 Cheilocystidia fusoid, ampullaceous and mucronate. Spores (8-)10-11
 (-12) μm long. Known only from New Zealand*P. novae-zelandiae*
- 3a Spores 7-9 μm long..... 4
 3b Spores smaller..... 5
- 4a On grass stems, rotten twigs, sticks or rotten wood. Widespread in tem-
 perate regions*P. inquilina*
 4b On soil with mosses or lichens. Known from Europe, India and alpine
 regions of Venezuela.....*P. muscorum*
- 5a Cheilocystidia up to 9 μm wide..... 6
 5b Cheilocystidia slender, up to 7 μm wide..... 7
- 6a Pileus with a separable pellicle. On soil. Known from Europe and the
 U.S.....*P. subviscida*
 6b Pileus without a separable pellicle. On soil. Known only from Europe...
*P. apelliculosa*
- 7a Subhymenium with incrusted pigment. Spores (5-)5.5-6(-6.5) μm
 long. On rotten mossy wood. Known only from New Guinea.....
*P. nothofagensis*
 7b Subhymenium without incrusted pigment..... 8
- 8a Veil conspicuous, remaining as appendages on the margin of the pileus
 and as fibrils on the stipe. On rotten wood or twigs, grass stems, ma-
 nured soil or very rotten dung. Known from Europe and N of North
 America.....*P. physaloides*
 8b Pileus and stem without veil remnants.....9
- 9a Pileus without a gelatinous pellicle. On rotten wood. Known from
 Europe and the U.S.....*P. smithiana*
 9b Pileus with a gelatinous pellicle.....10
- 10a On soil in lawns. Known only from the U.S.....
 *P. castanella vai. castanella*
 10b On rotten wood in *Quercus* forests. Known only from Colombia.....
*P. castanella var. subhyperella*

Sect. *Psilocybe*

- 1a Stipe with annulus. On soil covered by mosses at high elevation
 "paramos". Known only from Venezuela.....*P. andina*
 1b Stipe without annulus.....2

- 2a With two types of cheilocystidia according to the age of the basidiome, when young 22-38(-40) μm long; in age becoming larger, 50-70 μm long. On decaying stems. Known only from Canada..... *P. acadensis*
- 2b With one type of cheilocystidia..... 3
- 3a Cap with conspicuous dentate, appendiculate veil at the margin 4
- 3b Cap without veil remnants..... 8
- 4a Cheilocystidia up to 45-50 μm long.....5
- 4b Cheilocystidia shorter.....6
- 5a Spores (6.5-)7-8(-8.5) μm long. Known from the alpine regions of central Europe.....*P. velifera*
- 5b Spores (5-)5.5-6.5(-7.5) μm long. Wide distribution in temperate regions..... *P. crobula*
(see also *P. alpestris*, 9a)
- 6a Cheilocystidia 21-35 x 7-13 μm . Known only from Centr Europe.....
.....*P.schoeneti*
- 6b Cheilocystidia narrower..... 7
- 7a Cheilocystidia 25-35 x 4.5-5 μm . On rotting ferns. Known only from Argentina.....*P. pteridophytorum*
- 7b Cheilocystidia 16-25(-35) x (3.5-)4-5(-7) μm . On dung, rich soil or rotten straw. Widespread.....*P. bullacea*
- 8a Cheilocystidia 7-12 μm wide..... 9
- 8b Cheilocystidia narrow, 5-7 μm wide10
- 9a Cheilocystidia 8.5-9 μm wide. On soil. Known only from pine zones in Austria..... *P. alpestris*
- 9b Cheilocystidia 7-12(-15) μm broad. On debris. Known from Europe and the U.S.....*P. xeroderma*
- 10a Cheilocystidia longer than 40-60 μm . Spores (5-)6-7(-8) μm long. On leaves, rotten wood or debris. Known only from the U.S.....
.....*P. rhomboidospora*
- 10b Cheilocystidia shorter than 40 μm 11
- 11a Spores wider than 6 μm12
- 11b Spores narrower..... 13
- 12a Cheilocystidia 9-15 x 4.5-5.5 μm . Spores (8-)9-10(-11) μm long. On soil without mosses. Known only from Chile.....*P. marthae*
- 12b Cheilocystidia longer than 15 μm . Spores (7-)8-9(-10) μm . On soil

- covered by mosses or lichens. Wide distribution in Europe and North America *P. semistriata*
- 13a Cheilocystidia 17-30 μm and spores 5-6 μm long..... 14
- 13b Cheilocystidia and spores larger, or if the cheilocystidia smaller, spores longer than 7 μm 15
- 14a Cheilocystidia 19-30 μm long. On grasses, twigs or debris. Known only from the U.S..... *P. latispora*
- 14b Cheilocystidia 17-18 μm long. On soil. Known only from Bolivia..... *P. februarina*
- 15a Spores 6-7 μm . Cheilocystidia 22-37 μm long. Pileus dry. On leaves, mosses or twigs. Known from Europe and the U.S..... *P. modestus*
(= *P. phyllogend*)
- 15b Spores 7—8.5 μm long..... 16
- 16a Pileus dry. On dead monocotyledonous plants or mosses. Known from Central Europe and South America..... *P. angulata*
- 16b Pileus viscid. On soil covered by mosses..... 17
- 17a Cheilocystidia subcylindric moniliform or narrow sublageniform with the apex 4-8 μm wide. Known only from Czechoslovakia..... *P. magica*
- 17b Cheilocystidia sublageniform or lageniform with a long neck, apex of 2-3.5 μm wide. Widespread temperate species..... *P. montana*

Sect. *Semilanceata* Guzmán

= Sect. *Cyanescens* Guzmán

- 1a Pleurocystidia common..... 2
- 1b Pleurocystidia absent or rare..... 6
- 2a Spores (9-)10-12(-13) μm long. Known only from SE of Australia.....
..... *P. eucalypta*
- 2b Spores larger**..... **3**
- 3a Pleurocystidia and cheilocystidia 10.5-13 μm wide. Known only from India..... *P. indica*
- 3b Pleurocystidia narrow, up to 11 μm wide..... 4
- 4a Pleurocystidia 8-11 μm wide. Known only from SE of Australia and Tasmania..... *P. australiana*
- 4b Pleurocystidia 5-9 μm wide..... 5
- 5a Pileus (10-)20-50(-75) mm diam. On humus or soil. Known from

- Europe and North America (not Mexico).....*P. cyanescens*
- 5b Pileus 10-20 mm in diam. On dung or rich soil. Known from Tasmania, SE of Australia and New Zeland..... *P. tasmanianana*
- 6a Stipe without annulus..... 7
- 6b Stipe with annulus or at least a fibrillose zone or subannulus is present
- On the Stipe..... 17
- 7a Habit mycenoid..... 8
- 7b Habit collybioid..... 11
- 8a Spores up to 13 μ m long 9
- 8b Spores longer than 13 μ m..... 10
- 9a Spores (8-)9-11(-13) μ m long. Known from the NW of North America and Europe..... *P. pelliculosa*
- 9b Spores (6.5-)8.5-9.5(-11) μ m long. Known from NW of North America and Central Europe.....*P. silvatica*
- 10a Spores (10.5-)12-13(-14.5) μ m. Cheilocystidia 23-28 μ m long. Known only from Chile on carbonaceous soil.....*P. carbonaria*
- 10b. Spores (11-)12-14(-16) μ m. Cheilocystidia 18-32(-35) μ m long. Widespread in temperate meadows in Europe, Asia, North America (however unknown in Mexico), South America and Australia.....
..... *P. semilanceata*
- 11a Spores (12-) 13-14.5(-16.5) μ m long 12
- 11b Spores smaller..... 13
- 12a Edge of lamellae with a gelatinous layer. Fimicolous, known only from the Netherlands *P. liniformans* var. *liniformans*
- 12b Edge of lamellae without a gelatinous layer. Terricolous, known only from north of the U.S. and from Chile.... *P. liniformans* var. *americana*
- 13a Cheilocystidia arising from a layer of hyphae parallel to the edge of the gill. Spores (9-)10-11(-13) μ m long. Known only from Central Europe.....*P. serbica*
- 13b Cheilocystidia arising from hyphae in radial arrangement..... 14
- 14a Spores (7-)8-10(-11) μ m long. Known only from deciduous eastern forests of the U.S. and eastern subtropical forests of Mexico.....
.....*P. caerulipes*
- 14b Spores larger..... 15
- 15a Pleurocystidia absent. Cheilocystidia 21-46(-50) x 7-10 μ m. Known from Europe and North America (not in Mexico) and Chile.....

 <i>P. strictipes</i> (= <i>P. callosd</i>)	
15b	Pleurocystidia scanty.....	16
16a	Cheilocystidia in fascicules. Known only from central Europe.....	
 <i>P. bohémica</i>	
16b	Cheilocystidia not in fascicules, forming a sterile band at the edge of the gill. Known only from Morocco and Algeria.....	<i>P. mairei</i>
17a	Annulus membranous to fibrillose. Spores (8-)10-12(-14) x 6-7(-9) µm. Cheilocystidia 17-30(-36) x 4.5-7.5 µm. Known only from Japan..	
 <i>P. venenata</i>	
17b	Annulus dways fibrillose.....	18
18a	Cheilocystidia lageniform with one or two irregular and long necks. Spores (9-)9.5-11(-12) µm long. Pileus 14-35 mm diam, convex to plane. Known only from NW of the U.S.....	<i>P. cyanofibrillosa</i>
18b	Cheilocystidia with one neck and a different set of features.....	19
19a	Pileus 10-25(-36) mm diam. Spores (9.5-)12-14(-16) µm long. Known from the NW of North America and Europe.....	<i>P. fimetaria</i>
19b	Pileus (5-)8-12(-20) mm diam. Spores (10-)11-12(-12.5) µm long. Known from the NW of North America and from Chile.....	<i>P. sierrae</i> (= <i>P. subfimetaria</i>)

Sect. *Singeriana* Guzmán

1a	Pleurocystidia abundant.....	2
1b	Pleurocystidia scarce.....	8
2a	Pleurocystidia thick-walled.....	3
2b	Pleurocystidia thin-walled	4
3a	Spores (7-)8-9(-10) x (5-)5.5-6.5(-7) µm. Known only from Brazil (State of São Paulo).....	<i>P. truffemii</i>
3b	Spores (5-)6-7(-7.5) x (3.5-)4-4.5 µm. Known from Venezuela and the Caribbean zone.....	<i>P. venezuelana</i>
4a	Cheilocystidia very variable, from fusoid ventricose or mucronate to clavate. Known only from Washington State (U.S.)...	<i>P. washingtonensis</i>
4b	Cheilocystidia mostly uniform.....	5
5a	Pleurocystidia lageniform with a long neck. Known only from Oregon and Idaho (U.S.).....	<i>P. laticystis</i>
5b	Pleurocystidia fusoid or subcylindric without neck.....	6

- 6a Pleurocystidia up to 30 μm long. On dung, known only from high elevation "paramos" of Colombia..... *P. fimicola*
- 6b Pleurocystidia shorter..... 7
- 7a Pleurocystidia 10-13.5(-16) μm wide, irregular in form, ventricose mucronate symmetrical or asymmetrical, even with two mucrons, Cheilocystidia ventricose, 8-10 μm wide. On coniferous sticks and debris. Known only from the northern U.S.....*P. subborealis*
- 7b Pleurocystidia 8-10(-12) μm wide, uniform in form, ventricose mucronate. Cheilocystidia similar to the pleurocystidia. On dung. Known only from Argentina.....*P. horakii*
- 8a Pleurocystidia 30-44 μm long, sublageniform. On fallen sticks. Known only from Jamaica.....*P. pallidispora*
 ip to 30 μm long..... 9
- 9a On dung. Known only from Cuba..... *P. scatigena*
- 9b On other substrates..... 10
- 10a Pleurocystidia 11-16 μm diam.....11
- 10b Pleurocystidia 7-11 μm diam.....!2
- 11a Pleurocystidia hyaline to yellowish, frequently mucronate, neck more than 4 μm long. Known only from Argentina in *Alnus* forests
*P. subalnetorum*
- 11b Pleurocystidia always hyaline, not or rarely mucronate, neck shorter than 3 μm . On rotten wood and humus, known only from the New York Botanical Garden (U.S.)..... *P. pyrispora*
- 12a Pleurocystidia ventricose, 9-10 μm wide. On fallen leaves of bombacaceous plants, known only from Brazil (Bahia)*P. singeriana*
- 12b Pleurocystidia narrow, not wider than 9 μm 13
- 13a Pileus conic to subumbonate. On rotten wood, known only from a tropical forest in Mexico (Veracruz)*P. tuxtlenensis*
- 13b Pileus convex to plane. On dead stems of herbs, known only from New York State (U.S.)..... *P. bulbosa*

Sect. **Stuntzii** Guzmán

- 1a Pleurocystidia present..... **2**
- 1b Pleurocystidia absent..... **4**
- 2a Spores (4.5-)5-6(-6.5) μm long. On soil, in a subtropical forest.

known only from Mexico..... 1

2b Spores longer..... 3

3a Spores (8-)9-11(-13) μm . Pleurocystidia (19-)22-30(-33) μm and cheilocystidia (16-) 18-23(-33) μm long. On dung, known only from Java and subtropical regions of Japan.....*P. subaeruginascens*

3b Spores (5-)6-10(-12) μm . Pleurocystidia 19-23 μm and cheilocystidia 16-25 μm long. On conifer chips, known only from northern Japan.....*P. septentrionalis*

4a Cheilocystidia up to 22 μm long..... 5

4b Cheilocystidia longer..... 7

5a On dung. Spores 7.5-9.5 μm long. Cheilocystidia 13-17 x 2.5-5 μm , fusoid to lageniform. Known only from Sri Lanka..... *P. rostrata*

5b On soil or rotten wood, or if on dung character combination different...
.....6

6a Spores 10-11 μm long. On soil, rarely on dung or rotten wood. Known only from Brazil and Uruguay..... *P. caeruleoannulata*

6b Spores 8.5-10.5 μm long. On rotten wood. Known only from Java.....*P. aerugineomaculans*

7a Cheilocystidia pedicellate. On dung. Known only from Uruguay.....

7b Cheilocystidia not pedicellate. On soil..... 8

8a Cheilocystidia vesiculose submucronate or vesiculose subfusiform. On soil. Known only from Kenya.....*P. aquamarina*

8b Cheilocystidia sublageniform with a long neck. On soil. Known only from the NW of North America.....*P. stuntzii*

Sect. Zapotecorum Guzmán

1a Annulus well developed..... 2

1b Annulus absent..... 4

2a Pleurocystidia absent. Stipe with a pseudorhiza. Known only from Japan.....*P. argentipes*

2b Pleurocystidia present. Stipe without pseudorhiza..... 3

3a Spores 7.5-10 μm long. Known only from the U.S. (New Jersey State)
.....*P. graveolens*

3b Spores 6-7(-8) μm long. Species known only from Venezuela (State of Merida).....*P. meridensis*

- 4a Cheilocystidia of two types: 1) common, irregularly cylindric or sub-ventricose, (17-)18.5-34.5(-37) μm long, and 2) rare, vesiculose mucronate, 12-21.5(-22.5) μm long. Spores (4-)5-5.5(-6.5) μm long. Known only from SE of Mexico in subtropical forests *P. moseri*
- 4b Cheilocystidia mostly lageniform, branched or unbranched..... 5
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- 8b Pleurocystidia 24-32 μm , Cheilocystidia 16.5-31.5 μm . Spores 6.5-7.5 μm long. Known only from subtropical forests in Mexico*P. barrerae*
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Discussion

Ten years after the publication of the monograph of the genus *Psilocybe* (Guzmán, 1983), more than 80 new records and 28 new taxa (including new combinations) from different parts of the world have been published. A revision of all new taxa shows that 3 belong to the genus *Naematoloma*; one to *Stropharia* and one is a synonym of *P. montana*. Five new species are described and four new combinations in the genus *Psilocybe* are proposed. At present a total of 172 species and varieties are accepted in the genus, as opposed to the 144 listed in 1983. Thus, only 28 new taxa have been added to the genus, mostly from Latin America, followed by SE Asia and Europe, and one only from Africa.

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