

CHAPTER 4

RESULTS & DISCUSSION

The Spinose Species in the Mushroom

Genus *Mycena*

The spinose species of *Mycena* are characterized by small, typically white basidiomes with pileipellis containing spine-like pileocystidia, pileosetae, or clusters of erect adherent hyphae forming spine-like projections. The pileus spines are observed easily with a 10 x hand lens and give the pileus surface a hispid or spinulose appearance. These unique characteristics are diagnostic for fourteen species of *Mycena* worldwide. Eleven species possess pileus spines that are thick-walled, aculeate to acicular, non-exudative and unicellular (= pileosetae) that arise from pileipellis cells or as terminal cells from pileus subcuticular hyphae and project through the pileipellis. These species are currently accepted in *Mycena* sect. *Longisetae* (Desjardin et al., 2002, p. 70; Manimohan & Leelavathy, 1988, p. 861). In addition, one species (*M. dermatogloea*) forms thin-walled, exudative pileocystidia and is accepted in sect. *Polyadelphia*, and two species (*M. pseudoseta*, *M. mimicoseta*) form pileus spines composed of clusters of erect adherent hyphae forming spine-like projections and are accepted in sect. *Basipedes*. The latter three species were described recently from material

collected in Thailand (Desjardin et al., 2003, p. 7). This study focuses on the Southeast Asia species of *Mycena* with pileosetae.

The eleven worldwide species of *Mycena* sect. *Longisetae* as reported by Desjardin et al. (2002, p. 72) were accepted in two stirps: Stirps *Brunneisetosa*, with a hymeniform pileipellis of acanthocysts (*M. brunneisetosa*, *M. indica*, *M. tenuisetosa*, *M. trichocephala*); and Stirps *Longiseta*, with a cutis-type pileipellis of repent, densely spinulose hyphae (*M. aciculata*, *M. breviseta*, *M. brevisetosa*, *M. clavulifera*, *M. khonkhem*, *M. longiseta* and *M. palmicola*). *Mycena palmicola* and *M. khonkhem* were described recently as new species while *M. clavulifera* was redescribed based on material collected in Thailand. *Mycena aciculata* and *M. trichocephala* are not included in this monograph of Southeast Asian species because they are extralimital (U.S.A and Brazil, respectively).

Thirteen spinose species of *Mycena* are included herein from Southeast Asia, of which five represent new species. *Mycena amyloseta* and *M. volvata* are described as new from material collected in Malaysia, *M. gracilipilosa* and *M. gracilisetosa* are new species from Indonesia, while *M. variicystis* is a new species from Thailand. *Mycena indica*, currently known only from India, was not encountered during this study, and our concept of the species is based on the protologue (Manimohan et al., 1988, p. 861) and on examination of the isotype specimen at NY. The Southeast Asian spinose species of *Mycena* included in this monograph are itemized in Table 7 and plotted on the Google Earth Map below (Figure 9).

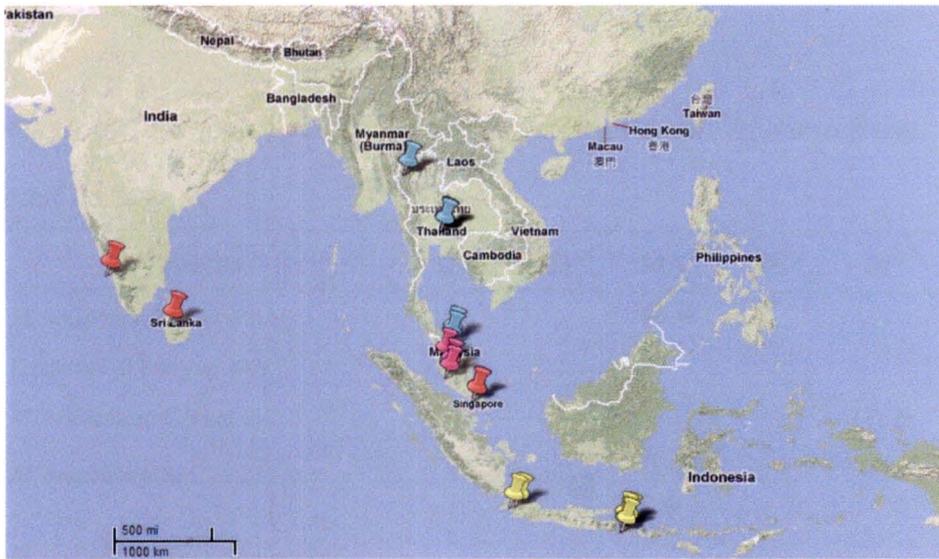


Figure 9 Distribution of spinose species of *Mycena* from Southeast Asia.

Note. From Google Map by Google–Map data © 2009 Kingway. Retrieved May 20, 2009, from <http://maps.google.com/maps?tab=ml>



Figure 10 Distribution of the type species of spinose *Mycena* from Southeast Asia

Note. From Google Map by Google–Map data © 2009 Kingway. Retrieved May 20, 2009, from <http://maps.google.com/maps?tab=ml>

Table 7*Synopsis of the Spinose Species of the Mushroom Genus Mycena from Southeast Asia*

No.	Species	IN*	ID*	MA*	SK*	SI*	TH*
1.	<i>M. amyloseta</i> Boonpratuang, Desjardin & Perry sp. nov.			① ★			
2.	<i>M. brevisetosa</i> Corner					① ★	
3.	<i>M. brunneisetosa</i> Corner		① ⑤	① ② ★			① ③
4.	<i>M. clavulifera</i> (Berk. & Broome) Sacc.			① ②	① ★		① ✕
5.	<i>M. gracilipilosa</i> Boonpratuang, Desjardin & Perry sp. nov.		① ★				
6.	<i>M. gracilisetosa</i> Boonpratuang, Desjardin & Perry sp. nov.		③ ★	①			
7.	<i>M. indica</i> Manimohan & Leelavathy	① ★					
8.	<i>M. khonkhem</i> Desjardin, Boonpratuang & Hywel-Jones						① ① ★
9.	<i>M. longiseta</i> Höhn.		① ② ★				② ①
10.	<i>M. palmicola</i> Desjardin, Boonpratuang & Hywel-Jones						① ★
11.	<i>M. tenuisetosa</i> Corner			① ★			①
12.	<i>M. variicystis</i> Boonpratuang, Desjardin & Perry sp. nov.						① ★
13.	<i>M. volvata</i> Boonpratuang, Desjardin & Perry sp. nov.			① ★			

*Collecting site acronyms: IN = India, ID = Indonesia, MA = Malaysia, SK = Sri Lanka, SI = Singapore, TH = Thailand, ★ = Holotype, ✕ = Redescribed, ① = species occurring in SEA with the number of specimens collected during this study and ① = species occurring in SEA but not encountered during this study.

Taxonomic Studies

Key to the spinose of Mycena from Southeast Asia

1. Pileosetae clavate, apex 20-64 μm diam..... 2
- 1* Pileosetae or pileocystidia subcylindrical to acicular, apex < 10 μm diam
..... 3
2. Basidiospores ellipsoid, 7-10.5 x 3.5-4.8 μm ; basal disc flattened
..... *M. clavulifera*
- 2* Basidiospores ovoid, 9-10.5 x 7-8 μm ; basal disc cupulate *M. volvata*
3. Pileocystidia entirely thin-walled 4
- 3* Pileocystidia thick-walled (= pileosetae)..... 6
4. Cheilocystidia present; stipe cortical hyphae smooth; caulocystidia
absent *M. variicystis*
- 4* Cheilocystidia absent; stipe cortical hyphae spinulose; caulocystidia
present and conspicuous 5
5. Pileus 1-2.5 mm diam.; stipe < 20 mm long; pileocystidia < 220 μm long
..... *M. gracilisetosa*
- 5* Pileus 4-7 mm diam.; stipe > 20 mm long; pileocystidia 500-1000 μm
long *M. gracilipilosa*

Key to the spinose of *Mycena* from Southeast Asia. (continued)

6. Pileosetae approx. 200-2000 μm long 7
- 6* Pileosetae typically < 200 μm long 9
7. Cheilocystidia conspicuous, fusoid with sparsely spinulose central region and smooth acicular apex ***M. indica***
- 7* Cheilocystidia absent..... 8
8. Pileipellis a hymeniform layer of acanthocysts; pileus often with yellow tones; pileosetae hyaline to golden yellow or brownish yellow.....
..... ***M. brunneisetosa***
- 8* Pileipellis a cutis of repent, spinulose hyphae; pileus often with grey tones; pileosetae hyaline..... ***M. longiseta***
9. Cheilocystidia absent or smooth-clavate..... 10
- 9* Cheilocystidia present and spinulose..... 11
10. Basidiomes tiny, with white pilei 0.5-1 mm diam. and stipes 0.5-1 mm long; lamellae 1-3 per basidiome; cheilocystidia absent; on palm leaves
..... ***M. palmicola***
- 10* Basidiomes larger, with grey pilei 0.5-2.5 mm diam. and stipes 1.5-7 mm long; lamellae 7-11 per basidiome; cheilocystidia absent or smooth-clavate; on bark ***M. brevisetosa***

Key to the spinose of *Mycena* from Southeast Asia. (continued)

11. Pileipellis a hymeniform layer of acanthocysts; spores 9.5-10.5 x 4.5-6.5 μm with mean 9.8 x 5.7 μm ; base of pileosetae often covered with spinulae
 ***M. tenuisetosa***
- 11*..Pileipellis a cutis of repent, spinulose hyphae; spores 6.5-8.5 x 3.2-4.5 μm with mean range 6.5-8.1 x 3.6-4.0 μm ; base of pileosetae lacking spinulae
 12
12. Pileosetae amyloid; caulocystidia present; stipe lacking a basal disc
 ***M. amyloseta***
- 12* Pileosetae inamyloid; caulocystidia absent; stipe arising from a basal disc ***M. khonkhem***

Taxonomy

Mycena amyloseta Boonpratuang, Desjardin & Perry sp. nov.

Mycobank: 513209

Etymology: *amylo-* (Latin) = starch, i.e., giving a blue reaction to iodine; *-seta* (Latin) = bristle, referring the thick-walled pileosetae that give a positive Melzer's reaction.

Pileus (Figure 11.1) 2.0-3.0 mm diam., obtusely conical; margin straight, pellucid-striate; surface dull, dry, hispid with short, hyaline setae; disc and striae off-white with a hint of pale yellowish gray, white elsewhere. Context < 1 mm thick. Odor not distinctive; taste unknown. Lamellae free, close with 1-2 series of lamellulae, narrow, thin, even edge, white. Stipe 10-



18 x 0.2 mm, central, equal, filiform, base slightly enlarged, without basal disc, dry, fragile; apex glabrous, translucent, white; base sparsely hispid, rey.

Basidiospores (Figure 11.2) 6.4-7.2 x 3.2-4.0 μm [$x = 6.5 \pm 0.22 \times 3.6 \pm 0.29 \mu\text{m}$, $Q = 1.6-2.3$, $Q_m = 2.05 \pm 0.11$; $n = 25$ spores], broadly cylindrical or ellipsoid, smooth, hyaline, distinctly amyloid, thin-walled. Basidia 12-15 x 5-6 μm , broadly clavate to ventricose, 4-sterigmate, clamped. Basidioles clavate. Pleurocystidia absent. Cheilocystidia (Figure 11.3) abundant, 12-17.5 x 11.5-12.5 μm , broadly clavate, with numerous spinulae, hyaline, inamyloid, thin-walled; spinulae 0.8-1.6 x 0.8-1.6 μm , irregularly cylindrical. Pileipellis (Figure 11.4-5) a hymeniform layer of acanthocysts when young, becoming a cutis of inflated, densely spinulose, repent cells with acanthocyst terminal cells in age, with scattered pileosetae interspersed; acanthocysts 12-20 x 8-18 μm , subglobose to broadly clavate, spinulose, hyaline, inamyloid, non-gelatinous, thin-walled; spinulae 0.5-1.5 x 0.5 μm , cylindrical; marginal cystidia abundant, 12-20 x 8-12 μm , broadly clavate, densely spinulose (undifferentiated from acanthocysts). Pileosetae (Figure 11.6-7) numerous, simple, 48-208 x 12-20 μm , acicular with an enlarged base, acute, smooth, hyaline, amyloid, with walls up to 4 μm thick. Hypodermium (Figure 11.8) composed of inflated to subglobose cells 20-28 μm diam., smooth, hyaline, strongly dextrinoid, thin-walled. Pileus trama composed of parallel, loosely arranged hyphae 8-18 μm diam., cylindrical, smooth, hyaline, strongly dextrinoid, non-gelatinous. Stipitipellis (Figure 11.9) a cutis of parallel hyphae 4-8 μm diam., cylindrical, smooth, hyaline, strongly dextrinoid, non-gelatinous, thin-walled. Caulocystidia (Figure 11.9-10) scattered, simple, -400

x 25-40 (base) x 15-20 (middle) μm , tapering upwards to an acute apex, smooth, hyaline, inamyloid, thin-walled. Clamp connections present but not at every septum.

Habit, habitat and known distribution. Solitary, on leaves of undetermined dicotyledonous tree in mature primary forest. Malaysia.

Specimen examined. MALAYSIA, Pahang Province, Cameron Highlands, Tanah Rata, Jungle trail #10-11, elevation 1455-1600 m, 11 Jan 2004, D. E. Desjardin 7640 (Holotype: SFSU).

Commentary: *Mycena amyloseta* is unique in the genus by forming amyloid pileosetae. In other features it is similar to *M. khonkhem* from central Thailand which differs in forming inamyloid pileosetae, and has a glabrous stipe that arises from a basal disc and lacks caulocystidia.

Mycena brevisetosa Corner, Beih. Nova Hedwigia 109: 171. 1994.

Holotype: Singapore, Mandai Road, scattered on dead bark in the forest, Oct. 1934, Corner s.n. (E).

Description adapted from the protologue:

Pileus 0.5-2 mm diam, convex to plane, striate to faintly sulcate, minutely pilose, pale grey to fuscous, becoming cinerous on expansion, paler at the margin. Context very thin, white, gelatinized. Odor not distinctive; taste unknown. Lamellae adnexed, pseudocollariate, distant (7-11) with 1-2 series of lamellulae, thin, narrow, pale greyish white. Stipe 1.5-7 x 0.05-0.25 mm, filiform, straight, arising from a subvillous, basal disc 0.2-0.5 mm wide x 0.15 mm tall, glabrous above, puberulous at the base, white overall.

Basidiospores 7-10 x 4.5-5 μm , ellipsoid, smooth, hyaline, thin-walled, amyloidity not recorded. Basidia 18-25 x 8-10 μm , 4-spored. Pleurocystidia absent. Cheilocystidia absent or scattered on a mostly fertile lamellar edge, clavate or rarely subventricose with a single apical process up to 4 μm long. Pileipellis a cutis of repent, smooth or spinulose hyphae 3-7 μm diam, lacking acanthocysts; spinulae 0.5-4 x 0.5 μm , rod-like, rarely with filiform, terminal or intercalary processes -20 x 1-2 μm , smooth or with spinulose base. Pileosetae abundant, 50-130 x 5-9 μm , 8-20 μm diam at the swollen base, 2.5-4 μm diam at the obtuse to subacute apex, conical, smooth, pale yellow, thick-walled. Hypodermium of inflated cells 30-85 x 10-30 μm , with pale brown cytoplasmic contents, gelatinous. Pileus trama hyphae not described. Stipitipellis hyphae not described, giving rise to caulocystidia; medullary hyphae 100-350 x 10-20 μm , secondarily septate. Caulocystidia ventricose-filiform, smooth, thin-walled. Clamp connections present. Reactions with Melzer's reagent not recorded.

Habit, habitat and known distribution. Scattered on dead bark in the forest. Singapore.

Commentary: Corner (1994, p. 174) described and illustrated *M. brevisetosa* from a single collection on bark of an unidentified plant from Singapore. *Mycena brevisetosa* is morphologically similar to *M. longiseta*, *M. palmicola*, and *M. khonkhem*. *Mycena longiseta*, which also produces greyish-colored pilei, differs in forming much longer pileosetae (up to 1,000 μm long) and grows on dicotyledonous leaves. In comparison, *M. brevisetosa* forms pileosetae only up to 350 μm long and grows on bark. *Mycena palmicola*

differs in forming pure white, smaller pilei (only 0.5-1 mm diam), fewer lamellae (1-3), a shorter stipe (0.5-1 mm long), and grows on palm leaves.

Mycena khonkhem differs in forming larger basidiomes with pilei 2-7 mm diam, narrower basidiospores (3.5-4.5 μm), lacks caulocystidia and grows on dicotyledonous leaves.

New material of *M. brevisetosa* was not collected during this study, and our concept of the species is based solely on the protologue (Corner 1994, p. 171).

Mycena brunneisetosa Corner, Beih. Nova Hedwigia 109: 172.1994.

Holotype: Singapore, Mandai Road, scattered on dead branch of *Diospyros* in the forest, 9 Nov. 1934, Corner s.n. (E).

Primordia 1 mm diam, hemispherical to ovoid, pale orangish white, covered with erect, stiff, hyaline to orange or brownish yellow setae up to 2 mm long. Pileus (Figure 12.1) 2.0-6.0 mm diam., convex to broadly convex, becoming plano-convex, disc flatten to slightly depressed or umbilicate, margin striate, short-ciliate at maturity; surface dull, dry, pruinose to hispid, with scattered to abundant, erect, hyaline to golden or pale orangish brown setae up to 2 mm long; disc yellowish white (4A2) to cream (4A3), orangish white (5A3), or greyish orange (5B5-8), margin white or concolorous with disc. Context very thin, 0.1-0.2 mm, soft, white to greyish yellow. Odor not distinctive; taste unknown. Lamellae shallowly adnate to subfree or rarely adnate to a pseudocollarium, close to subdistant (13-20) with 1-3 series of lamellulae, narrow to broad, thin, white, non-marginate. Stipe (2.0-) 6-20 (-35) x 0.2-0.5 mm, central, cylindrical with an enlarged base, fragile, dull, dry,

pruinose to hispid or puberulous, apex white, base white to pale orangish white (5A2-3) or orange (5A6); arising from a poorly- to well-developed, yellow (4A2-4) to orange (5A4) basal disc with a hispid margin.

Basidiospores (Figure 13.2) (6.5-) 7.0-10.5 (-12) x 4.0-6.0 μm [$x_{\text{mr}} = 7.5-10.2$ x 4.2-5.6, $x_{\text{mm}} = 8.5 \pm 0.9$ x 5 ± 0.5 , $Q = 1.1-2.3$, $Q_{\text{mr}} = 1.6-1.9$, $Q_{\text{mm}} = 1.67 \pm 0.2$; $n = 20-25$ spores per collection, 7 collections], ellipsoid to broadly ellipsoid to ovoid, pip-shape, smooth, hyaline, distinctly amyloid, thin-walled. Basidia (Figure 12.3) 12-20 x 6.5-16 μm , clavate to broadly clavate, 2-4-sterigmate, smooth, hyaline, inamyloid, thin-walled, without clamp connections. Basidioles (Figure 12.4) 20-28 x 5-6.5 μm , narrowly clavate, smooth, hyaline. Pleurocystidia absent. Cheilocystidia absent. Pileipellis (Figure 12.5-6) a hymeniform layer of acanthocysts with some interspersed repent spinulose hyphae, plus pileosetae and marginal cystidia, at maturity acanthocysts spread out over pileus and pileipellis appearing to be a cutis of repent, spinulose, non-gelatinous to subgelatinous with scattered acanthocyst terminal cells; acanthocysts, (4-) 12-25 (-30) x (4-) 8-20 μm , clavate to broadly clavate, seldom lobed, covered with evenly spaced spinulae, thin-walled to slightly thick walled, hyaline, inamyloid, non-gelatinous; spinulae 1-3 x 0.5-1.5 μm , rod-shaped. Marginal cystidia (Figure 12.7) abundant, 40-150 x 8-20 (base), 4-7.0 (apex) μm , centrally up to 13 μm broad, clavate to fusoid, fusoid-ventricose or irregularly clavate, densely spinulose over lower $\frac{1}{2}$ to $\frac{2}{3}$ with upper $\frac{1}{2}$ to $\frac{1}{3}$ smooth and tapered to an obtuse apex, sometimes entirely spinulose, smooth upper portion 20-50 x 6.5-16 μm , hyaline or with orange, refractive contents (exudates), inamyloid; spinulae 0.5-3 x 0.5 μm ,

cylindrical. Pileosetae (Figure 12.8) scattered to abundant, simple, 80-2000 x 9.5-40 (base) x 3-10 (centrally) x 4-9 (apex) μm , acicular, gradually tapering upwards to a sharply acute apex, smooth, hyaline to orange, golden or brownish orange, inamyloid, thick-walled (1-6.5 μm). Hypodermium (Figure 12.9) composed of broadly clavate to inflated cells, smooth, hyaline, strongly dextrinoid, thin-walled. Pileus trama composed of interwoven, loosely arranged, short-celled hyphae, 6-32 μm diam, cylindrical to inflated, smooth, hyaline, strongly dextrinoid, non-gelatinous. Lamellar trama of similar, dextrinoid hyphae. Stipitipellis (Figure 12.10) a cutis of parallel, narrowly cylindrical hyphae, hyaline, strongly dextrinoid, thin-walled, non-gelatinous. Caulocystidia (Figure 12.10) abundant, (16-) 32-160 x (2.5-) 6.5-30 (base), x 8-14 (centrally) μm , aculeate with a swollen and often geniculate base, smooth, hyaline, inamyloid, thin-walled, seldom slightly roughened from adherent debris. Stipe tissue monomitic; cortical hyphae 4-12 μm diam, parallel, cylindrical, smooth, hyaline, dextrinoid, non-gelatinous; medullary hyphae 8-24 μm diam, strongly dextrinoid, otherwise similar to cortical hyphae. Basal disc cystidia similar to the caulocystidia, cylindrical with enlarge base, up to 160 μm long, hyaline, to golden, inamyloid, thin- to thick-walled. Clamp connections present but not at every septum.

Habit, habitat and known distribution. Solitary to gregarious, lignicolous and folicolous, on leaves, twigs and bark of living and decaying dicotyledonous debris in primary and mixed forests. Indonesia, Thailand and Malaysia.

Specimens examined. INDONESIA, Bali, Bedugul Botanical Garden, 14 Jan 2000, D.E. Desjardin 7112 (SFSU); same location, 17 Jan 1998, D.E. Desjardin 6813 (SFSU); same location, 15 Jan 1999, K.P. Collins 9946 (SFSU); Trail to Lake Tamblingan, near deserted temple, 15 Jan 1999, KPC99-45 (SFSU); Java, Mt. Halimun National Park, trail to Cikiniki, 13 Jan 1998, D.E. Desjardin 6757 (SFSU); same location, 6 Jan 1999, D.E. Desjardin 6868 (SFSU). MALAYSIA, Pahang Province, Fraser's Hill, Pine Tree trail, 16 Jan 2004, D.E. Desjardin 7667 (SFSU); same location, 8 Jan 2006, D.E. Desjardin 7903 (SFSU). THAILAND, Nakorn Nayok, Khao Yai National Park, km. 33, 5 May 2007, T. Boonpratuang 782 (BBH18492); Khao Yai National Park, Darn Chang trail, 9 July 2002, T. Boonpratuang 421 (BBH6916); Khao Yai National Park, Phakrajai, 26 Jun. 2001, T. Boonpratuang 262 (BBH1974).

Commentary: *Mycena brunneisetosa* is most phenetically similar to *M. indica* and *M. longiseta*. *Mycena indica* differs in forming distinctive fusoid cheilocystidia with sparsely spinulose central region and smooth acicular region. *Mycena longiseta* differs in forming a grey-tones pileus with cutis-type pileipellis composed of spinulose hyphae and shorter pileosetae (up to 1000 μm) with hyaline to pale yellow walls.

Mycena clavulifera (Berk. & Broome) Sacc., Syll. Fung. 5: 301. 1887.

Basionyms = *Agaricus clavuliferus* Berk. & Broome, J. Linn. Soc. Bot. 11: 525. 1871.

Holotype: Sri Lanka, Kandy District, Peradeniya, on decayed vegetable matter, Nov. 1868, Thwaites #803 p.p. (K!).

Primordia 1 mm diam., hemispherical, covered with long, hyaline to pale golden setae. Pileus (Figure 13.1) 1-3 mm diam., convex to plano-convex, often shallowly umbilicate with age, drying deeply umbilicate; margin striate to eroded, decurved; disc covered with hyaline to golden setae up to 500 μm long; surface dull, dry, white with a pale yellowish brown disc and striate. Context very thin, 0.1-0.2 mm, soft, white to grayish yellow-colored. Odor not distinctive; taste unknown. Lamellae ascending to horizontal, narrowly adnate to free, distant (8-11) with one series of lamellulae, convex, narrow to broad, thin, white. Stipe 10-20 x 0.2-0.5 mm, central, filiform, equal, arising from a small basal disc; surface dull, dry, glabrous at the apex, hispidulous at the base, white overall. Basal disc 1 mm diam., circular, flattened, greyish white.

Basidiospores (Figure 13.2) 7.0-9.0 (-11) x 3.5-5.0 μm [$x_{\text{mr}} = 7.8-8.9$ x 3.9-4.8, $x_{\text{mm}} = 8.4 \pm 0.6$ x 4.4 \pm 0.5, $Q = 1.6-2.3$, $Q_{\text{mr}} = 1.7-2.0$, $Q_{\text{mm}} = 1.88 \pm 0.1$; $n = 15-25$ spores per collection, 3 collections], narrowly ellipsoid to pip-shape, smooth, hyaline, amyloid, thin-walled. Basidia (Figure 14.3) 12.5-16.5 x 7-8 μm , clavate to broadly clavate, 4-sterigmate, smooth, hyaline, inamyloid, thin-walled, basally clamped. Basidioles clavate to broadly clavate, smooth, hyaline, thin-walled. Pleurocystidia absent. Cheilocystidia absent. Pileipellis (Figure 13.4-5) a cutis of repent, densely spinulose hyphae with acanthocyst-type terminal cells, give rising to numerous pileosetae; hyphae 2.5-10.5 μm diam., cylindrical, to inflated, hyaline, inamyloid, subgelatinous to non-gelatinous, thin-walled; acanthocyst-type terminal cells, broadly clavate, spinulose; spinulae 0.5-4 x 0.5 μm , cylindrical. Marginal

cystidia (Figure 13.6) abundant, 84-105 x 16-17.5 (centrally) μm , apex narrowed to 2.5 μm , clavate to fusoid-ventricose, densely spinulose overall or with a smooth elongated apical portion, hyaline, inamyloid, thin-walled. Pileosetae (Figure 13.7) scattered to abundant, simple, 114-500 x 6-42 (base), 8-20 (centrally), (8-) 13-45 (apex) μm , cylindrical to subclavate or clavate with an enlarged base, broadly obtuse, smooth, hyaline to yellow or tawny, inamyloid, thick-wall (2-10 μm). Hypodermium differentiated from pileus tramal hyphae, of inflated hyphae 24-90 μm diam., smooth, hyaline, weakly to strongly dextrinoid, thin-walled. Pileus trama composed of parallel to interwoven, loosely arranged hyphae 8-16 μm diam., smooth, hyaline, weakly to strongly dextrinoid, non-gelatinous. Lamella trama weakly dextrinoid. Stipitipellis (Figure 13.8) a cutis of parallel hyphae giving rise to caulocystidia. Stipe tissue monomitic; cortical 3-9 μm diam., cylindrical, smooth, hyaline, strongly dextrinoid, thin-walled, non-gelatinous; medullary hyphae 8-12 μm diam., dextrinoid. Caulocystidia (Figure 13.9) absent from upper $\frac{2}{3}$ of stipe, scattered and scarce on lower $\frac{1}{3}$ of stipe, 36-120 x 9-13 (base) x 3.5-10 (apex) μm , cylindrical to subclavate or fusoid-ventricose with a long tapered neck, smooth, hyaline, inamyloid, thin-walled. Clamp connections observed only rarely on pileipellis hyphae, absent elsewhere.

Habit, habitat and known distribution. Solitary to scattered, foliicolous and lignicolous, on decaying leaves and sticks of undetermined dicotyledonous trees in primary forest. Sri Lanka, Malaysia and Thailand

Specimens examined. SRI LANKA, Kandy District, Peradeniya, Nov. 1868, Thwaites 803 p.p. (Holotype: K). MALAYSIA, Pahang Province,

Fraser's Hill, 15 Jan 2004, D.E. Desjardin 7651 (SFSU); Cameron Highlands, Gua Musang, Brinchang, along road near the summit, elevation ca. 1980 m, 10 Jan 2004, D.E. Desjardin 7634 (SFSU). THAILAND, Chiang Mai Province, Doi Inthanon National Park, Vachiratharn Waterfall, 14 Jan 2002, T. Boonpratuang 311 (BBH2025).

Commentary: *Mycena clavulifera* and *M. volvata*, described herein as a new species, are the only known spinose *Mycena* species with broadly clavate pileosetae, and as such are easy to distinguish from all other species. *M. clavulifera* differs from *M. volvata* by forming ellipsoid basidiospores with mean $8.4 \times 4.4 \mu\text{m}$ and mean $Q = 1.9$, and has a flattened basal disc. In comparison, *M. volvata* has ovoid basidiospores with mean 10.2×7.8 and mean $Q = 1.3$, and a cupulate basal disc. The molecular data (Figure 22) indicate that they are very similar and may be conspecific. Because of the distinctly different basidiospore shape and basal disc morphology we accept the two as distinct species until further material becomes available for analysis and comparison.

Mycena gracilipilosa Boonpratuang, Desjardin & Perry sp. nov.

MycoBank: 513210

Etymology: *gracili-* (Latin) = thin, slender; *-pilosa* (Latin) = hairy; referring to the slender, thin-walled pileocystidia.

Pileus (Figure 14.1) 4-7 mm diam., obtusely conical when young, becoming convex and umbilicate in age; margin straight, sulcate; surface dull, dry, with numerous erect, long white hairs up to 1 mm long; disc pale grey, margin white. Context thin, white. Odor not distinctive; taste unknown.

Lamellae adnate, subdistant (13-14), lacking lamellulae, narrow, thin, white, non-marginate. Stipe 22-35 x 0.5 mm, central, cylindrical, lacking a basal disc, fragile, dry, dull, pilose with abundant erect hairs up to 1 mm long, white to greyish white with a darker base.

Basidiospores (Figure 14.2) 9-10.5 x 4.0-5.5 μm [$x = 9.8 \pm 0.64 \times 4.6 \pm 0.57 \mu\text{m}$, $Q = 1.8-2.6$, $Q_m = 2.15 \pm 0.3$; $n = 25$ spores], subcylindrical to elongate-ellipsoid, smooth, hyaline, distinctly amyloid, thin-walled. Basidia (Figure 14.3) 16-18 x 6.5-8.0 μm , clavate to broadly clavate, 4-sterigmate. Basidioles (Figure 14.3) clavate. Pleurocystidia absent. Cheilocystidia absent. Pileipellis (Figure 14.4-5) a cutis of repent spinulose hyphae with broadly clavate acanthocyst-type terminal cells and pileocystidia; hyphae 8-20 μm diam., cylindrical, hyaline, dextrinoid, non-gelatinous; spinulae 0.5- 2.5 x 0.5 μm , rod-shaped, thin-walled. Pileocystidia (Figure 14.5-6) numerous, simple, 500-1000 x 7-13 (-20) (base) x 6-10 (apex) μm , with an enlarged base and gradually narrowed upwards to an obtuse apex, smooth, hyaline, inamyloid, thin-walled. Hypodermium undifferentiated. Pileus trama composed of parallel, loosely arranged hyphae up to 20 μm diam., cylindrical, smooth, hyaline, dextrinoid, non-gelatinous. Lamellar trama weakly dextrinoid. Stipitipellis (Figure 14.7) a cutis of repent, parallel hyphae giving rise to caulocystidia. Stipe tissue monomitic; cortical hyphae 6.0-20 μm diam., cylindrical, sparsely spinulose, hyaline, strongly dextrinoid, thin-walled, non-gelatinous; medullary hyphae similar but smooth; spinulae as in pileipellis. Caulocystidia (Figure 14.7) abundant, simple, 100-1000 x 8-20 (base) x 4-8

(apex) μm , cylindrical to acicular, gradually narrowed upwards to an obtuse apex, smooth, hyaline, dextrinoid, thin-walled. Clamp connections present.

Habit, habitat and known distribution. Solitary, scattered, folicolous on undetermined dicotyledonous leaves in mixed forest. Indonesia

Specimen examined. INDONESIA, Bali, Lake Bratan, trail to Mountain Catur, 16 Jan. 2000, A. Retnowati, AR192 (Holotype: SFSU).

Commentary: *Mycena gracilipilosa* forms pilei 4-7 mm in diam.

covered with pileocystidia up to 1000 μm long, has a stipe 20-35 mm long covered with similar long cystidia, and has subdistant lamellae numbering 13-14 per basidiome. It is most phenetically similar to *M. gracilisetosa*, a new sympatric species described herein, but the latter species differs in forming smaller basidiomes with pilei only 1-2.5 mm in diam., stipes < 20 mm long, fewer lamellae (5-7) and shorter pileo- and caulocystidia only up to 220 μm long. The molecular data (Figure 22) indicate that *M. gracilipilosa* and *M. gracilisetosa* (below) do not belong to the same clade as members of sect. Longisetae and should not be included in that infrageneric group. The thin-walled cystidia, rather than thick-walled setae is apparently the defining feature.

Mycena gracilisetosa Boonpratuang, Desjardin & Perry sp. nov.

MycoBank: 513211

Etymology: *gracili-* (Latin) = thin, slender; *-setosa* (Latin) = bristle, referring to the slender pileocystidia.

Pileus (Figure 15.1) 1-2.5 mm diam., convex to plano-convex, even or slightly depressed in age; margin straight, striate to sulcate; surface dull, dry,

hispid, white overall. Context thin, white. Odor not distinctive; taste unknown. Lamellae ascending, shallowly adnate to adnexed, some with a short decurrent tooth, distant (5-7) with 0-1 series of lamellulae, narrow, thin, white, non-marginate. Stipe 5-20 x 0.1-0.3 mm, central, cylindrical, mostly equal, sometime with a slightly enlarged base, arising from a narrow basal ring or a poorly-developed basal disc, fragile, dull, dry, hispid, white overall or with a pale yellowish orange base.

Basidiospores (Figure 15.2) (7-) 8-11.5 x 3.2-5 μm [$x_{\text{mr}} = 7.9-10.3$ x 3.6-4.7, $x_{\text{mm}} = 9.3 \pm 1.1$ x 4.3 ± 0.4 , $Q = 1.7-3$, $Q_{\text{mr}} = 1.9-2.4$, $Q_{\text{mm}} = 2.2 \pm 0.2$; $n = 25$ spores per collection, 4 collections], subcylindrical to elongate-ellipsoid, smooth, hyaline, weakly to strongly amyloid, thin-walled. Basidia (Figure 15.3) 14.5-25 x 6-9.5 μm , clavate to broadly clavate, 4-sterigmate. Basidioles (Figure 15.3) clavate. Pleurocystidia absent. Cheilocystidia absent. Pileipellis (Figure 15.4) a cutis of repent spinulose hyphae with acanthocyst-type terminal cells and pileocystidia; hyphae 5-20 (-32) μm diam., cylindrical, hyaline, strongly dextrinoid, thin-walled, non-gelatinous; terminal cells and marginal cystidia (Figure 15.6) broadly clavate, densely spinulose; spinulae 0.5-1.5 x 0.5 μm , rod-shaped. Pileocystidia (Figure 15.5) numerous, simple, (48-) 144-216 x 6-12 (base) x 3-10 (apex) μm , cylindrical or gradually narrowed upwards to an obtuse apex, sometimes subcapitate, smooth, hyaline, inamyloid, thin-walled. Hypodermium composed of inflated hyphae 16-33 μm diam., thin-walled, hyaline, strongly dextrinoid. Pileus trama composed of parallel, loosely arranged, cylindrical hyphae up to 20 μm diam., smooth, hyaline, strongly dextrinoid, non-gelatinous. Lamellar trama weakly

dextrinoid. Stipitipellis (Figure 15.7) a cutis of repent, parallel hyphae giving rise to caulocystidia. Stipe tissue monomitic; cortical hyphae 4-20 μm diam., cylindrical, spinulose, hyaline, strongly dextrinoid, thin-walled, non-gelatinous; medullary hyphae similar but smooth; spinulae 2-4 x 0.5-1.0 μm , rod-shaped. Caulocystidia (Figure 15.8) abundant, simple, (24-) 144-320 x 6-10 (-21) (base) x 6-16 (centrally) x 2-5 (apex) μm , cylindrical to acicular, gradually narrowed upwards to an obtuse apex, smooth, hyaline, inamyloid to weakly dextrinoid, thin-walled. Clamp connections present but not at every septum.

Habit, habitat and known distribution. Scattered, on leaves of *Castanopsis javanica* (Blume) A. DC, *Ficus* sp., and undetermined dicotyledonous trees in primary forests. Indonesia and Malaysia.

Specimens examined. INDONESIA; Bali, Temple south of Sanda, 16 Jan. 1999, D.E. Desjardin 6949; Bali, Lake Bratan, trail to Mount Catur, 16 Jan. 2000, D.E. Desjardin 7140 (Holotype: SFSU); Java, Mount Halimun National Park, 7 Jan 1999, D.E. Desjardin 6885 (SFSU). MALAYSIA, Kuala Lumpur, Gombok Field Station, 12 Jan 2003, D.E. Desjardin 7516 (SFSU).

Commentary: *Mycena gracilisetosa* is an apparently widespread species, sympatric at one site with *M. gracilipilosa*. For a comparison of these two species see the commentary above.

Mycena indica Manim. & Leelav., Mycologia 80(6): 861. 1988.

Holotype: INDIA, Kerala State, Calicut University Campus, scattered on bark of *Artocarpus heterophyllus* Lamk., 6 Jul. 1987, Manimohan M383 (Isotype: NY!).

Macromorphological description adapted from the protologue:

Pileus 3-10 mm diam., convex to conico-convex; margin decurved, crenulate, often finely fimbriate, sulcate to striate; surface dull, dry, pruinose, with scattered, erect, pale brown hairs. Context thin, white. Odor and taste unknown. Lamellae ascending, adnexed to free, close with three series of lamellulae, white, edge pruinose. Stipe 3-9 x 0.5-1 mm, central, cylindrical, equal, arising from basal disc, densely pruinose, white.

Micromorphological description based on analysis of the isotype specimen:

Basidiospores 8-10 (-11.2) x 5-6 μm [$x = 9.6 \pm 0.8 \times 5.7 \pm 0.4 \mu\text{m}$, $Q = 1.6-1.8$, $Q_m = 1.67 \pm 0.1$, $n = 20$ spores], ellipsoid, smooth, hyaline, strongly amyloid, thin-walled. Basidia 18-20 x 6-9 μm , clavate, 4-sterigmate. Pleurocystidia absent. Cheilocystidia 60-120 x 8-13 μm , fusoid-ventricose with sharply acute apex, base and apex smooth, centrally spinulose, hyaline or with orange globular contents, sometimes with orange, refractive, oily droplets adhered to apex, inamyloid, thin-walled; spinulae 1-3 x 1-1.6 μm , cylindrical, obtuse, hyaline. Pileipellis initially a hymeniform layer of acanthocysts with interspersed pileosetae and marginal cystidia. Acanthocysts 20-40 x 6-15 μm , clavate to irregular in outline, seldom lobed, densely spinulose, hyaline, inamyloid, thin-walled, at maturity widely dispersed; spinulae 1-2.5 x 0.5-1 μm , cylindrical, obtuse. Marginal cystidia identical to the cheilocystidia. Pileosetae scattered, 225-440 x 20-28 (base) x 8-22 (centrally) x 4-8 (apex) μm , acicular, sometimes with a geniculate base, gradually narrowed upwards to an acute apex, smooth, orange to brownish

orange, inamyloid with walls 4-12 μm thick. Hypodermium undifferentiated. Pileus trama of loosely interwoven hyphae 8-20 μm diam., cylindrical to inflated, hyaline, weakly dextrinoid, subgelatinous. Lamellar trama dextrinoid. Stipitipellis (Figure 14.7) a cutis of repent hyphae and caulocystidia. Stipe tissue monomitic; cortical and medullary hyphae parallel, cylindrical, smooth, hyaline, strongly dextrinoid, thin-walled, non-gelatinous. Caulocystidia scattered, simple, 40-65 x 8-15 μm , clavate to fusoid with a swollen base, hyaline, inamyloid, thin-walled. Clamp connections present but not in every septum.

Habit, habitat and known distribution. Scattered on bark of *Artocarpus heterophyllus*. India.

Commentary: *Mycena indica* is currently known from only a single collection made on the campus of Calicut University in Kerala State, India (Manimohan and Leelavathy 1988). Our analysis of the isotype specimen (NY) differed only subtly from the data provided in the protologue, in that many of the cheilocystidia were exudative (with orange oily contents and adherent exudates). The species differs from all other spinose *Mycena* species in the distinctive fusoid cheilocystidia that are centrally spinulose.

Mycena khonkhem Desjardin, Boonpratuang & Hywel-Jones, Fungal Diversity 11: 82. 2002.

Holotype: THAILAND, Nakorn Nayok Province, Khao Yai National Park, Darn Chang trail, solitary to scattered on dead undetermined dicotyledonous leaves, 1 Nov. 2001, T. Boonpratuang TBP 0297 (BBH).

Primordia 1 mm diam., hemispherical, dark grey with short, erect, hyaline setae. Pileus (Figure 16.1) 1-5 mm diam., obtusely conical to convex when young, expanding to plano-convex in age, umbilicate to deeply umbilicate; margin inflexed, decurved, striate; surface dull, dry, hispid, covered with short, erect, hyaline to pale yellow setae; disc and striae grey to dark grey, white elsewhere. Context very thin. Odor not distinctive; taste unknown. Lamellae ascending, narrowly adnate, often with a pseudo-collarium, subdistant to distant (10-16) with 1-2 series of lamellulae, narrow to moderately broad, thin, white to pale greyish white. Stipe 10-20 x 0.1-0.2 mm, central, filiform, cylindrical, glabrous overall, dry, fragile, white-colored, arising from a small, circular, flattened basal disc, white when fresh, drying grey.

Basidiospores (Figure 16.2) (6.5-) 7.0-8.5 (-10) x 3.5-4.5 μm [$x_{\text{mr}} = 7.6-8.1 \times 3.9-4.0$, $x_{\text{mm}} = 7.9 \pm 0.3 \times 3.9 \pm 0.02$, $Q = 1.6-2.5$, $Q_{\text{mr}} = 1.9-2.0$, $Q_{\text{mm}} = 1.98 \pm 0.1$; $n = 15-25$ spores per collection, 2 collections], ellipsoid to broadly ellipsoid, smooth, hyaline, strongly amyloid, thin-walled. Basidia 16-27 x 7-10 μm , clavate, 4-sterigmate, without clamp connections. Basidioles clavate. Pleurocystidia absent. Cheilocystidia scattered, lamellae edge sterile; 20-30 (-35) x 7-18 μm , clavate to broadly clavate or vesiculose, densely spinulae overall, hyaline to pale yellow, inamyloid, thin-walled; spinulae 0.5-2 x 0.5 μm , irregularly cylindrical, obtuse. Pileipellis (Figure 16.3-4) a cutis of repent, densely spinulose hyphae with clavate terminal cells and margin cystidia, and erect pileosetae; hyphae 3.5-8 μm diam., cylindrical to inflated, hyaline to pale yellow, inamyloid, thin-walled, embedded in a thin gelatinous

matrix. Marginal cystidia 20-40 x 10-16 μm , similar to the cheilocystidia, subcylindrical to broadly clavate, densely spinulose overall, hyaline, inamyloid, thin-walled; spinulae 0.5-1 x 0.5 μm , cylindrical. Pileosetae (Figure 16.5) scattered, simple, 70-230 x 16-25 (base) x 6-16 (centrally) μm , aculeate to acicular, gradually narrowed to a sharply acute apex, base geniculate, smooth, hyaline to pale yellow, inamyloid, with walls 2-4 μm thick. Hypodermium not differentiated. Pileus trama composed of inflated hyphae up to 20 μm diam., smooth, hyaline, strongly dextrinoid, non-gelatinous. Lamellar trama hyphae similar to those in the pileus, dextrinoid. Stipitipellis a cutis of repent hyphae and caulocystidia. Stipe tissue monomitic; cortical and medullary hyphae 6-18 μm diam., cylindrical, parallel, smooth, hyaline, strongly dextrinoid, thin-walled. Caulocystidia absent. Clamp connections absent.

Habit, habitat and known distribution. Solitary, scattered, foliicolous on decaying leaves of undetermined dicotyledonous trees in mixed and tropical rain forests. Thailand.

Specimens examined. THAILAND, Nakorn Nayok, Khao Yai National Park, Darn Chang trail, 1 Nov 2001, T. Boonpratuang 297 (Holotype: BBH2011); Narathiwat, Bala Hala Wildlife Sanctuary-Princess Sirindorn Plant Research Unit, 14 Feb. 2001, T. Boonpratuang 177 (BBH1829).

Commentary: *Mycena khonkhem* and *Mycena variicystis*, described herein as a new species, are the only known spinose species of *Mycena* with a smooth stipe that lacks caulocystidia. *Mycena variicystis* differs in forming

cheilocystidia with few, long apical projections (instead of dense spinulae), has a hymeniform pileipellis of acanthocysts when young, and has slightly larger basidiospores (mean $9.0 \times 4.4 \mu\text{m}$). *Mycena khonkhem* is also similar to *Mycena amyloseta*, but the latter species differs in forming amyloid pileosetae, has caulocystidia and lacks of basal disc.

Mycena longiseta Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 118: 282 1909.

Holotype: Indonesia, Java, Cibodas (Tjibodas), on rotten leaves and twigs, 1907-1908, F. von Höhnel, 225 (FH ex 4386!).

Primordia (Figure 18.1) 0.5-1 mm diam., hemispherical, white to greyish white, covered with erected hair, hyaline setae up to 1 mm long. Pileus (Figure 17.1, 18.1) 1-5 mm diam., convex to campanulate or plano-convex, flatten to slightly depressed in age; margin striate to sulcate, ciliate; surface dull, dry, covered with erect, hyaline setae up to 1 mm long; disc white to grey or pale greyish brown, margin pale greyish white to white, becoming yellowish brown with white margin when dried. Context very thin, white. Odor not distinctive; taste unknown. Lamellae ascending, narrowly adnate to subfree, often attached to a pseudocollarium, distant to subdistant (10-12) with 1-2 series of lamellulae, narrow (0.2-0.3 mm), thin, white, non marginate. Stipe 5-28 x 0.2-0.7 mm, central, terete, fistulose, \pm equal above a subbulbous base that arises from a basal disc; dull, dry, sparsely hispid overall, white or with a grey base; basal disc 0.5-1 mm diam, circular, white, sharply defined with an outer raised rim and a radially striate, flattened internal portion.

Basidiospores (Figure 17.2, 18.2) (6.5-) 7.0-9.0 (-10) x (3-) 3.5-5 (-6) μm [$x_{\text{mr}} = 7.3-8.5 \times 3.7-4.7$, $x_{\text{mm}} = 7.9 \pm 0.5 \times 4.1 \pm 0.4$, $Q = 1.4-2.5$, $Q_{\text{mr}} = 1.8-2.1$, $Q_{\text{mm}} = 1.98 \pm 0.1$; $n = 20-25$ spores per collection, 4 collections], ellipsoid to broadly cylindrical, smooth, hyaline, strongly amyloid, thin-walled. Basidia 12.5-18 x 6.5-8 μm , clavate to broadly clavate, 4-sterigmate. Basidioles clavate. Pleurocystidia absent. Cheilocystidia absent. Pileipellis (Figure 17.3, 18.3) a cutis of repent hyphae plus erect pileosetae and marginal cystidia; hyphae 4-12 μm diam., cylindrical to inflated, densely spinulose, hyaline, inamyloid, non-gelatinous to subgelatinous, thin-walled; spinulae 0.5-1.5 x 0.5 μm , cylindrical, obtuse; terminal cells of hyphae are clavate, densely spinulose acanthocysts. Marginal cystidia (Figure 17.5, 18.4) abundant, 40-160 x 8-16 μm (at broadest), ranging from clavate to fusoid or fusoid-ventricose, lower $\frac{1}{2}$ to $\frac{2}{3}$ densely spinulose, upper $\frac{1}{2}$ to $\frac{1}{3}$ smooth, seldom spinulose overall, smooth apical portion tapered, acute, 4-6 μm diam, hyaline, inamyloid, thin-walled; spinulae 0.5-2 x 0.5 μm , cylindrical. Pileosetae (Figure 17.4, 18.5) scattered, simple, (80-) 150-1000 x 10-64 (base), 8-18 (centrally) x 3-10 (apex) μm , acicular with a swollen base, narrowed upwards to an acute apex, smooth, hyaline to pale yellowish, inamyloid, with refractive walls 1-8 μm thick. Hypodermium (Figure 18.6) composed of short-celled, inflated hyphae up to 20 μm diam., hyaline, strongly dextrinoid, thin-walled. Pileus trama composed of parallel to interwoven, loosely arranged hyphae 6-20 μm diam, cylindrical to inflated, smooth, hyaline, strongly dextrinoid, non-gelatinous. Lamellar trama of hyphae similar to pileus trama, dextrinoid. Stipitipellis (Figure 17.6-7) a cutis

of repent hyphae and caulocystidia. Stipe tissue monomitic; cortical hyphae 4-10 μm diam, parallel, cylindrical, smooth, hyaline, strongly dextrinoid, thin-walled, non-gelatinous. Caulocystidia (Figure 17.6-7) abundant, simple, 40-240 x 5-16 μm (at broadest), aculeate, gradually narrowed to an acute apex, base often swollen and geniculate, smooth, hyaline, inamyloid, seldom slightly roughened from adherent debris, thin-walled. Clamp connections absent.

Habit, habitat and known distribution. Solitary to scattered, on leaves of *Castanopsis javanica* (Blume) A. DC. l and undetermined dicotyledonous trees in primary forests in Indonesia and Thailand.

Specimens examined. INDONESIA, Java, Mt. Halimum National Park, loop trail from Cikaniki, 7 Jan. 1999, D.E. Desjardin 6883 (SFSU); Cibodas Botanical Garden, trail to Mount Gede, ca 1406 m, 13 Jan 2005, D.E. Desjardin 7787 (SFSU). THAILAND, Chiang Mai, Doi Inthanon National Park, elev. ca 1600 m., 26 Jun 2002, T. Boonpratuang 348 (BBH6843; SFSU); Nakorn Nayok, Khao Yai National Park, Phakrajai waterfall trail, 26 Jun. 2001, T. Boonpratuang 262 (BBH1974); Khao Yai National Park, Tatapu site, 5 Jul. 2000, T. Boonpratuang 90 (BBH264).

Commentary: *Mycena longiseta* is the type species of *Mycena* sect. *Longisetae*. The species was recently redescribed by Desjardin and Horak (2002, p. 143) based on analysis of the holotype specimen at FH and on material freshly collected in Java, Indonesia. They determined that the current concept of *M. longiseta* was incorrectly based on European and North American specimens that more accurately should be known as *M. aciculata*

(A.H. Sm.) Desjardin & E. Horak. We follow their concept of *M. longiseta* based on topotypical material and add here numerous additional specimens. In the field, *M. longiseta* is most likely confused with *M. brunneisetosa*. *Mycena brunneisetosa* differs, however, in forming a hymeniform pileipellis of acanthocysts, a pileus with yellowish tones, and the pileosetae are typically yellow or yellowish brown.

Mycena palmicola Desjardin, Boonpratuang & Hywel-Jones, Fungal Diversity 11: 79. 2002.

Holotype: Thailand, Nakorn Nayok, Khao Yai National Park, Phakrajai Waterfall trail, scattered to gregarious on senescent leaves of fan palm (*Licuala* sp.) in primary forest, 26 Jun. 2001, T. Boonpratuang 0254 (BBH).

Primordia 0.5 mm diam., hemispherical, minutely hispidulous with short, erect setae, white. Pileus 0.5-1 mm diam., convex, sulcate, minutely hispidulous with short, erect, hyaline setae, dull, dry, white. Lamellae horizontal, adnexed, remote (1-3) without lamellulae, white. Stipe 0.5-1 x 0.2 mm, central, cylindrical, dull, dry, apex glabrous, base pruinose, white overall, arising from small, circular, concave, pruinose, white basal disc.

Basidiospores 7.5-9 (-9.5) x 4.8-5.6 μm [$x = 8.4 \pm 0.6 \times 5.2 \pm 0.3 \mu\text{m}$, $Q = 1.4-1.9$, $Q_m = 1.62 \pm 0.1$, $n = 15$ spores per one collection], ellipsoid, smooth, hyaline, weakly amyloid, thin-walled. Basidia 16-20 x 8-9.5 μm , broadly clavate, 4-sterigmate. Basidioles clavate. Pleurocystidia absent. Cheilocystidia absent. Pileipellis a cutis of repent hyphae with marginal cystidia and pileosetae; hyphae 3.5-6.5 μm diam., cylindrical, sparsely to densely spinulose, hyaline, inamyloid, non-gelatinous. Marginal cystidia 24-

32 x 5.5-9 μm , clavate, apically spinulose, basally smooth, hyaline, thin-walled; spinulae 0.5-1.5 x 0.5 μm , cylindrical, unevenly distributed. Pileosetae, simple, 75-150 x 5-8 (base) x 2.5-3.5 (apex) μm , filiform to acicular, apex sharply acute, base geniculate, with hyaline, inamyloid, smooth, thick-walls 0.5-2.5 μm thick. Hypodermium not differentiated. Pileus trama hyphae 5-10.5 μm diam, cylindrical to inflated, smooth, hyaline, dextrinoid, non-gelatinous. Lamellar trama hyphae similar to pileus trama, dextrinoid. Stipitipellis a cutis of repent hyphae and caulocystidia. Stipe tissue monomitic; cortical and medullary hyphae 4-10 μm diam, parallel, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. Caulocystidia absent at stipe apex, common at stipe base, 28-68 x 8-10 (base) x 1-3 (apical neck) μm , with a swollen ventricose base, and a long, simple or sparsely branched neck, hyaline, inamyloid, thin-walled. Basal disc cystidia numerous, 24-32 x 6.5-11 μm , cylindrical to clavate, covered with dense spinulae, similar to pileus marginal cystidia, hyaline, inamyloid, thin-walled; spinulae 1-2.5 x 0.5 μm , cylindrical. Clamp connections present at the base of basidia, not observed elsewhere.

Habit, habitat and known distribution. Scattered to gregarious, foliicolous on senescent leaves of fan palm (*Licuala* sp.) in primary forests. Thailand.

Specimen examined. THAILAND, Nakorn Nayok, Khao Yai National Park, Phakrajai Waterfall trail, 26 Jun 2001, T. Boonpratuang 254 (Holotype: BBH1966).

Commentary: *Mycena palmicola* is the smallest member of sect. *Longisetae* known to date, with pilei less than 1 mm diam and stipes less than 1 mm long. In other features it is similar to *Mycena brevisetosa*, but the latter differs in forming larger basidiomes with grey to fuscous pilei, more lamellae (7-11), a longer stipe (1.5-7 mm), forms occasional cheilocystidia, and grows on the bark of dicotyledonous trees (Corner, 1994, p. 171). Unfortunately new specimens of this unusual species were not encountered during the course of this study and the holotype was too limited for DNA extraction. Its relationship to other spinose *Mycena* species is therefore unknown.

Mycena tenuisetosa Corner, Beih. Nova Hedwigia, 109: 174. (1994).

Holotype: Malaysia, Johore, Mawai, on dead bark of logs in the forest, Sep. 1934, Corner s.n. (E).

Pileus (Figure 19.1) 3-5 mm diam., convex to pulvinate, disc flattened, margin incurved, striate to sulcate; surface dull, dry, minutely hispidulous, fuscous brown to pale grey when young, in age fading to white, pale grey overall when dried. Context very thin. Odor and taste unknown. Lamellae adnate, distant (10) with 1 series of lamellulae, broad, thin, edge serrulate, white, non-marginate. Stipe 5-7 x 0.5 mm, central, cylindrical, base slightly enlarged, fragile, arising from a basal disc, apex glabrous, base pruinose, dry, white to pale yellowish white.

Basidiospores (Figure 19.2) (7.5-) 9.5-10.5 x 4.5-6.5 μm [$x = 9.8 \pm 0.38$ x 5.7 ± 0.51 μm , $Q = 1.5-2.2$, $Q_m = 1.76 \pm 0.19$; $n = 25$ spores per one collection], broadly ellipsoid to pip-shaped, smooth, hyaline, strongly amyloid, thin-walled. Basidia (Figure 19.3) 20-22 x 8-9.5 μm , clavate to

broadly clavate, 4-sterigmate. Basidioles clavate. Pleurocystidia absent. Cheilocystidia (Figure 19.4) abundant (lamellar edge sterile), 11-32 x 8-13 μm , clavate to broadly clavate, densely spinulose and often with apical appendages up to 24 μm long sometimes branched, hyaline, inamyloid, thin-walled; spinulae 0.5-4 (-24) x 0.5-1.5, cylindrical. Pileipellis (Figure 19.5) a hymeniform layer of acanthocysts and scattered pileosetae. Acanthocysts (Figure 19.6) densely aggregated when young, more widely dispersed as terminal cells in age, 10-24 μm diam., broadly clavate, similar to the cheilocystidia but lacking long apical appendages, hyaline, inamyloid, thin-walled, non-gelatinous; spinulae 0.5-3 x 0.5-1 μm , cylindrical. Pileosetae (Figure 19.7) abundant, 64-88 x 8-12 (base) x 3-5 (apex) μm , narrowed upwards to an acute apex, apical region smooth, lower $\frac{1}{4}$ - $\frac{1}{3}$ densely spinulose, hyaline, inamyloid, with walls up to 1 μm thick; spinulae as on acanthocysts. Hypodermium (Figure 19.8) composed of short-celled, inflated hyphae up to 20 μm diam., hyaline, strongly dextrinoid, thin-walled. Pileus trama composed of parallel to interwoven, loosely arranged cylindrical hyphae, smooth, hyaline, strongly dextrinoid, non-gelatinous. Stipitipellis (Figure 19.9) a cutis of repent hyphae and caulocystidia. Stipe tissue monomitic; cortical and medullary hyphae 8-25 μm diam., cylindrical, smooth, hyaline, strongly dextrinoid, thin-walled, non-gelatinous. Caulocystidia (Figure 19.10) abundant, simple, 15-140 x 6-15 μm , cylindrical to clavate, usually with a long filiform appendage 2.5-4 μm diam., smooth, hyaline, inamyloid, thin-walled. Clamp connections present but not in all tissues.

Habit, habitat and known distribution. Scattered, lignicolous on decaying bark of undetermined dicotyledonous trees in mixed forest. Thailand.

Specimen examined. THAILAND, Nakorn Nayok, Khao Yai National Park, 33th km. marker from Prachin Buree entrance, 5 Mar. 2003, T. Boonpratuang 786 (BBH18496; SFSU).

Commentary: *Mycena tenuisetosa* and the extralimital *M. trichocephala* Singer (Brazil) are the only known spinose *Mycena* species with pileosetae that are basally spinulose. This feature alone clearly distinguishes *M. tenuisetosa* from other South East Asian species.

Mycena variicystis Boonpratuang sp. nov.

MycoBank: 513212

Etymology: *varie-* (Latin) = variously; *-cystis* (Latin) = cell; referring to the various types of cystidia present in the species.

Pileus 1.0-4.5 mm diam., convex to plano-convex with a flattened disc, margin inflexed, striate; surface dry, rugulose, hispid; disc pale brown, margin cream-coloured. Context < 0.5 mm thick. Odor not distinctive; taste unknown. Lamellae adnate to a pseudocollarium, distant (10-12) with 2 series of lamellulae, broad, thin, white. Stipe 5.0-15.0 x 0.2 mm, central, cylindrical, equal, arising from a small basal disc, fragile, dry, glabrous, white to cream-coloured.

Basidiospores (Figure 20.1) 8-12 (-15) x 4-5.6 (-7) μm [$x = 9.0 \pm 0.9$ x 4.4 ± 0.5 μm , $Q = 1.4-3$, $Q_m = 2.08 \pm 0.11$; $n = 25$ spores], ellipsoid, smooth, hyaline, distinctly amyloid, thin-walled. Basidia (Figure 21.2) 18-20 x 10-15

μm , broadly clavate, 4-sterigmate. Basidioles clavate. Pleurocystidia absent. Cheilocystidia (Figure 21.3) abundant, lamellae edge sterile, 20-30 (-35) x (5-) 7-11 μm , clavate, with few to numerous apical appendages, hyaline to pale yellow, inamyloid, thin-walled; apical appendages 4-12x 1-1.5 μm , irregularly cylindrical. Pileipellis (Figure 20.4) a hymeniform layer of acanthocysts when young, becoming a cutis of repent hyphae with acanthocyst terminal cells in age, with scattered pileocystidia; hyphae 8-15 μm diam, densely spinulose, hyaline, inamyloid, thin-walled, non-gelatinous. Acanthocysts (Figure 20.5) 20-35 x 10-30 μm , broadly clavate to sphaeropedunculate, densely spinulose, hyaline to pale yellowish brown, inamyloid, thin-walled; spinulae 0.5-2.5 x 0.5-1 μm , cylindrical. Pileocystidia (Figure 20.6) scattered, simple, 56-92 x 4-10 μm , acicular, often with an enlarged base and gradually narrowed upwards to an acute apex, smooth, hyaline, inamyloid, thin-walled. Hypodermium not differentiated. Pileus trama composed of loosely arranged hyphae 7-20 μm diam., cylindrical, smooth, hyaline, strongly dextrinoid, non-gelatinous. Lamellar trama hyphae dextrinoid. Stipitipellis a cutis of repent hyphae. Stipe tissue monomitic; cortical and medullary hyphae parallel, cylindrical, hyaline, strongly dextrinoid, thin-walled, non-gelatinous. Caulocystidia absent. Clamp connections present but not at every septum.

Habit, habitat and known distribution. Solitary, scattered, lignicolous on bark of undetermined dicotyledonous tree in mixed forest. Thailand.

Specimen examined. THAILAND, Narathiwat, Pru Sirinthorn Research unit, Peat Swamp trail (along the wood bridge), 14 Feb. 2001, T. Boonpratuang 176 (Holotype: BBH1888; Isotype: SFSU).

Commentary: *Mycena variicystis* is the only known spinose *Mycena* species with cheilocystidia that have long apical appendages. Many species in sect. *Longisetae* lack cheilocystidia, while most others have cheilocystidia covered with short, rod-like spinulae. The thin-walled pileocystidia of *M. variicystis* suggest a close relationship with *M. gracilipilosa* and *M. gracilisetosa*, however, both of the latter species lack cheilocystidia and have abundant caulocystidia.

Mycena volvata Boonpratuang, Desjardin & Perry sp. nov.

Mycobank: 513213

Etymology: *volvata*– (Latin) = with a volva; referring to the volva-like basal disc.

Pileus (Figure 21.1) 2-5 mm diam., convex to obtusely conical, margin straight, striate; surface dull, dry, with scattered, erect, blunt setae up to 0.75 mm long, white overall. Context very thin. Odor and taste unknown. Lamellae narrowly adnex to subfree, subdistant with 1 series of lamellulae, broad (-0.5 mm), white. Stipe 5-14 x < 0.5 mm, central, terete, cylindrical, arising from a well-developed basal disc, fragile, dull, dry, minutely hispidulous, translucent, white; basal disc 1-1.5 mm diam. x 1 mm tall, cupulate, margin ciliate, white.

Basidiospores (Figure 21.2) 9-10.5 x 7-8 μm [$x = 10.2 \pm 0.42$ x 7.8 ± 0.35 μm , $Q = 1.1-1.4$, $Q_m = 1.32 \pm 0.09$; $n = 25$ spores], ovoid, smooth, hyaline, distinctly amyloid, thin-walled. Basidia (Figure 21.3) 28-30 x 9-14

μm , broadly clavate, 4-sterigmate, mostly hyaline, some with orange globular contents in Melzer's reagent, inamyloid, with basal clamp connections. Basidioles (Figure 21.3-4) clavate. Pleurocystidia absent. Cheilocystidia absent. Pileipellis (Figure 21.5) a hymeniform layer of acanthocysts when young, becoming a cutis of densely spinulose hyphae with acanthocyst terminal cells in age, with marginal cystidia and scattered pileosetae; hyphae 6-20 μm diam., densely spinulose, hyaline, inamyloid, thin-walled, non-gelatinous; spinulae 0.5-2.0 x 0.5-1.0 μm , cylindrical. Acanthocysts (Figure 21.6) 16-48 x 6-32 μm , broadly clavate to sphaeropedunculate, densely spinulose, hyaline, inamyloid, thin-walled, non-gelatinous; spinulae 0.5-2.0 x 0.5-1.0 μm , cylindrical. Marginal cystidia (Figure 21.7) 80-100 x 6-15 μm , broadly clavate to fusoid, many entirely spinulose, many with a smooth apical projection and a spinulose base; spinulae 0.5-2.0 x 0.5-1.0 μm , cylindrical. Pileosetae (Figure 21.8) scattered, simple, 300- 500 x 24-30 (base) x 50-70 (apex) μm , apex broadly clavate, tapering downwards to a narrow base, smooth, hyaline, inamyloid, with walls 4-9 μm thick. Hypodermium (Figure 21.9) composed of inflated, short-celled hyphae poorly differentiated from the pileus trama, strongly dextrinoid. Pileus trama composed of loosely arranged hyphae 16-48 μm diam., cylindrical to inflated, smooth, hyaline, strongly dextrinoid, thin-walled, non-gelatinous. Stipitipellis (Figure 21.10) a cutis of repent hyphae and erect caulocystidia. Stipe tissue monomitic; cortical hyphae 4-8 μm diam, parallel, cylindrical, smooth, hyaline, strongly dextrinoid, thin-walled, non-gelatinous; medullary hyphae similar but up to 20 μm diam. Caulocystidia (Figure 21.10) 14-52 x 6.5-16 μm , cylindrical or fusoid-

ventricose with a long tapering neck, smooth, hyaline, inamyloid, thin-walled. Clamp connections present but not at every septum.

Habit, habitat and known distribution. Solitary, scattered, lignicolous on bark of undetermined dicotyledonous tree in mixed secondary forest. Malaysia.

Specimen examined. MALAYSIA, Cameron Highlands, Tanah Rata, Jungle trail #9A to Robinson Falls, N04°27.958', E101°23.153', elev. 1415 m, 9 Jan. 2004, D. E. Desjardin 7628 (Holotype: SFSU).

Commentary: *Mycena volvata* is known currently from a single specimen collected in Cameron Highlands in central Malaysia. It is phenetically similar to *M. clavulifera* because of the pileosetae with broadly clavate apices. The latter species differs in forming narrowly ellipsoid basidiospores with mean $Q = 1.9$ and has a less well-developed, flattened basal disc. In comparison, *M. volvata* has ovoid basidiospores with mean $Q = 1.3$ and has a distinctly cupulate basal disc.

Insufficiently known species

Mycena breviseta Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 118: 283. 1909.

Holotype: Indonesia, Java, Cibodas (Tjibodas) on dicotyledonous leaf fragments, 1907-1908, F. von Höhnel #2225 (FH ex 4375).

Desjardin and Horak (2002, p. 149) examined the holotype specimen of *M. breviseta*, deposited at FH, and indicated that it consisted of a few dicotyledonous leaf fragments, no intact basidiomes, and only a portion of a

nearly glabrous stipe attached to a leaf fragment and arising from a circular, white, strigose, somewhat flattened basal disc.

Translation from the protologue:

Similar to *M. longiseta*, but differing in the following features: Pileus umbilicate, striate-sulcate towards the margin, snow white; margin ciliate, with cilia fragile, 60-70 x 10 μm , lacking an apical flagellum, with minutely granular to roughened walls; pileus with white, stiff setae that are short, 70 x 8 μm , or up to 500 x 12-16 μm , with an almost always rooting, not blunt, base. Stipe attached to a conical, radially striate basal disc with ciliate margin, as in *M. stylobates* (Pers.: Fr.) Kummer. Basidiomes scattered on dry leaves in the forest at Tjibodas, Java.

Commentary: Von Höhnelt described *M. longiseta* and *M. breviseta* in the same paper and clearly indicated that they differed in a few features, primarily grey-hemispherical versus white-umbilicate pilei, and long versus short pileosetae, respectively. Until additional material matching the protologue of *M. breviseta* is discovered in Java for comparison with other spinose *Mycena* species, the species will remain insufficiently known.



Figure 11 *Mycena amyloseta* sp. nov. (1) Basidiome, (2) Basidiospores (3) Cheilocystidia, (4) Pileipellis, (5) Pileocystidia arising from Pileipellis, (6-7) Pileocystidia, (8) Hypodermium, (9) Stipitipellis with Caulocystidia and (10) Caulocystidia; Bar (1) = 10 mm, (2-9) = 10 μ m, DED7640.

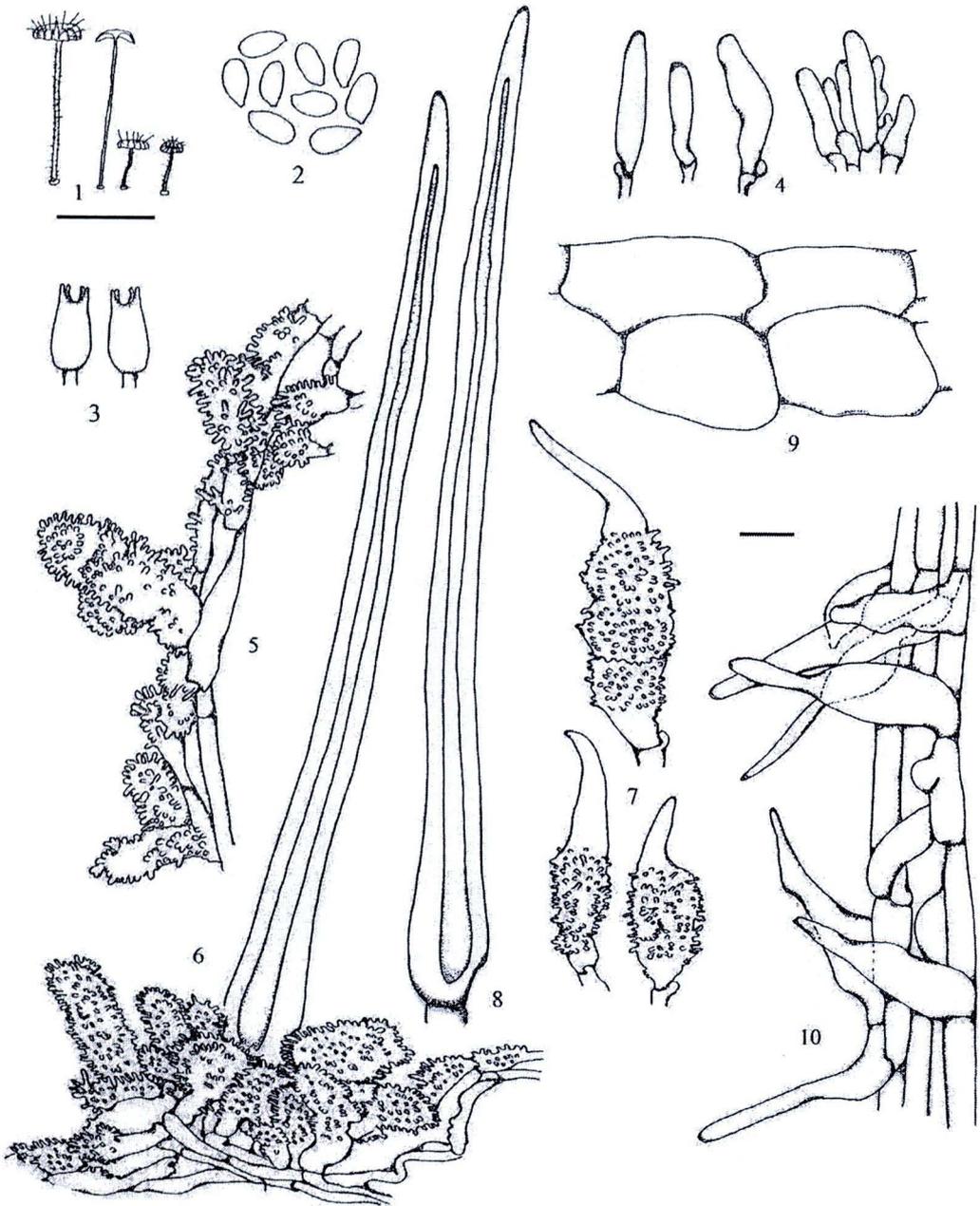


Figure 12 *Mycena brunneisetosa* (1) Basidiome, (2) Basidiospores, (3) Basidia, (4) Basidioles, (5) Pileipellis, (6) Pileocystidia arising from Pileipellis, (7) Marginal Cystidia, (8), Pileocystidia (9) Hypodermium and (10) Stipitipellis with Caulocystidia; Bar (1) = 10 mm, (2-10) = 10 μ m, DED7667.

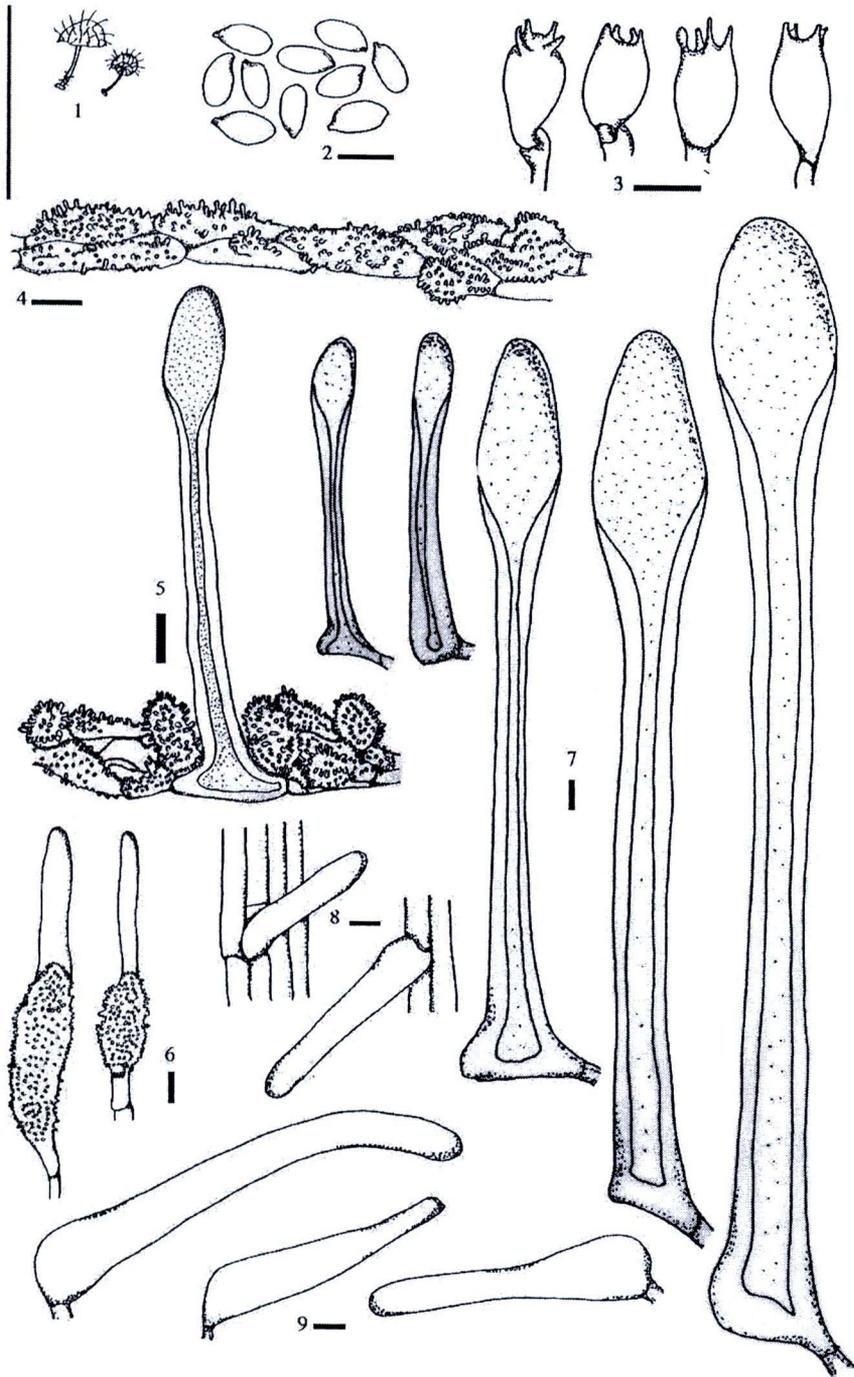


Figure 13 *Mycena clavulifera* (1) Basidiome, (2) Basidiospores, (3) Basidia, (4) Pileipellis, (5) Pileocystidia arising from Pileipellis, (6) Marginal Cystidia, (7) Pileocystidia, (8) Stipitipellis with Caulocystidia, (9) Caulocystidia; Bar (1) = 10 mm, (2-9) = 10 μ m, DED7634.

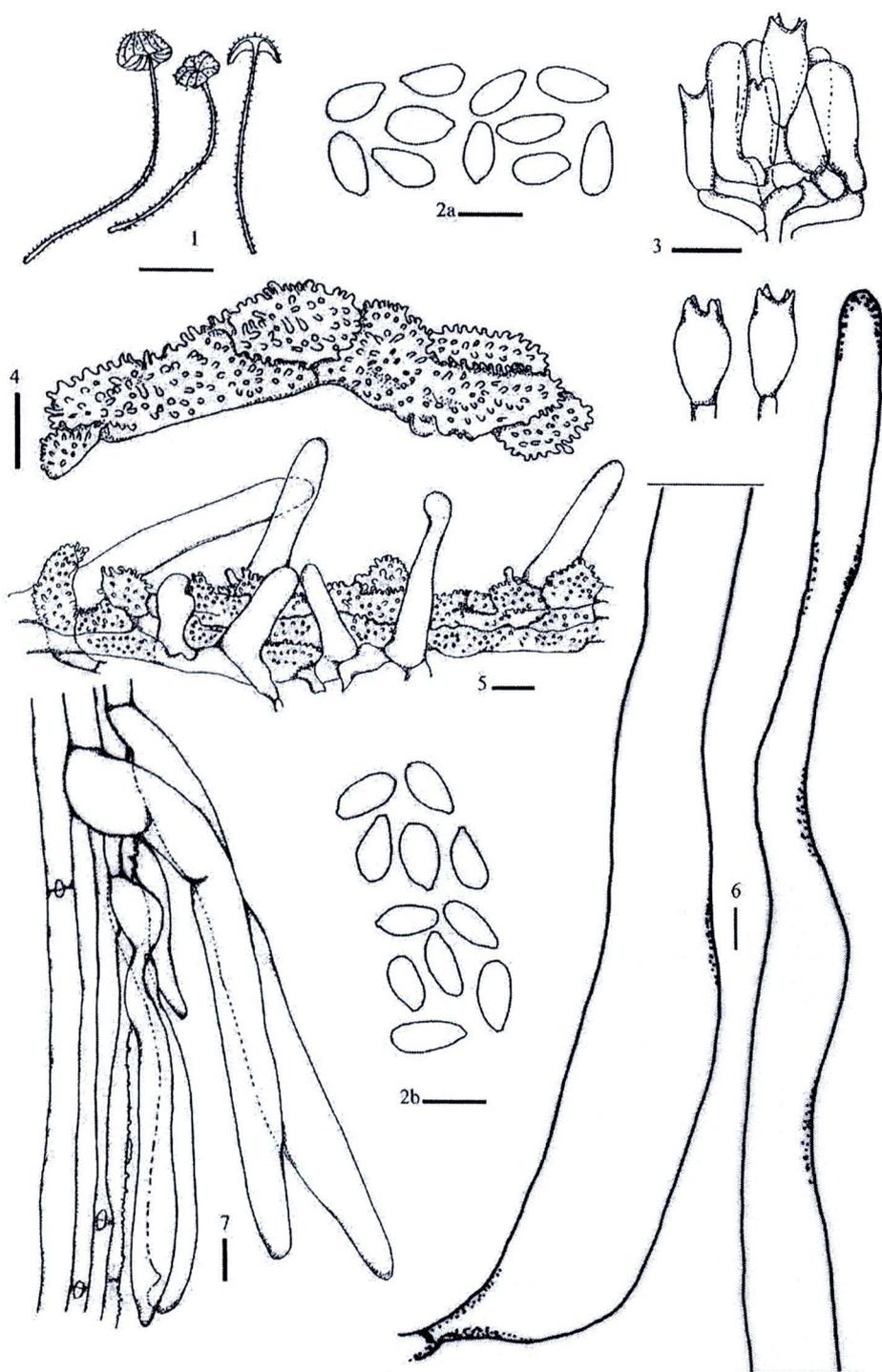


Figure 14 *Mycena gracilipilosa* sp. nov. (1) Basidiomes, (2a-b)

Basidiospores, (3) Basidia with Basidioles, (4) Pileipellis, (5)

Pileocystidia arising from Pileipellis, (6) Pileocystidia, (7) Stipitipellis

with Caulocystidia; Bar (1) = 10 mm, (2-7) = 10 μ m, AR192.

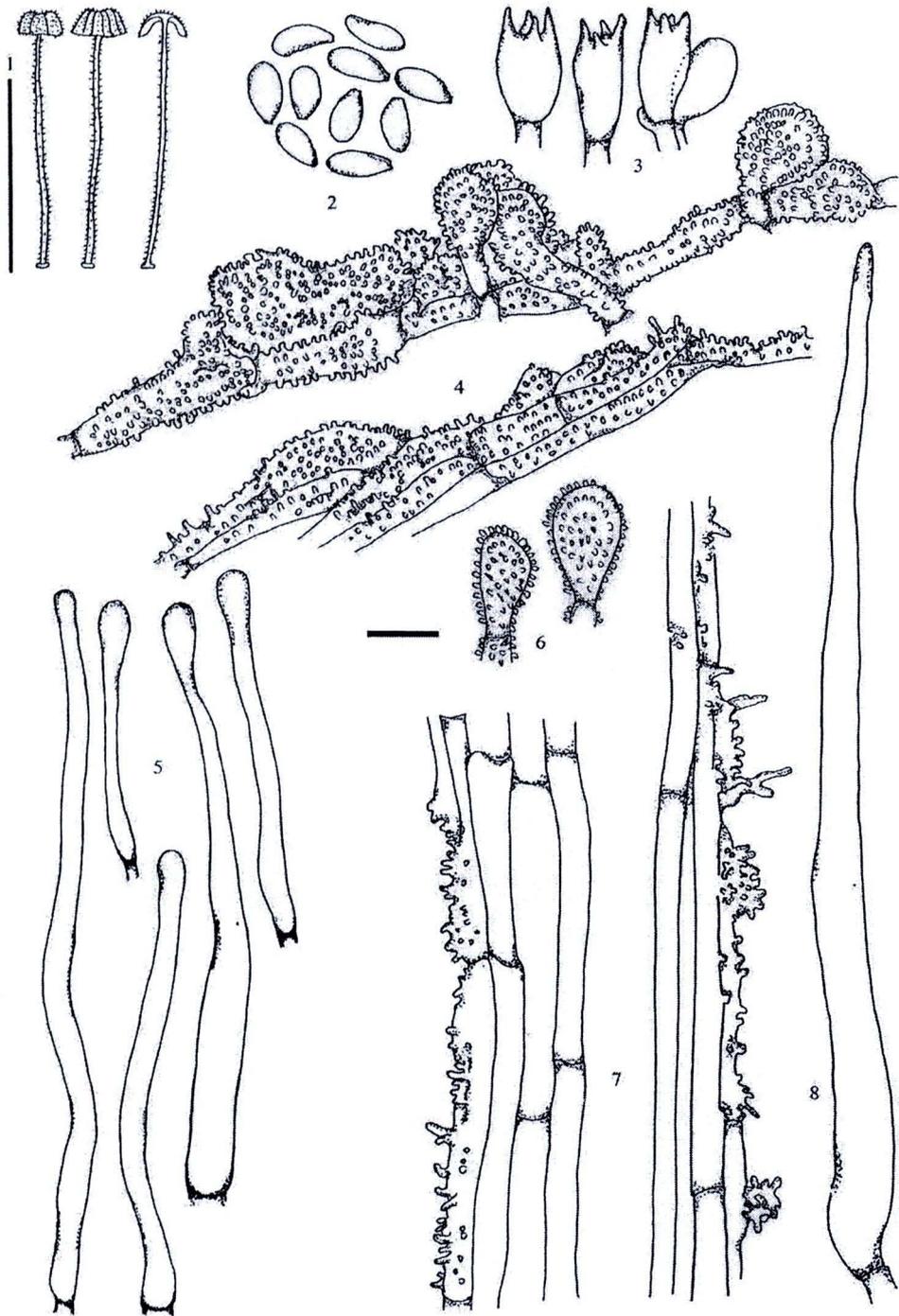


Figure 15 *Mycena gracilisetosa* sp. nov. (1) Basidiomes, (2) Basidiospores
 (3) Basidia and Basidium with basidiole, (4) Pileipellis, (5) Pileocystidia,
 (6) Acanthocyst, (7) Stipitipellis, (8) Caulocystidium; Bar (1) = 10 mm,
 (2-8) = 10 μ m, DED7140.

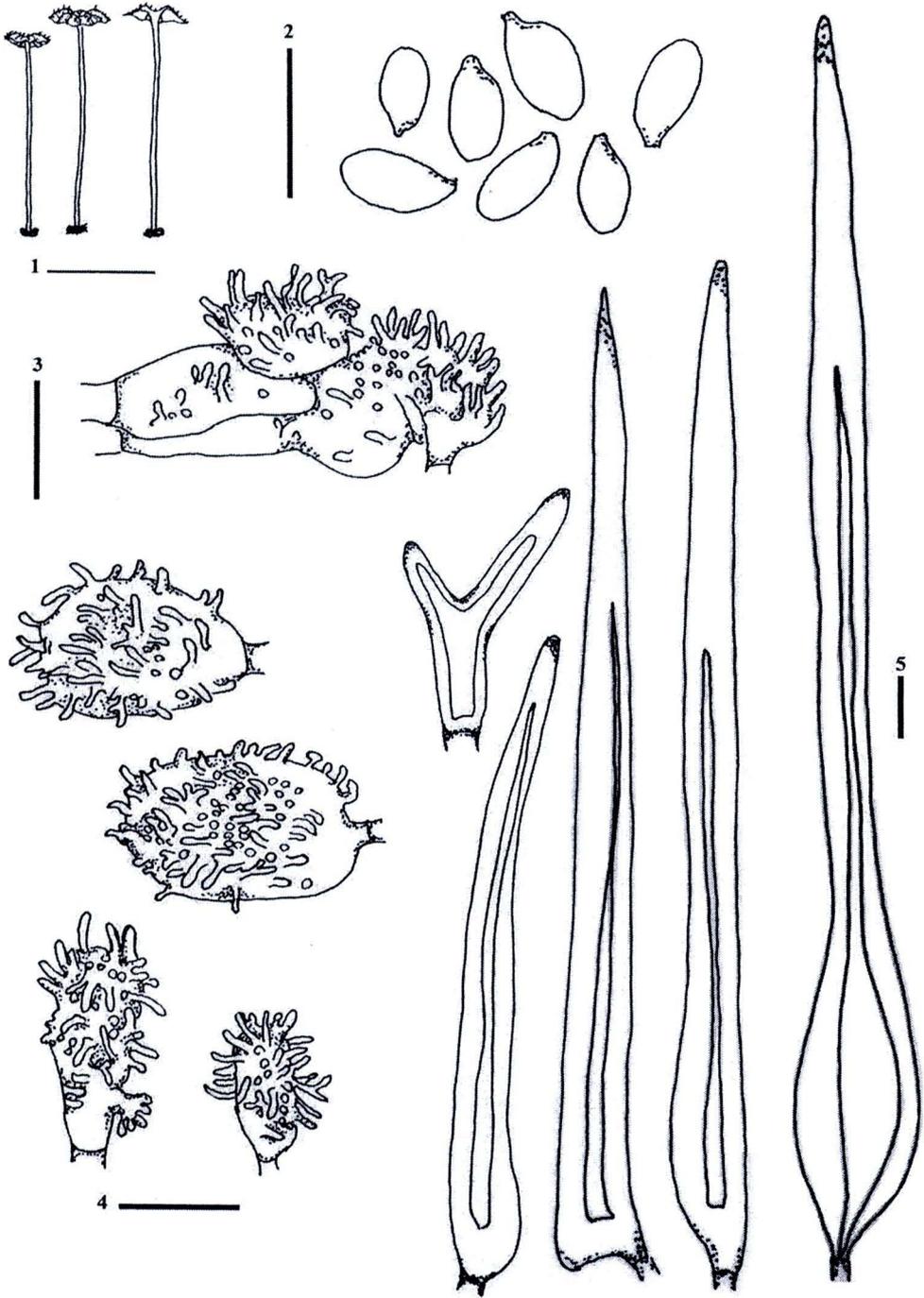


Figure 16 *Mycena khonkhem* (1) Basidiomes, (2) Basidiospores 3) Pileipellis,
 (4) Acanthocysts, (5) Pileocystidia; Bar (1) = 10 mm, (2-5) = 10 μm,
 TBP177.

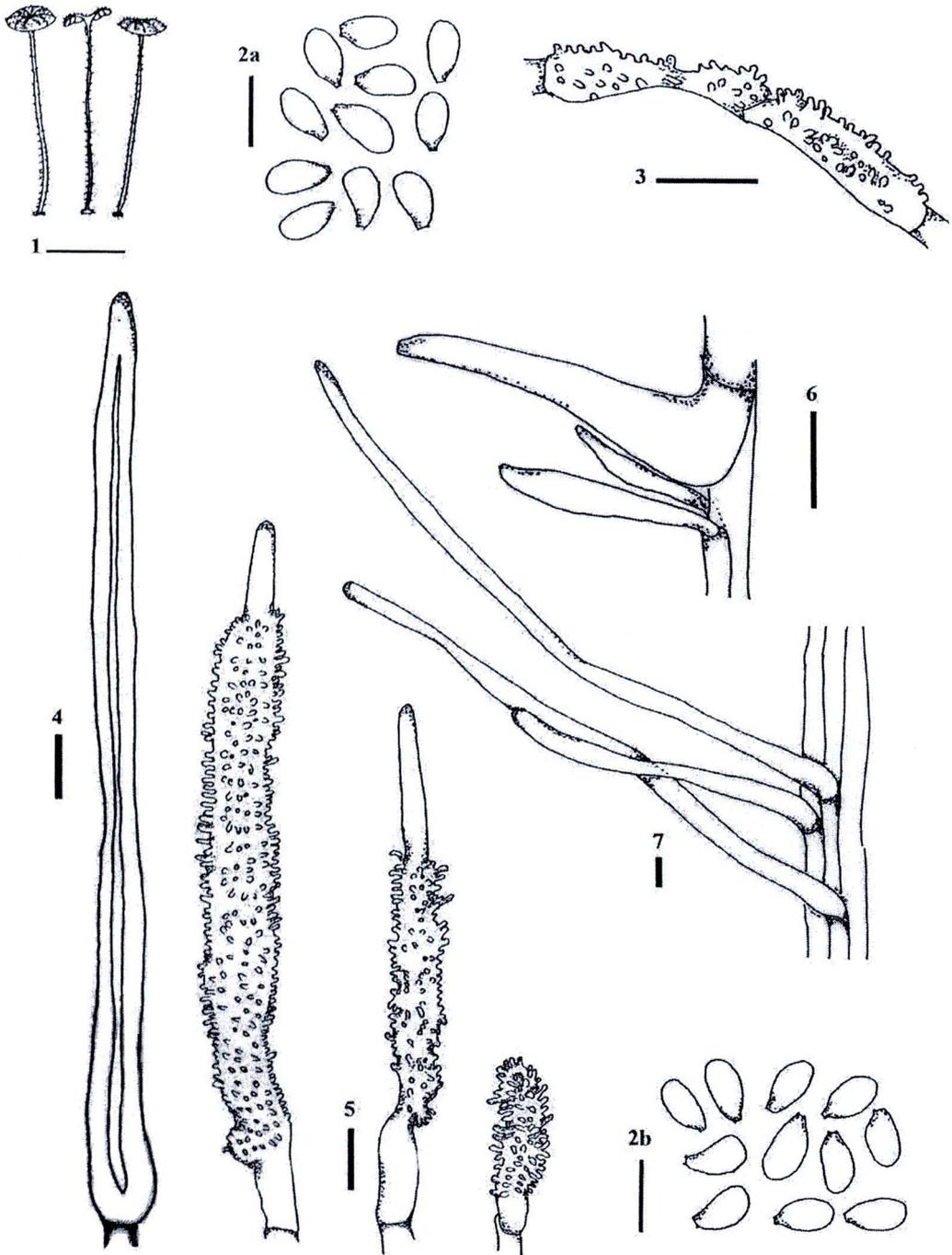


Figure 17 *Mycena longeseta* (1) Basidiomes, (2a-b) Basidiospores (3)

Pileipellis, (4) Pileosetae, (5) Marginal Cystidia, (6-7) Caulocystidia arise from Stipitipellis; Bar (1) = 10 mm, (2-7) = 10 μm , DED7787.

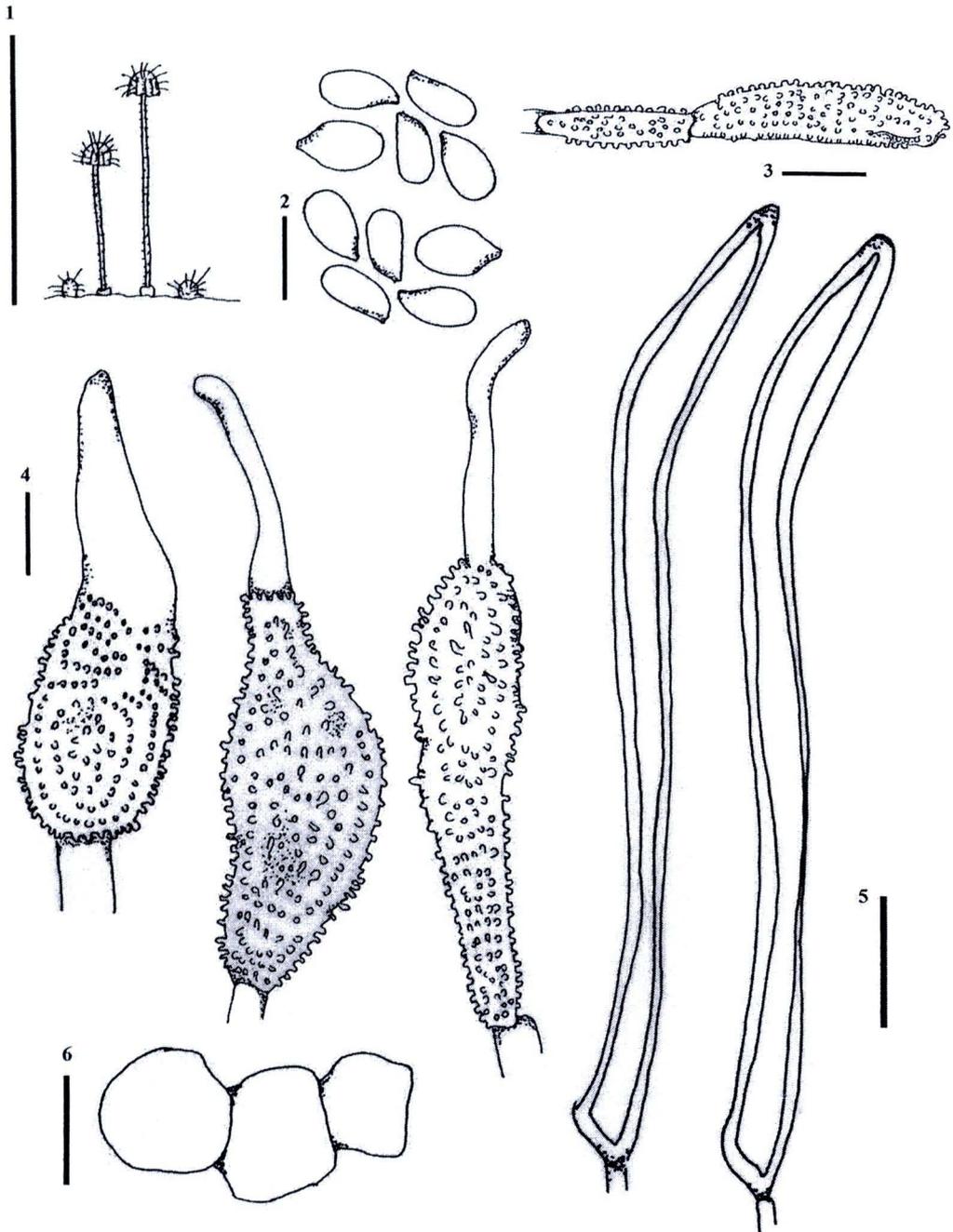


Figure 18 *Mycena longeseta* (1) Basidiomes, (2) Basidiospores, (3) Pileipellis, (4) Marginal Cystidia, (5) Pileosetae, (6) Hypodermium; Bar (1) = 10 mm, (2-6) = 10 μ m, TBP348.

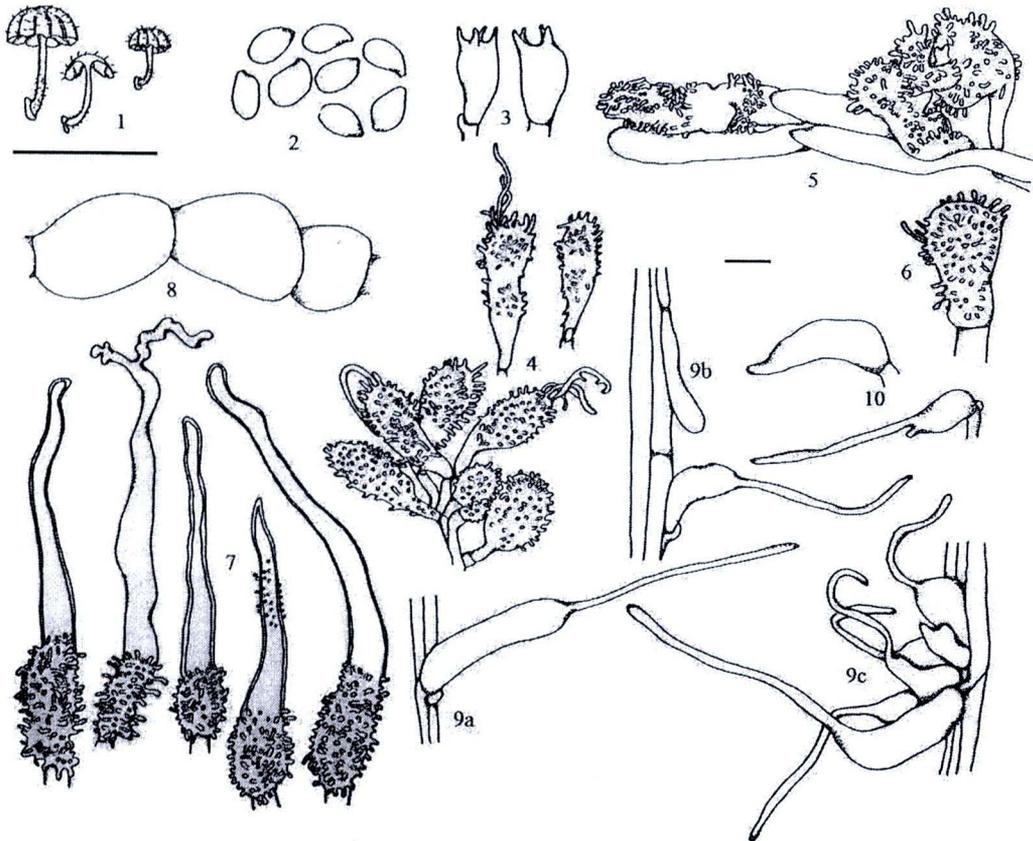


Figure 19 Mycena tenuisetosa (1) Basidiomes, (2) Basidiospores, (3) Basidia, (4) Cheilocystidia, (5) Pileipellis with Acanthocysts, (6) Acanthocyst, (7) Pileocystidia, (8) Hypodermium, (9a-c) Stipitipellis with Caulocystidia, (10) single cell of Caulocystidia; Bar (1) = 10 mm, (2-10) = 10 μ m, TBP786.

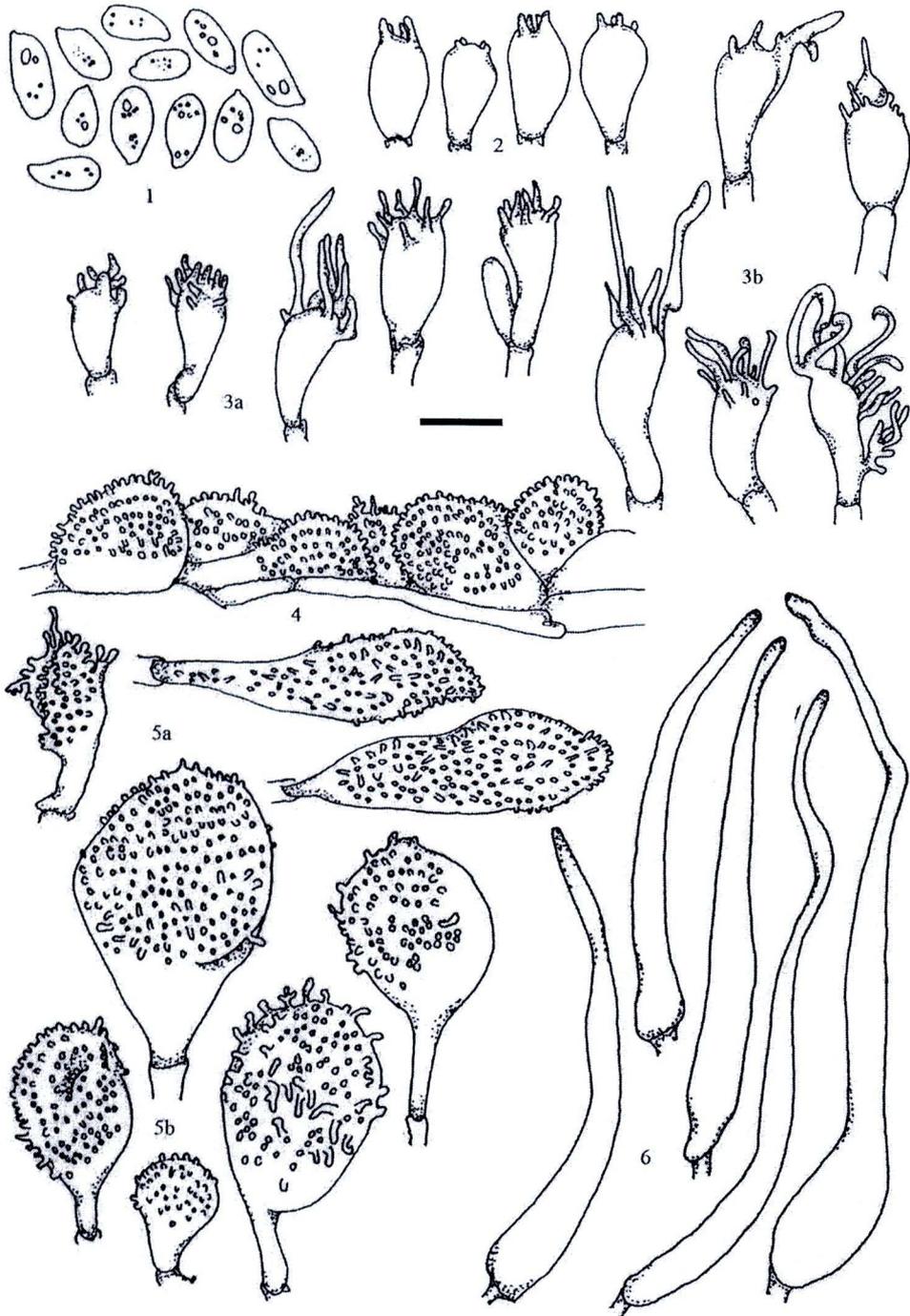


Figure 20 *Mycena variicystis* Boonpratuang sp. nov. (1) Basidiospores, (2) Basidia, (3a-b) Cheilocystidia, (4) Pileipellis with Acanthocysts, (5a-b) Acanthocyst, (6) Pileocystidia; Bar = 10 μ m, TBP176.

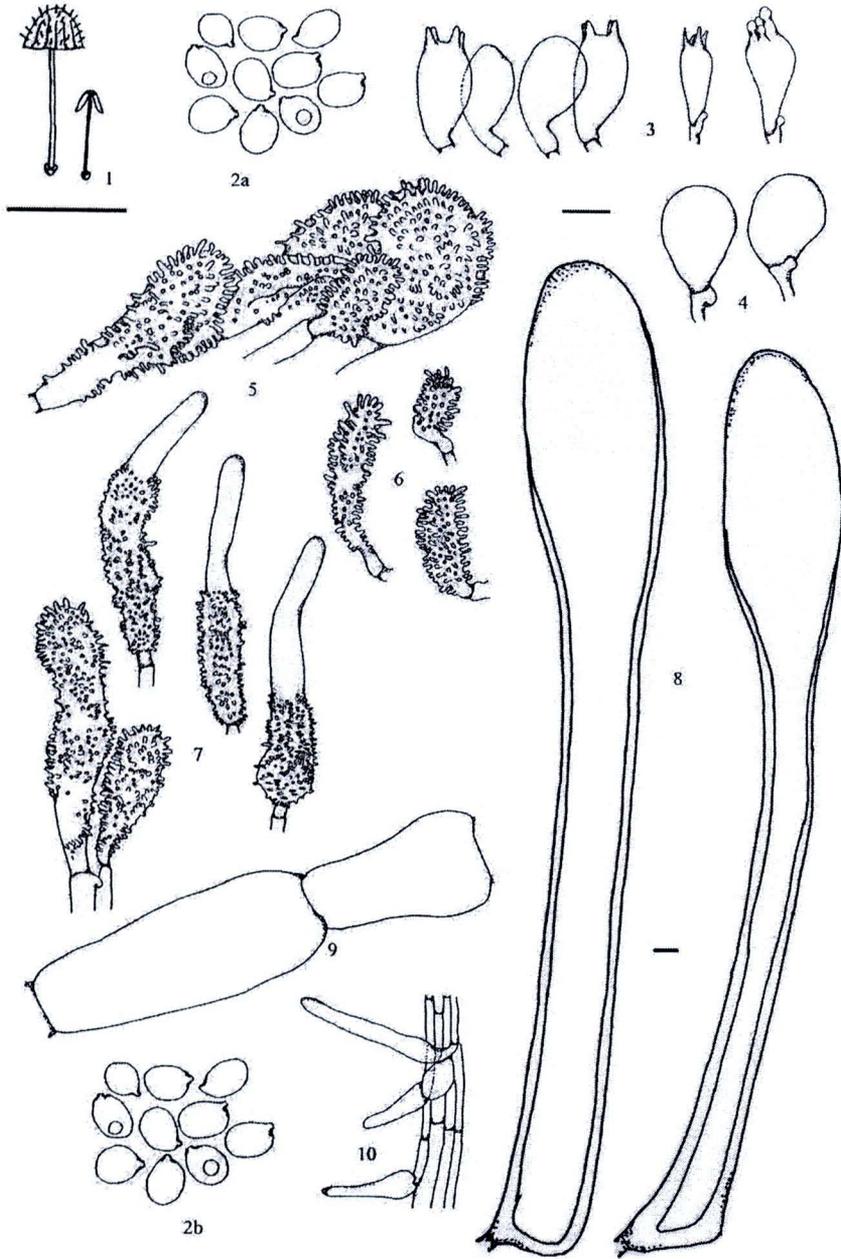


Figure 21 *Mycena volvata* sp. nov. (1) Basidiomes, (2a-b) Basidiospores, (3) Basidia and Basidioles, (4) Basidioles, (5) Pileipellis with Acanthocysts, (6) Acanthocyst, (7) Marginal Cystidia, (8) Pileocystidia, (9) Hypodermium, (10) Stipitipellis with Caulocystidia and single cell of Caulocystidia; Bar (1) = 10 mm, (2-10) = 10 μ m, DED7628.

Phylogenetic Studies

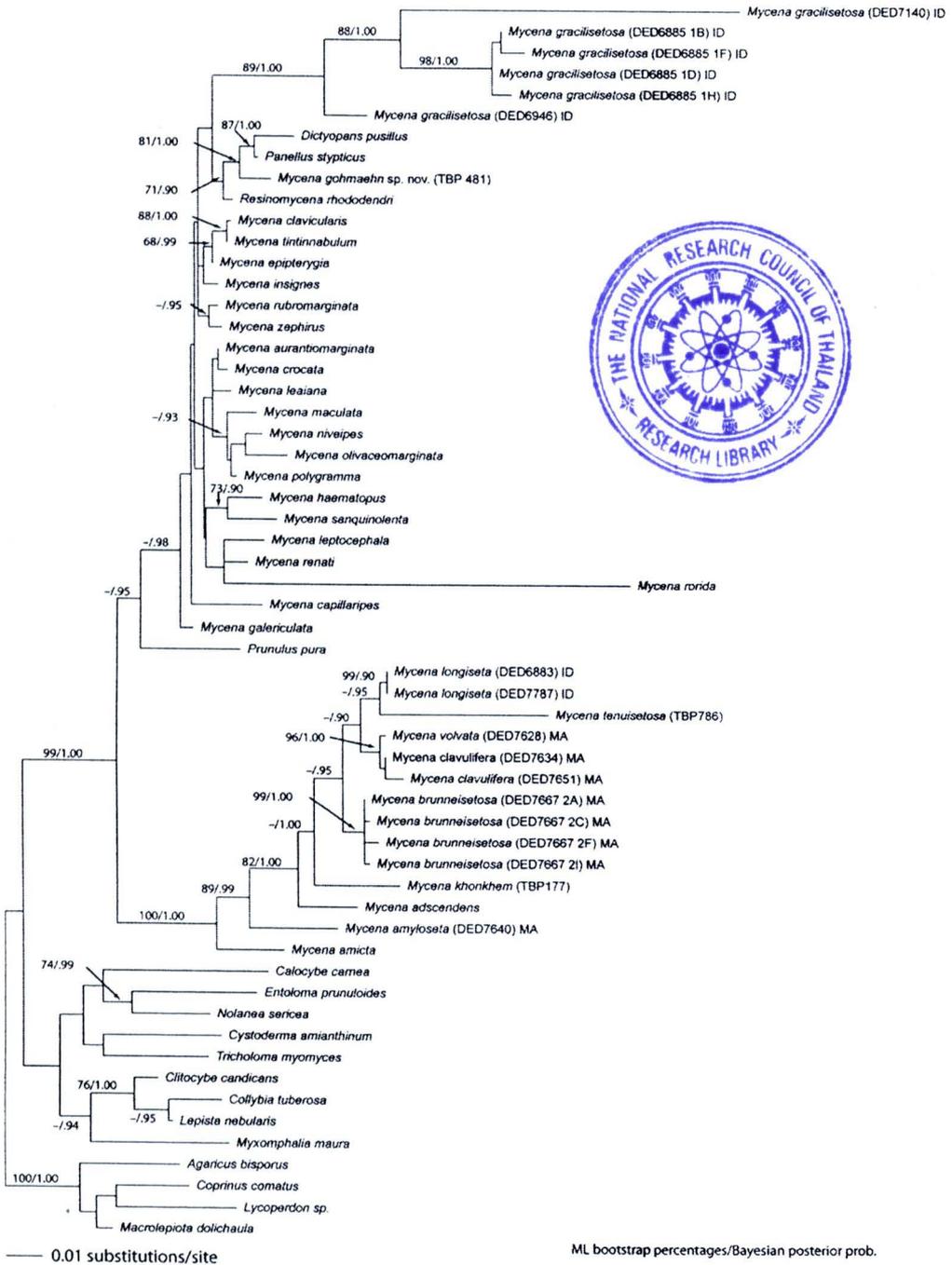


Figure 22 The ML and Bayesian analyses of spinose species of *Mycena* from South East Asia base on nuc-lsu-rDNA sequences. Phylogenetic relationships of the spinose species of *Mycena* inferred from a combined dataset of nuc-lsu-rDNA sequences. The single most parsimonious tree (873 steps, $-\ln L = 5279.64287$) is shown, with branch lengths proportional to the number of mutations inferred with parsimony. Bootstrap values greater than 50% are indicated in plain type. Posterior probabilities generated from the Bayesian analysis are indicated after/symbol.

The nLSU dataset consists of 828 aligned positions for 57 ingroup taxa. Out of 282 variable positions, 181 are parsimony informative. Each of the Maximum Likelihood (ML) iterations recovered a single tree, the likelihood values of which did not differ significantly. The topology recovered in the final iteration is presented herein (Figure 22; $-\ln L = 5279.64287$). Parsimony analyses recovered 144 trees of 873 steps (data not shown), which did not differ significantly in topology from the trees recovered by ML analyses. Bayesian analyses reached a standard deviation of split frequencies below 0.03 after approximately 5,000,000 generations, and the initial 1,000 topologies recovered were discarded as the burn-in.

All species currently accepted in the genus *Mycena* that were included in this study formed a monophyletic lineage with 99% bootstrap (BS) and 1.0 Bayesian posterior probability (PP) support and constitute the family Mycenaceae. Several allied genera, such as *Roridomyces*, *Dictyopanus*, *Panellus*, *Cruentomyцена*, *Resinomyцена* and *Prunulus* were derived within *Mycena sensu lato* (type *M. galericulata*) making *Mycena* non-monophyletic. The eight spinose *Mycena* species included in the molecular phylogenetic analysis based on nLSU sequences (Figure 22) were distributed into two distinct lineages. Three specimens of *Mycena gracilisetosa* formed a monophyletic clade with 89% BS and 0.99 PP support that was sister to the genera *Dictyopanus*, *Panellus*, *Cruentomyцена* and *Resinomyцена* although with limited support (71% BS, 0.90 PP). The remaining seven spinose species (*M. longiseta*, *M. tenuisetosa*, *M. clavulifera*, *M. volvata*, *M. brunneisetosa*, *M. khonkhem*, *M. amyloseta*) formed a monophyletic clade including *M.*

adscendens (Lasch) Maas G. with 89% BS and 1.0 PP support. In this limited sampling, the latter clade plus *M. amicta* formed a monophyletic group with 100% BS and 1.0 PP support that was sister to the remaining members of the Mycenaceae with 99% BS and 1.0 PP support. The cloned sequences for *M. gracilisetosa* (DED 6885) and *M. brunneisetosa* (DED 7667) each formed their own monophyletic clades with 98% or 99% BS and 1.0 PP support (respectively).