New North American species of Gymnopus

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Abstract: Collections of four Gymnopus taxa are proposed as new species: G. barbipes, G. disjunctus, G. micromphaleoides and G. pseudoluxurians. All are placed in subg. Vestipedes and all are compared with taxa producing similar basidiomata.

Key words: Taxonomy, Euagarics, /omphalotaceae
In the course of fieldwork in 2013, two locations not often previously targeted for inventorying were visited. One, in southern Mississippi in mid-July (vic. Wiggins) during the Gulf States Mycological Society summer foray, is considered at the northern border of the Gulf (of Mexico) floristic area. Although Murrill (1938, 1939a, b, 1941, 1942, 1945a, b, 1951) described several Gymnopus (also known as Collybia at that time) species from the vicinity of Gainesville, Florida, that area seems hardly sympatric to the southern Mississippi site. In an otherwise comprehensive, annotated list of Alabama fungi, Underwood and Earle (1897) included only seven “Collybia” species, almost all of which have been transferred to other genera, but also furnished a bibliography to a preceding publication on fungi of the southeastern United States (Underwood, 1897). Atkinson (1897) nearly overlooked agarics, his major interest being in plant pathogenic fungi. The second under-explored site was on the Ozark Plateau of Arkansas (Baxter Co. and vicinity) during the annual foray of the North American Mycological Association in late October. Although late in the season for fleshy fungi, numerous new and/or interesting collections were made.

A third site, conversely, has seen concerted inventorying for much of the 20th century. Although Atkinson (1892) summarized some fungi from the Appalachian Mountains of North Carolina, and Hesler (1937, 1942, 1943, 1945, 1949, 1951, 1957, 1959) and Smith & Hesler (1938, 1943) described the Gymnopus (as Collybia) taxa from the southern Appalachian Mountains of Tennessee and North Carolina, they apparently missed a small fungus from the Great Smoky Mountains National Park. The introduction below of four putatively new species of Gymnopus underscores the probability that additional taxa will be discovered.

Almost all the new taxa described below are represented only by their type specimens, a practice normally disparaged, but considering the low likelihood of recollecting these taxa again in the near future, to relegate them to herbarium names would seem inappropriate.

**Materials and methods:** DNA extraction, PCR of the ribosomal ITS region, Sanger sequencing and cloning procedures were described in Hughes et al., (Hughes et al. 2013). ITS sequences were aligned with other Gymnopus sequences in our database (Mata et al. 2007) and from GenBank using GCG (GCG 2000). The sequence database was trimmed to retain only closely related clades and imported into Geneious (Geneious 2005). PHYML (Guindon & Gascuel 2008) with 100 bootstrap replicates was performed in Geneious. The resulting tree was exported to FigTree (Rambaut 2006). GenBank numbers for this data set are KJ416235 to KJ416269.

Abbreviations: RHP = senior author; KWH = Karen W. Hughes; BF = bright field microscopic illumination; PhC = phase contrast microscopic illumination; GSMNP = Great Smoky Mountains National Park; TFB = Tennessee field book = temporary tracking number of fungal collections assigned prior to herbarium number (TENN). \( L \) = length; \( L^m \) = mean length of n spores; \( W \) = width; \( W^m \) = mean width of n spores; \( Q \) = length divided by width; \( Q^m \) = mean of length divided by width of n spores. Colors enclosed in quotation marks are from Ridgway (1912); color cited alphanumerically are from Kornerup & Wanscher (1967).

**Gymnopus barbipes** R.H. Petersen & K.W. Hughes, sp. nov.

Mycobank no.: 808041

*Holotype:* United States, Tennessee, Blount Co., GSMNP, Metcalf’s Bottoms, 35° 40’ 15.22”

**Diagnosis:** 1. fruiting on deciduous leaf litter, not bark or wood; 2. basal mycelium binding substratum; 3. small basidiospores; 4. absence of well-differentiated pleuro- or cheilocystidia.

**Basidiomata** (Fig. 1) small, collybioid or marasmielloid. **Pileus** 5-15 mm broad, applanate at least when mature, striatulate, not discernibly fibrillose; disc dark brown (6E5, “Verona brown”); limb tan (6C5, “sayal brown”); margin grayish buff (7B2, “tilleul buff”), hardly sulcate. **Lamellae** adnexed to free, sinuate, usually significantly seceding during drying, shallow, thin, subdistant, “Mikado brown” (7C6) around stipe, outward “tilleul buff” (7B2), drying pale cream or off-white (not pearl gray). **Stipe** terete, profoundly hollow, upward “wood brown” (7C4), downward “buffy brown” (6D4) near stipe base, minutely vestured apically, less so downward; stipe base sheathed in a thin, felty, off-white mycelium which spreads locally over the leafy substrate (not tuberculate, not hispid); basal mycelium off-white with very slender repent rhizomorphs. **Odor** negligible; **taste** negligible.

**Habitat and phenology:** Fruiting on deciduous leaf litter; mid-summer.

**Pileipellis** a repent, radial layer of hyphae 2-4 cells thick, with occasional upraised hyphal termini variable in diameter but sometimes slightly enlarged; hyphae 4-12 μm diam, firm-walled (wall – 0.5 μm thick), hardly pigmented, delicately encrusted with scattered (never spiraled or annulate), small deposits (PhC). Subhymenium composed of tightly interwoven, knobby or strangulate hyphae 2-2.5 μm diam, conspicuously clamped, surrounded by a matrix of amorphous, perhaps gelatinous material (?collapsed dead spores and dead, crumpled subhymenium?). Basidioles typically fusiform or torpedo-shaped. **Basidia** (Fig. 4a) 24-31 × 6-7(7.5) μm, clavate to shallowly urniform or hour glass-shaped, 4-sterigmate (sterigmata not unusually long); contents homogeneous, with 1-2 paler vacuoles (?nuclei under PhC). **Pleuro- and cheilocystidia** (Fig. 4a) doubtful, somewhat strangulate to hour glass-shaped, clamped; contents more or less homogeneous, not refringent. **Basidiospores** (Fig. 5) 6-6.5 × 2.5-3 (-3.5) μm, ellipsoid, slightly flattened adaxially, smooth, thin-walled, aguttulate, inamyloid, hyaline. ** Caulocystidia** (Fig. 4b) from stipe apex abundant, 7-12 μm diam, knobby to irregularly shaped, apparently without clamp connections, unencrusted, very slightly pigmented (BF). Lower stipe surface less vestured than upper stipe surface; caulocystidia 3.5-10 μm diam, side branches of stipe surface hyphae, gnarled to irregularly knobbed, usually tapering distally or with narrower terminus than base, thick-walled (wall from firm to 1.0 μm thick, never obscuring cell lumen), hardly pigmented, clamped.

**Commentary:** Original collection TFB 14106 was found to be a mixture of two taxa; *G. dichrous* (retaining TFB 14106) and a taxon, now identified as a second collection of *G. barbipes* (TFB 14483).

For Murrill (see Kimbrough, 1972), the Florida Gymnopus species were sorted according to substrate. Those on cones are now placed in *Strobilurus*, the rest were divided as those “on the ground” versus those “on dead wood, above ground or buried.” According to this, *G. barbipes* would be placed in the former category. Among “Gymnopus” taxa fruiting “on the ground,” *G. atriceps* Murrill (1942) seems most similar to *G. barbipes*, but Singer (1946, 1982), after examining type material, transferred Murrill’s species to *Hydropus*, diagnosed (in part) by amylloid spores. Hesler (1959) drew the same conclusion.

Pleurocystidia are very doubtful. Structures observed were probably advanced basidioles,
given the shape and size of sterigmate basidia. Concerted search on several gill edges did not reveal any other differentiated structures which could be identified as cheilocystidia. Without differentiated pleuro- or cheilocystidia, with prominent stipe vesture (especially on upper stipe), essentially narrow spores and pileipellis hyphae ornamented only with scattered “crystals” (not diverticulate branchlets), *G. barbipes* would have been placed in sect. *Subfumosae* under the taxonomic scheme by Halling (1983), but his later revision (http://www.nybg.org/bsci/res/col/index.html) merged sects. *Subfumosae* and *Vestipedes* and *G. barbipes* must be placed in the latter section. Spores are at the limits of Halling’s key but too short for *G. fasciatus*, and basidiomata much smaller than *G. striatipes*.

Fortuitously, a spore print was produced by TFB 14110, the spores germinated and a self-cross of single-basidiospore isolates was accomplished. When 12 SBIs were paired in all combinations, a tetrapolar mating system was revealed. $A_1B_1 = 1^*$, 2, 5, 7; $A_2B_2 = 4, 6^*, 8, 11$; $A_2B_1 = 3^*$; $A_1B_2 = 9, 10, 12^*$. Subordinate mating types were assigned based on $1/2/5/7 \times 9/10/12 = \text{flat} = \text{common-A}$. The self-cross was very difficult to read, with clamp connections scattered, exclusively on slender, often crimped hyphae and obscured by crystals.

As seen on the limited phylogeny (Fig. 6), *G. barbipes* is found in a clade which is dominated by taxa whose basidiomata emit a foul or disagreeable odor (Antonin & Noordeloos, 2010, *Gymnopus* subg. *Vestipedes*, sect. *Impudicae*). The clade also includes *G. foetidus*, the type species of the formerly recognized genus *Micromphale*. Following Mata et al. (2007), *Micromphale* taxa were transferred to *Gymnopus*. Recently, Cooper & Leonard (2013) described three *Gymnopus* taxa with foetid basidiomata from New Zealand, thus following Mata et al. (2007) and Antonin & Noordeloos (2010).

*Micromphale* was diagnosed by two leading characters: 1. foetid odor of basidiomata; and 2. gelatinized material in pileus, lamella and stipe tramae. Testifying to discrepancies between diagnostic characters gleaned from morphological features and phylogenies based on DNA, *G. barbipes* seems to lack both diagnostic characters. Instead it seems rather typical of other taxa in subg. *Vestipedes* (*G. subnudus*, *G. biformis*, etc.).

In phylogenies below, a clade labeled as *G. luxurians* and “aff. dichrous” contains collections from eastern Russia, Primorsky Territory, Hasansky Dist. Examination of these collections may show them to also represent a new taxon, the subject of a future investigation.

Specimens examined: United States, Tennessee, Blount Co., GSMNP, Metcalf’s Bottoms, 35° 40’ 15.22” N, 83° 41’ 28.20” W, 10.VIII.2012, coll. KWH, TFB 14110 (TENN 67858; holotype); same location, same date, TFB 14106 (pro parte) (TENN 69173).

**Gymnopus disjunctus** R.H. Petersen & K.W. Hughes, sp. nov. Figs. 7-9
Mycobank no.: 808042

**Holotype:** United States, Connecticut, Tolland Co., vic. Amston, Camp Hemlocks, 41° 37’23.15” N, 72° 23’ 34.81” W, 1.IX.2013, coll Paula De Santo (COMA), TFB 14339 (TENN 69172).

**Etymology:** “disjunctus” = referring to the wide geographic separation of the two known collections.

**Diagnosis:** 1) capillary stipe; 2) barbed stipe vesture; 3) small, dark pileus; 4) off-white basal pad; 5) occurrence on deciduous leaves and aments of *Quercus*; 5) spores with $Q^m$ circum 2.0; 6) locally abundant, coralloid cheilocystidia; and 7) heavily encrusted pileipellis hyphae.
**Basidiomata** (Fig. 7a) 17-45 mm high, collybioid or marasmioid, erect. **Pileus** 7-12 mm broad, shallowly convex to applanate, minutely roughened in contour, matt, radially fibrillose, often with slightly darker central depression, closely sulcate-striate ¼-1/3 toward center; disc “snuff brown” (5E8), outward “sayal brown” (6C5), drying darker, with an olivaceous tint (near “dark grayish olive” 30E4) and disc sometimes becomes paler, creating a pallid “eye.” **Lamellae** adnexed, thickish, subdistant to distant, seceding in drying, perhaps so in nature when aging to give a pseudocollariate impression, shallow, not ventricose, not anastomosed, “pale pinkish buff” (6A2) to near “tilleul buff” (7B2). **Stipe** 3-6 times as long as pileus breadth, erect, terete, equal, very slender (0.5-1 mm thick), lightly vestured throughout, apically concolorous with lamellae, downward “sayal brown” (6C5) to “buffy brown” (6D4), usually becoming strigose; vesture minute and delicate upward on stipe, downward becoming a solid turf, often with caulocystidia gathered into spikes or synnemata; stipe base hardly expanded, inserted as a small mycelial pad occasionally well-developed, off-white; in one case, accompanied by a couple off-white, hair-like rhizomorphs with bases as pads on the mid-vein of a leaf. **Odor** and **taste** negligible.

**Habitat and phenology:** Some basidiomata on dead, sclerophyllous leaves, others on cast-off but not rotted catkins (probably of *Quercus*); mid-summer in open, secondary forest of “mixed woods,” including *Quercus*, *Carya* and *Pinus*.

Superficial pileipellis hyphae (Fig. 7b, c) radial, 3.5-8 μm diam, significantly pigmented, strongly encrusted in bands with small calluses in profile, conspicuously clamped; subpellis hyphae 3-4.5 μm diam, firm-walled, frequently branched, smooth to lightly encrusted; encrustation appearing as flakes, scattered, without profile calluses, “free-form,” appearing as though in a mucoid matrix.

Subhymenium and hymenium immersed in hyaline mucoid material, with evidence that effete basidia gelatinize. Subhymenial hyphae 1-1.5 μm diam, tightly interwoven, clamped. Basidioles 23-32 × 4-7 μm, digitate when young, becoming torpedo-shaped and finally broadening into basidia. **Basidia** 22-34 × 5-7(-11) μm, clavate, 4-sterigate, clamped; contents multigranular, the granules scattered throughout. Pleurocystidia not observed. **Basidiospores** (Fig 8c, d) (5.5-)6-7.5 × 3-3.5 μm (Q = 1.71-2.33; Qm = 1.98; Lm = 6.58 μm), ellipsoid-lacriform, smooth, thin-walled, inamyloid, hyaline; contents more or less homogeneous. Lamellar edge sporadically fertile. **Cheilocystidia** (Fig. 7d, e) locally abundant, 24-50 × 8-20 μm, subarbuscular with stout stalk and lobed-branched apex, thin-walled, often internally septate, hyaline. Hyphae of stipe trama 5-12 μm diam, strictly parallel, adherent, firm- to thick-walled (wall -0.7 μm thick), weakly pigmented, with evidence of a mucoid or gelatinized matrix partially soluble in KOH. Stipe cortical hyphae 2.5-4.5 μm diam, strictly longitudinal, apparently adherent, thick-walled (wall -1.0 μm thick), seldom but prominently clamped, gradually tapering to slender, acutely rounded apex. Stipitipellis a thatch of interwoven, thick-walled (wall -1 μm thick), copiously branched, gnarled or coralloid hyphae producing caulocystidia as hyphal tips. **Caulocystidia** (Fig. 8a, b) more or less straight, internally clamped, thick-walled (wall -0.7 μm thick), hyaline, gathered together into conical sheaves so as to appear thorny or barbed at 50×; individual caulocystidial hyphal cells 28-85 × 3-6 μm, smooth, thick-walled (wall -0.7 μm thick), hyaline.

**Commentary:** The presence of a mucoid or subgelatinous exudate in pileus trama, lamellar and stipe tissues is reminiscent of *Micromphale*, but Mata et al (2007) showed that *Micromphale* was subsumed within *Gymnopus*, so presence or absence of mucoid matrix no longer defines...
Micromphale at genus rank. ITS sequence also shows that *G. disjunctus* is not closely related to either *M. foetens* or *M. perforans* complexes. (Fig.9).

It was serendipitous to find two collections of this fungus widely separated geographically. The eventual type specimen (Connecticut) was thought to represent *G. subnudus*, but its ITS match to the Mississippi specimen obliged a more careful morphological examination in which the two specimens were hardly separable. The Connecticut specimen was contributed to the sorting table at the annual foray of the Connecticut-Westchester Mycological Association (COMA).

**Additional specimen examined:**
Mississippi, Forrest Co., Desoto National Forest, vic. Wiggins, Black Creek Trail at CCC Camp car park, N 31° 01’ 34.64”, W 89° 11’ 35.24” (229 ft elev), 11.VII.2013, coll RHP, TFB 14281 (TENN 68136).

**Gymnopus micromphaleoides** R.H. Petersen & K.W. Hughes, sp. nov.
Mycobank no.: 808043

**Holotype:** United States, Mississippi, Forrest Co., vic Wiggins, DeSoto National Forest, Black Creek Trail at CCC Camp car park, 31° 01’ 34.64” N, 89° 11’ 35.24” W, 11.VII.2013, coll RHP, TFB 14282 (TENN 68165).

**Etymology:** micromphale = referring to the genus Micromphale; -oides = resembling; thus, resembling Micromphale.

**Diagnosis:** 1) common pileocystidia; 2) small spores; 3) small basidiomata; 4) clavate cheilocystidia; 5) habit on dead, deciduous woody twigs; 6) close, ventricose lamellae. Location in Gulf-influenced geography may also be significant.

**Basidiomata** (Fig. 2) small, marasmielloid or micromphaleoid. **Pileus** -12 mm broad, applanate, slightly centrally depressed, deeply pebbled-striate, “wood brown” (7C4), outward “vinaceous buff” (9B2) remaining so in drying. **Lamellae** adnexed, more or less thick, ventricose, close, “tilleul buff” (7B2), drying pale pearl gray. **Stipe** scurfy-vestured, “olive brown” (5E5) over all, inserted squarely (not expanded at base, not insititious), perhaps arising from a lenticel, becoming somewhat cartilaginous upon drying, but vesture remaining intact; vesture scales “tilleul buff” (7B2). **Odor** none; **taste** not tested.

**Habitat and phenology:** Fruiting on dead deciduous twigs: mid-summer.

**Pileipellis** (Fig. 10a) a layer of radially oriented hyphae; hyphae (3-5)-12 μm diam, strongly pigmented, firm- to thick-walled (wall 0.7 μm thick), strongly encrusted; encrustation in irregular rings or stripes, commonly with slender, refringent (PhC) calluses in profile.

**Pileocystidia** (Fig. 10c) erect, common, composed of 1-2 cells (with clamp connection between), of which the terminal cell is 27-55 × 10-14 μm, clavate, thick-walled (wall 0.7 μm thick), weakly pigmented, virtually smooth to lightly speckled or flecked. Lamellar trama irregularly longitudinal; hyphae (2.5-)3-7 μm diam, thin-walled, free (not gelatinized or in a mucoid matrix), conspicuously clamped; contents homogeneous. Basidioles clavate (not torpedo-shaped); **Basidia** (Fig. 10b) 20-22 × 5-6 μm, clavate, 4-sterigmate, obscurely clamped; contents scattered-multiguttulate.

**Cheilocystidia** (Fig. 10b) locally abundant, 30-52 × 8-12 μm, clavate, clamped, thin-walled, often semicollapsed; contents homogeneous, “empty.” **Basidiospores** (Fig. 10d) 4.5-6(6.5) × 2.5-3 μm (Q = 1.67-2.20(-2.60); Qm = 1.96), lacrymiform to ellipsoid, smooth, thin-walled, inamyloid; contents 1-3-guttulate (guttules refringent, masking spore wall outline, PhC). Stipe medulla cartilaginous; **stipe**
**medullary hyphae** 3-7 μm diam, strictly parallel, thick-walled (wall -0.5 μm thick), unornamented, hardly pigmented. Stipe surface cartilaginous; hyphae 3-7 μm diam, thick-walled (wall -0.7 μm thick), encrusted in flakes, moderately pigmented (olive-brown, PhC), producing caulocystidia as side branches. Stipe ornamentation a thatch of tightly interwoven, tortuous-gnarled, encrusted hyphae producing caulocystidial terminal cells; **caulocystidial terminal cells** (Fig. 10E) 11-50 × 4-11 μm, digitate to clavate, often branched once or twice, thick-walled (wall -0.7 μm thick), unornamented (smooth), hardly pigmented.

**Commentary:** Based on habit on wood and applanate brown, striate pilei, the collection was mistaken for a *Micromphale*. Absence of gelatinized deposit on the pileipellis or in the trama of pileus or lamellae, however, pointed in the direction of *Gymnopus*. ITS sequence (Fig. 11) indicated its close relationship to *G. dichrous* (also on deciduous wood or bark), where it was considered a variant. *G. dichrous* differs in significantly larger basidiomata, usually campanulate pileus, flattened or compressed stipe, more saccate cheilocystidia and larger spores.

Stipe vesture appears somewhat squamose when dry. The squamose scale-like structures are actually plaques of gnarled, tightly interwoven superficial hyphae which produce the smooth caulocystidial terminal cells. Thus the smooth terminal cells can be seen arising from encrusted subcystidial cells.

Pileocystidia are obvious and common, somewhat rare in the *Vestipedes* complex.

Recently (Cooper & Leonard 2013), three species of *Gymnopus* belonging to the *Micromphale* complex were described from New Zealand. *Gymnopus micromphaleoides* basidiomata macroscopically resemble those of *G. hakaroa* in size, shape and habit, but ITS sequences are clearly separate.

**Gymnopus pseudoluxurians** R.H. Petersen & K.W. Hughes, sp. nov. Figs. 3, 12-14. Mycobank no.: 808044

**Holotype:** United States, Mississippi, Stone Co., vic. Wiggins, Walker’s Run, 30° 54’ 42” N, 89° 05’ 25” W, 12.VII.2013, coll C. Ovrebo, TFB 14290 (TENN 68144)

**Diagnosis:** 1. basidiomata of medium size; 2. resemblance to *Marasmius* sect. *Globulares*; 3. habit among grasses; 4. cheilocystidia hardly differentiated from basidia in size and clavate shape; 5. basidiospores 8-10 × 4-5 μm (Qm = 1.90); 6. caulocystidia short, a tangled thatch.

**Basidiomata** (Figs. 3, 12a) medium-sized, collybioid. **Pileus** -29 mm broad, weakly convex when young, applanate by maturity, occasionally centrally depressed, smooth, delicately radially fibrillose to subglabrous, not striate, sometimes cracked centrally, more or less uniform in color, “cinnamon buff” (6B4). **Lamellae** adnate, close, thin, shallow, weakly sinuate, “pale pinkish cinnamon” (6A2), seceding in drying to appear pseudocollariate. **Stipe** terete, more or less equal, sometimes slightly tapered downward, thinly vesture, apically concolorous with lamellae, downward soon “pinkish buff” (6A3) to “cinnamon buff” (6B4), becoming twisted in drying, usually including a small ball of soil on stipe base. **Odor** none. **Taste** negligible.

**Habitat and phenology:** Fruiting on small, well-decayed sandy debris buried in lawn; summer.

**Pileipellis hyphae** (Fig. 12b) 4-16 μm diam, firm-walled, very weakly encrusted in transverse banding (PhC) but with no visible calluses in profile and invisible in BF with no stain, with occasional erect side branches or termini (Fig.12b), consistently clamped.
Pleurocystidia not observed. Basidioles fusiform, tapering distally. Basidia (Fig. 12c) 27-29 × 7-9 μm, clavate, 4-sterigmate, arising from a clamp connection, thin-walled; contents multiguttulate, with guttules scattered throughout. Basidiospores (Fig. 13) (7.5-)8-10 × 4.5 μm (Q = 1.67-2.25; Qm = 1.90; Lm = 8.75 μm), hyaline, thin-walled, inamyloid, smooth; contents 1-few guttulate, the guttules small but obscuring the spore wall (PhC). Cheilocystidia (Fig. 12c), if present, scattered on lamellar edge (lamellar edge fertile), 30-39 × 8-11 μm, clavate, somewhat larger than basidia, sometimes with irregularly lumpy apex, thin-walled, arising at a clamp connection; contents uni- to few-guttulate. Stipitipellis of longitudinal, clamped hyphae. Vesture a thatch of tangled caulocystidia. Caulocystidia (Fig. 12d) -90 × 3.5-6.5 μm diam, thick-walled (wall -0.5 μm thick), pallid straw-colored in mass (BF), occasionally internally clamped, gnarled to wavy, often branched.

Commentary: Basidiomata of G. luxurians are larger, darker brown, more or less polished with habit on second-year woody mulch (usually spread among ornamental plantings). Basidiomata of G. pseudoluxurians are paler and resemble those of Marasmius of sect. Globulares [M. cystidiosus (A.H. Sm & Hesler) Gilliam, M. oreades (Bolton) Fr., M. nigrodiscus (Peck) Halling or M. strictipes (Peck) Singer], for which it was mistaken when fresh. The lack of unornamented broom cells in the pileipellis disqualifies G. pseudoluxurians from that complex. The stipe is hardly pruinose, but the pileipellis is surely not a “dryophila structure,” but more or less typical of the old Collybia section Subfumosae.

This stipe vesture in G. pseudoluxurians is unique. As vestures go, it is quite short and rather uniform in length, giving the appearance of a cropped beard rather than a long tangle. This may account for the ease with which the vesture is suppressed on handling of the stipe.

Discussion: It is unfortunate that the new taxa described above are represented by only very sparse specimens. No data are available, for example, on the variability of caulocystidial characters, perhaps important in identification of collections of Gymnopus subg. Vestipedes. While “barcode” DNA sequences (now accepted as nrITS sequence) are becoming useful in identification as more and more diverse sequences are deposited in databases, such sequences for small, unimpressive, saprophytic agarics are few and so cannot yet provide a guide for identification and therefore for morphological comparison and assessment of character variability.

A case in point is Gymnopus dichrous, which now seems to occur in a plethora of macro- and micromorphological forms some of which would qualify as distinct taxa were it not for close matches of ITS sequences. Moreover, according to Hughes et al. (2013), these entities are undergoing hybridization in nature, which may account for the proliferation of taxonomic variation.

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Literature cited


Rambaut, A. 2006. FigTree: Tree Figure Drawing Tool Version 1.4.0 2006-2012, Institute of Evolutionary Biology, University of Edinburgh.


Table 1. List of collections sequenced for this study.

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Fig. 4. *Gymnopus barbipes*, microstructures. A. Basidia and cheilocystidial structures. B. Caulocystidia; above = stipe apex; below = lower stipe. Holotype. Standard bar = 20 μm

Fig. 5. *Gymnopus barbipes*, basidiospores. Holotype. Standard bar = 5 μm.
Fig. 6. Abbreviated nrITS phylogeny showing placement of *G. barbipes*. PYHML tree of ribosomal ITS sequences. Bootstrap support is given to the left of the supported node. GenBank numbers are given for sequences not generated in this study.
Fig. 9. Abbreviated nrITS phylogeny showing placement of *G. disjunctus*. PYHML tree of ribosomal ITS sequences. Bootstrap support is given to the left of the supported node. GenBank numbers are given for sequences not generated in this study.
Fig. 11. Abbreviated phylogeny of nrITS showing placement of *G. micromphaleoides*. PYHML tree of ribosomal ITS sequences. Bootstrap support is given to the left of the supported node. GenBank numbers are given for sequences not generated in this study.
Fig. 13. *Gymnopus pseudoluxurians*, basidiospores. Holotype. Standard bar = 5 μm.

Fig. 14. Abbreviated phylogeny of nrITS showing placement of *G. pseudoluxurians*. PYHML tree of ribosomal ITS sequences. Bootstrap support is given to the left of the supported node. GenBank numbers are given for sequences not generated in this study.