

TWO NEW GENERA OF AGATHIDIINI FROM THE
NEARCTIC AND NEOTROPICAL REGIONS (COLEOPTERA: LEIODIDAE)

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Abstract

Two new genera of Agathidiini are described and revised: *Gelae* Miller and Wheeler, **new genus** and *Decuria* Miller and Wheeler, **new genus**. *Gelae* differs from other agathidiines by having 11 antennomeres, a distinctly 3-segmented antennal club, no supraocular carina, no postocular temporum, 5–4–4 female tarsal formula and obsolete dorsal punctation, or, if present, inconspicuous and not serially arranged. *Decuria* differs from other agathidiines by having 10 antennomeres. The dramatically poor taxonomic condition of genera in the Agathidiini is discussed and problems are identified. A key to the genera of Agathidiini is presented. The following new combinations are proposed: *Gelae parile* (Fall), **new combination**, *G. parvulum* (LeConte), **new combination**, and *G. cognatum* (Mathews), **new combination**. Each are transferred from *Agathidium* Panzer. The following new species are described: *Gelae rol*, **new species**, *G. fish*, **new species**, *G. donut*, **new species**, *G. baen*, **new species**, *G. belae*, **new species**, and *Decuria newtoni*, **new species**. A lectotype is designated for *Agathidium parile* Fall.

Notwithstanding certain recent advances in the classification of genera of the leiodid tribe Agathidiini (Angelini and Peck 2000; Newton 1998), monophyly of some of these genera and proposed relationships among them remain in serious doubt. A particular problem is represented by the genus *Agathidium* Panzer, which is a huge group of several hundred species without a single known unambiguous synapomorphy. The current definition of the genus is based on a character combination with conspicuous exceptions. The genus is defined, in part, as having a distinct 3-segmented antennal club, the clypeus not protuberant, and punctured elytral striae absent. However, some (*e.g.*, *Ag. rusticum* Fall) have a relatively prominent 5-segmented club, several (*e.g.*, *Ag. athabaskanum* Fall, *Ag. laetum* Fall, the *Ag. sexstriatum*-group) have rather prominently anteriorly-protruding anterior clypeal margins and others (*e.g.*, the *Ag. sexstriatum*-group and several members of the *Ag. pulchrum*-group) have longitudinally serial punctures on the elytra (Miller and Wheeler in press; Wheeler and Miller in press). The problem is not necessarily the misplacement of species in this genus since many of these species strongly resemble other, more “typical” *Agathidium* in other less general characters.

Other genera have different problems. The genus *Anisotoma* Panzer appears to be united by apparently plesiomorphic features including a typical leiodid 5-segmented antennal club, protuberant anterior clypeal margin, longitudinally striate elytra (absent in some *Anisotoma*), and lack of a postocular temporum and carina. Other genera, including *Sphaeroliodes* Portevin, *Stetholiodes* Fall, and *Pseudoagathidium* Angelini are apparently ambiguously defined or are based on characters that vary within the genus *Agathidium* such that even writing an adequate key is quite difficult.

In a recent paper describing a new agathidiine genus, Angelini and Peck (2000) presented a number of characters used to distinguish genera of the tribe, a key to the genera, and a proposal of the phylogeny. However, there are a number of problems with their analysis. For example, the topology they present is not the most parsimonious. When their character matrix is analyzed using all additive character states (as they did) using NONA and the commands “hold/20,” “mult*20,” for tree

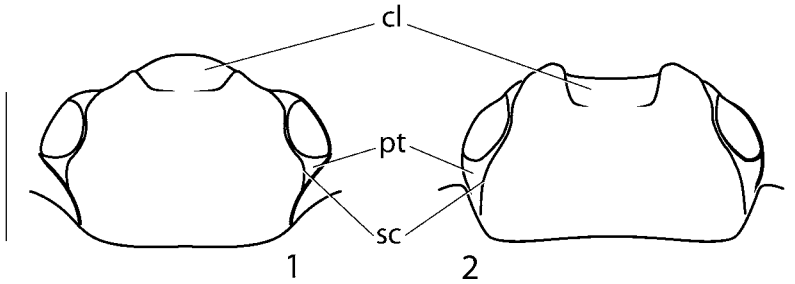
search and “save*,” and “inters” to save all trees and the consensus tree, respectively, there are three most parsimonious trees instead of one and none of these are the same as their single presented tree. The consensus is not well-resolved. Their conclusion that *Besuchetionella* Angelini and Peck is the sister to *Agathidium* is not supported by their data. Rather, in the consensus of the actual most parsimonious trees, *Besuchetionella* is resolved as sister to *Afroagathidium* Angelini and Peck, whereas *Agathidium* is in a moderately large polytomy. A possible reason for the discrepancy in these conclusions is that their topology was “generated by the software MacClade 3.1” which is not a tree search program and is not designed to find a most parsimonious tree. This analysis is also inadequate in that it used genera as terminals instead of species that, in the case of Agathidiini, would be clearly desirable given the apparent problems with some of the genera. Partly because of this, many of their terminals are coded as polymorphic for several characters. Breaking these up (*i.e.*, using species as terminals) would allow for a better test of monophyly of the genera of Agathidiini.

Another recent analysis by Kilian (1998) presented a large number of characters present in the larvae of agathidiines (*Anisotoma*, *Agathidium* and *Liadopria*). Although she presents evidence for parphyly of both *Agathidium* and *Anisotoma*, her proposal to synonymize the two genera is an undesirable solution to the problem given that the resultant taxon would be even more unwieldy than each is already. Also, her analysis is very limited in taxon sampling (few agathidiine genera are known from larvae) and strongly contradicts the conclusions by Angelini and Peck (2000) (despite the problems inherent to their analysis). We recommend that were *Agathidium* and/or *Anisotoma* found to be paraphyletic, a more desirable solution would be to subdivide the genera into more evidently monophyletic groups than to synonymize them with other genera. Nevertheless, Kilian's (1998) descriptions of larvae and discovery of new characters are extremely valuable contributions to our knowledge of Agathidiini higher classification.

Given the undoubtedly large number of species remaining to be described in this tribe, some likely having unique character combinations, a classification based on a comprehensive cladistic analysis using a large sample of species from all genera will become increasingly necessary. Also greatly needed is a search for hitherto unused characters because there is considerable homoplasy in the few characters used historically for grouping taxa. The morphology of the group is diverse and we expect that there are many new and useful phylogenetic characters to be found for grouping taxa. The classification of Agathidiini is uncertain, and we would ordinarily not advocate erecting new genera outside the context of a phylogenetic hypothesis. However, we feel that description of two new genera here will serve to make available basic knowledge of the diversity in characters in this tribe at a time when an adequate and thorough cladistic analysis is unavailable.

Peck *et al.* (1998) pointed out the unusual character combination present in certain species of agathidiines in Central and South America and suggested that these undescribed species might be placed in new genera in the future (their “genus 6” and “genus 7”). In our revision of the genus *Agathidium*, (Miller and Wheeler in press; Wheeler and Miller in press) we also discovered numerous species apparently allied with *Agathidium*, but that did not share a number of characters with other more “typical” members of that genus. A least a couple of species already described in *Agathidium* also belong to one of these unnamed groups, making the description of a new genus to include at least these species important for resolving some taxonomic issues for *Agathidium*.

For this project the methods and material (including collections from which specimens were borrowed) are the same as for our revision of *Agathidium* (Miller and Wheeler in press; Wheeler and Miller in press). For measurements, OHW (ocular head width) = greatest width of head across eyes; MDL (median head length) = head length



Figs. 1–2. *Agathidium* species, heads, dorsal. 1) *A. athabascanum*; 2) *A. pulchrum*. cl = clypeus; pt = postocular temporum; sc = supraocular carina. Bars = 0.5 mm.

from base of labrum to posterior margin of cranium; PNW (pronotal width) = greatest width of pronotum; PNL (pronotal length) = length of pronotum along midline; ELW (elytral width) = greatest width of combined elytra; SEL (post-scutellar elytral length) = length of elytra along suture from posterior margin of scutellum to apex; MTL (metasternal length) = length of metasternum along midline; MTW (metasternal width) = greatest width of metasternum; TBL (total body length) = MDL + PNL + SEL.

Our key to the genera of Agathidiini includes the genus *Cainosternum* Notman even though this taxon was excluded from the tribe by Newton (1998). In our opinion, the placement of this genus remains equivocal since the relative apomorphy or plesiomorphy of the characters exhibited in this taxon and related leiodid tribes has not been firmly established. Characters in our key were derived from Peck *et al.* (1998) and Angelini and Peck (2000) and compared with the following taxa in addition to *Gelae* and *Decuria* species: *Cainosternum imbricatum* Notman, all species of *Anisotoma*, *Amphicyllis globiformis* Sahlberg, *Am. globus* Fabricius, *Afroagathidium capense* Angelini and Peck, *Liadopria serricornis* (Gyllenhal), *Stetholiodes laticollis* Fall, and all New World and many Palearctic and Ethiopian *Agathidium*. We have not seen specimens of *Cyrtoplastus* Reitter, *Sphaeroliodes* Portevin or *Besuchetionella* Angelini and Peck.

Key to the Genera of Agathidiini

1. Elytron with many (*ca.* 20) longitudinal impressed rows of punctures, integument between rows with transverse striations; mesosternum keel-like, interrupted by large excision visible in lateral view; apex of lateral lobe membranous, setose; eastern U.S. *Cainosternum* Notman
- Elytron with nine or fewer rows of punctures, frequently with only irregularly distributed punctures or none; mesosternum with or without carina, never in form of excised keel; apex of lateral lobe not membranous 2
- 2(1). Antenna with 10 antennomeres (Fig. 23) *Decuria*, new genus
- Antenna with 11 antennomeres 3
- 3(2). Antennal club distinctly 5-segmented, antennomere VIII somewhat to considerably narrower than VII 4
- Antennal club 3- or 4-segmented, antennomeres VII and VIII similar in size or VIII distinctly larger than VII, (one northeastern Nearctic species, *Ag. rusticum*, with antennomere VII broader than VIII) 5
- 4(3). Anterior clypeal margin extending distinctly beyond anterolateral margins of frons (as in Fig. 1); supraocular carina absent (as in Figs. 24–32); punctation

- on elytra in linear, impressed series or not; metasternum without oblique femoral lines or carinae; Palaearctic, Oriental and Nearctic *Anisotoma* Panzer
- Anterior clypeal margin not extending to level of anterolateral margins of frons (as in Fig. 2); supraocular carina present (as in Figs. 1–2); elytral punctation never in linear series; metasternum with or without femoral lines; eastern Palaearctic and Oriental *Besuchetionella* Angelini and Peck
- 5(3). Antennal club distinctly 4-segmented 6
- Antennal club 3-segmented (one northeastern Nearctic species, *Ag. rusticum*, with antennomere VII broader than VIII) 7
- 6(5). Anterior clypeal margin distinctly extending beyond anterolateral margins of frons (as in Fig. 1); elytra with punctation arranged into longitudinal linear series or not; western Palaearctic *Amphicyllis* Erichson
- Anterior clypeal margin not extending to anterolateral margins of frons, distinctly excavate (as in Fig. 2); elytra with punctation not arranged into longitudinal linear series; Ethiopian and Oriental *Afroagathidium* Angelini and Peck
- 7(5). Supraocular carina absent (as in Figs. 24–32), or if present then clearly not extending posterad of the eye 8
- Supraocular carina distinctly present, extending posterad of eye (as in Figs. 1–2) 9
- 8(7). Female tarsi 4–4–4; Palaearctic and Oriental *Liodopria* Reitter
- Female tarsi 5–4–4; Nearctic and Neotropical *Gelae*, new genus
- 9(7). Elytra with prominent longitudinal striae with linear series of punctures (except *S. agathidiodes* Angelini and Cooter); clypeus extending beyond anterolateral margins of frons (as in Fig. 1); eastern Palaearctic, Oriental and Nearctic *Stethliodes* Fall
- Elytra without prominent punctured longitudinal striae (except the Nearctic *Ag. sexstriatum*, *Ag. bistriatum* and *Ag. estriatum*); clypeus extending beyond anterolateral margins of frons or not 10
- 10(9). Anterior clypeal margin excavated, not extending beyond anterolateral margins of frons (as in Fig. 2) 11
- Anterior clypeal margin not excavated, extending to or beyond anterolateral margins of frons (as in Fig. 1) 12
- 11(10). Aedeagus without lateral lobes; postocular tempora absent (as in Figs. 24–32); Oriental and Ethiopian *Pseudoagathidium* Angelini
- Aedeagus with lateral lobes; postocular tempora present or absent; Palaearctic, Oriental, Australian and Nearctic *Agathidium* Panzer (in part)
- 12(10). Palaearctic and/or Oriental 13
- Nearctic. *Agathidium* Panzer (in part)
- 13(12). Postocular tempora absent (as in Figs. 24–32) (except in *C. tianmuensis* Angelini and Cooter); anterior clypeal margin extending well beyond anterolateral margins of frons (as in Fig. 1) *Cyrtoplastus* Reitter
- Postocular tempora present (as in Figs. 1–2); clypeus extending slightly beyond anterolateral margins of frons *Sphaeroliodes* Portevin

Gelae Miller and Wheeler, new genus

“Undescribed Genus 7,” Peck *et al.*, 1998.

Type Species. *Gelae donut* Miller and Wheeler, new species, by present designation.

Diagnosis. This genus can be distinguished from other genera of Agathidiini by the combination of: the antennae with 11 antennomeres and a distinct 3-segmented club

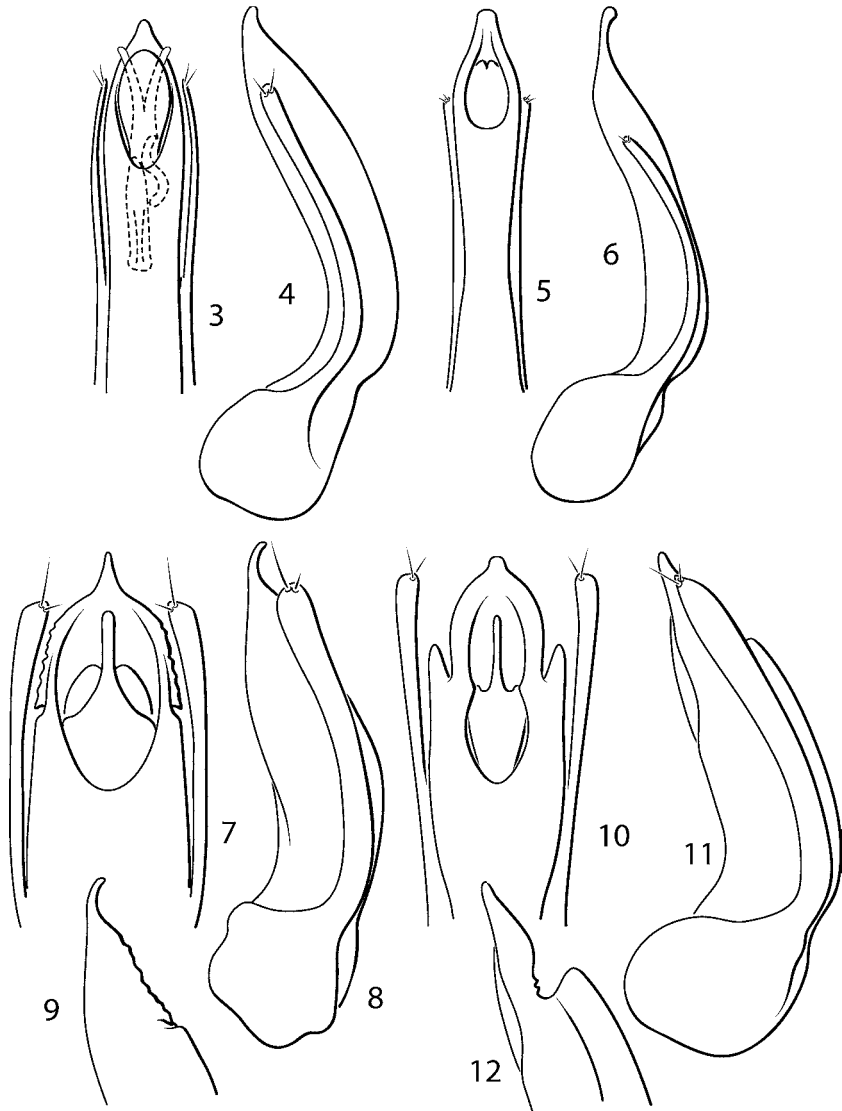
(antennomere VII similar in size and shape to antennomere VI), a postocular temporum absent, a supraocular carina absent (or if indistinctly present anteriorly then not extending posterad of the eye), the anterior clypeal margin extending distinctly anterad of the anterolateral margins of the frons, and the elytra moderately to very finely and sparsely punctate with the punctures not forming longitudinal series.

Discussion. Members of *Gelae* are very similar to some species currently assigned to *Anisotoma* (the *Ani. horni-errans*-group) in being dorsally nearly impunctate (except *G. baen*), lacking postocular tempora and supraocular carinae and in the shape of the male aedeagus. The median lobe in many species is attenuate or acuminate apically in ventral aspect, the operculum is broad, flap-like, apically emarginate and seemingly fused to the median lobe at its base in some species, and the lateral lobes are reduced in some species. *Gelae* species differ from these *Anisotoma* in having a small antennomere VII (a distinctly 3-segmented club) making them, instead, similar to some *Agathidium* and several Ethiopian, Palaearctic and Oriental genera of Agathidiini (a similarity pointed out by Peck *et al.* 1998). Several species of Nearctic *Agathidium* are very similar in some characters. Specifically, *Ag. athabascanum*, *Ag. columbianum*, *Ag. laetum*, and *Ag. concinnum* each have somewhat protuberant anterior clypeal margins (the clypeus extends distinctly beyond the antero-lateral margins of the frons) and somewhat similar genitalia as well. They differ in having moderately to very prominent postocular tempora, supraocular carinae that clearly extend posterad of the eyes and more prominent dorsal punctation. The genus appears to be extremely similar to the Palaearctic and Oriental *Liadopria* as well. Without a cladistic analysis, it is impossible at this time to assess whether similar features in *Gelae*, *Anisotoma*, *Liadopria* and some *Agathidium* are apomorphic or plesiomorphic.

Peck *et al.* (1998) called attention to the presence of a series of closely placed striae at the side of abdominal tergum 6 and a region of long parallel ridges on the ventral surface of the elytron near the apex. These striae are present in several species of *Gelae*, including, at least, *G. cognatum*, *G. baen* and *G. rol*. We have not had the opportunity to survey this character thoroughly enough to determine its possible use for grouping taxa. These striae have been interpreted as possible stridulatory devices, (Peck *et al.* 1998) but there is no evidence as yet that this system of striae functions as a stridulatory device in *Gelae*. Such features are sometimes associated with wing folding and binding rather than with stridulation (Hammond 1979).

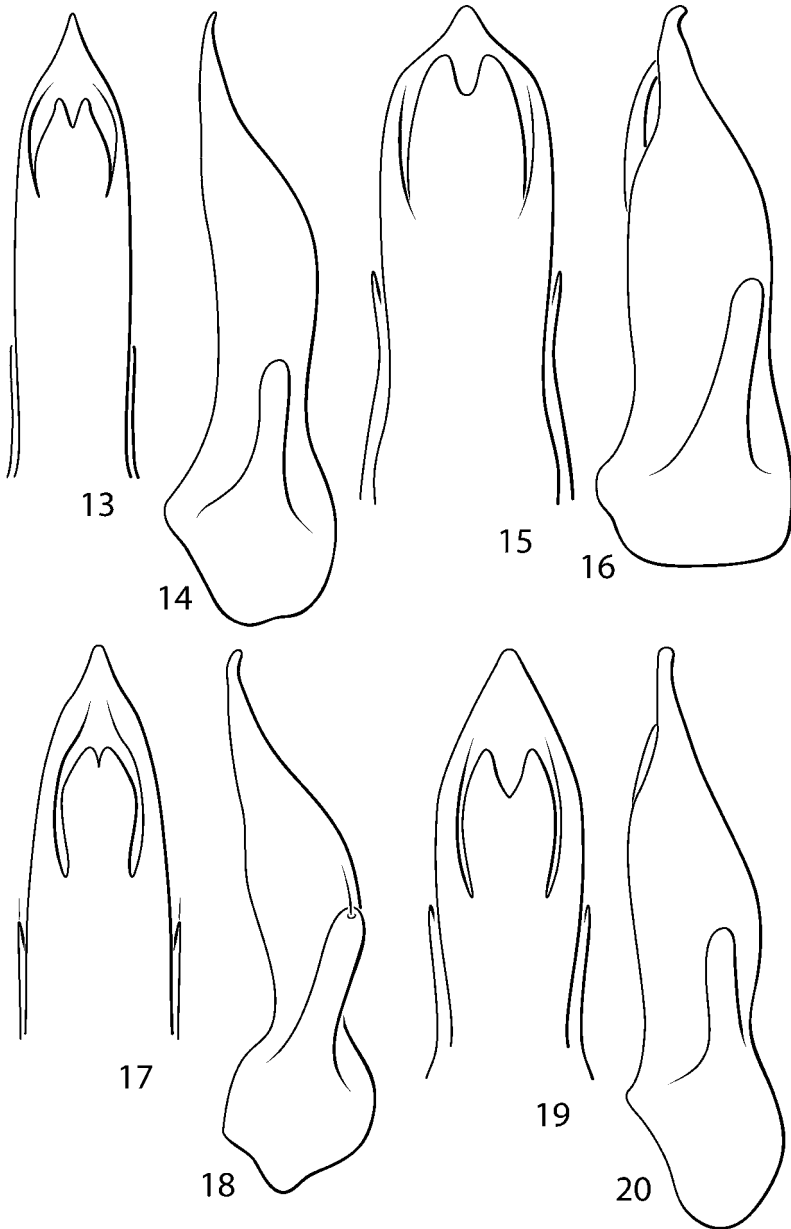
Within *Gelae* there are two main groups united by similar features. The first is *G. parile* and *G. parvulum*. These two species have similar male genitalia with a lateral lobe that has a prominent lateral emargination (Figs. 9, 12) (much larger in *G. parvulum* (Fig. 12)) and the operculum long and with the apical half very slender and elongate (Figs. 7, 10). The second group includes *G. rol*, *G. cognatum*, *G. donut* and *G. baen*, each of which is dorsally diffusely brown and yellow and has a very robust median lobe with a large, platelike operculum that is apically emarginate (Figs. 13, 15, 17, 19). The lateral lobes in these species are reduced (Figs. 14, 16, 18, 20). The species *G. fish* and *G. belae* do not appear strongly similar to each other or any other species.

Biology. Members of this genus have been collected from near sea level to nearly 3,000 m elevation. Most specimens have been collected from flight intercept traps or using Berlese devices. A few have been collected at blacklights. Similar to many other genera in the tribe, specimens have been collected from a variety of litter sources where they likely feed on fungi and slime molds, though host records are few. *Gelae cognatum* has been collected on the fungus *Hohenbuehelia* von Müggenberg, *G. parile* has been collected from the myxomycetes *Cribraria* (Persoon) Persoon and *Dictydium cancellatum* (Batch) MacBride, and *G. fish* has been collected from a "slime mold."



Figs. 3–12. *Gelae* species, median and lateral lobes of aedeagus. **Figs. 3–4** *G. fish*; 3) ventral; 4) lateral. **Figs. 5–6** *G. belae*; 5) ventral; 6) lateral. **Figs. 7–9** *G. parile*; 7) ventral; 8) lateral; 9) apex of median lobe, lateral. **Figs. 10–12** *G. parvulum*; 10) ventral; 11) lateral; 12) apex of median lobe, lateral.

Etymology. This genus is named *Gelae* (gender neutral), a shortened version of the Latin word *gelatus*, meaning “congealed” or “jellied” (and pronounced like the English word “jelly”) in reference to the slime molds preyed upon by members of the group.



Figs. 13–20. *Gelae* spp., median and lateral lobes of aedeagus. **Figs. 13–14)** *G. baen*; 13) ventral; 14) lateral. **Figs. 15–16)** *G. donut*; 15) ventral; 16) lateral. **Figs. 17–18)** *G. rol*; 17) ventral; 18) lateral. **Figs. 19–20)** *G. cognatum*; 19) ventral; 20) lateral.

Key to the Species of *Gelae*

1. Size very small (TBL < 2.00 mm); male median lobe relatively slender in both lateral and ventral aspects (Figs. 3–4), operculum apically broadly rounded, not emarginate or elongate and slender (Fig. 3), endophallus including two moderately long, strut-like processes that often extend out of orifice (Fig. 3) *G. fish*, new species
 - Size larger, TBL = 2.00–3.50 mm; male median lobe very broad or slender, operculum apically with medial emargination, though this may be small in some species, or with operculum very long and slender, endophallus without long, strut-like apical processes 2
- 2(1). Metasternum relatively narrow medially (MTL/MTW < 0.30) 3
 - Metasternum very broad medially (MTL/MTW > 0.35) 5
- 3(1). Male median lobe very slender and elongate, without lateral emarginations, teeth or lobes (Fig. 5); southern Mexico *G. belae*, new species
 - Male median lobe very broad and robust, with lateral emarginates and teeth or large lobes; North America north of Mexico 4
- 4(3). Male with posterior margin of metafemur slightly expanded, but without prominent tooth; median lobe with lateral emarginations small, without very large lobes (Figs. 7, 9), apex of median lobe attenuate and sharply pointed in ventral aspect (Fig. 7), in lateral aspect with apex pointed and strongly curved dorsad (Figs. 8, 9) *G. parile* (Fall)
 - Male with prominent tooth along posterior margin of metafemur; median lobe with very large, prominent lateral emarginations subtending very large lobes (Figs. 10, 12), apex of median lobe bluntly rounded in ventral aspect (Fig. 10), in lateral aspect with apex narrowly rounded and approximately straight (Figs. 11, 12) *G. parvulum* (LeConte)
- 5(2). Elytra prominently and relatively coarsely punctate over entire surface; male median lobe strongly acuminate apically in ventral aspect, sharply pointed (Fig. 13) *G. baen*, new species
 - Elytra finely and indistinctly punctate over entire surface (*G. rol* with irregular longitudinal subsutural series of relatively coarse punctures); male median lobe somewhat acuminate or not, but not generally as sharply pointed 6
- 6(5). Size very large (TBL > 3.02 mm); male median lobe very robust, apically abruptly attenuated in ventral aspect (Fig. 15), apex very abruptly curved dorsad in lateral aspect (Fig. 16); Bolivia and Peru *G. donut*, new species
 - Size smaller (TBL < 3.02 mm); male median lobe robust, but not as strongly so, apically gradually attenuated in ventral aspect, apex not so abruptly curved dorsad in lateral aspect; southwestern United States south to Central America 7
- 7(6). Apex of male median lobe in lateral aspect distinctly curved dorsad (Fig. 18); elytra with irregular longitudinal subsutural series of relatively coarse punctures; southern Arizona, USA *G. rol*, new species
 - Apex of male median lobe in lateral aspect straight (Fig. 20); elytra without punctation or punctation very fine, sparse and inconspicuous and without subsutural series more coarse than others; Mexico and Central America *G. cognatum* Matthews

Gelae fish Miller and Wheeler, new species

(Figs. 3–4, 24)

Material Examined. Holotype, ♂ in PECK labeled "PAN:Chiri;1,550 m 15 km NW HatoVolcan Harmann Finca 25.v.77, S&J.Peck Ber369, u. bark/ HOLOTYPE

Gelae fish Miller and Wheeler, 2003 [red label with black line border].” About 80 additional paratypes were also examined from the following localities: **Costa Rica:** Guanacaste, Prov. Monte Verde, 15 Dec 1985, A. Forsyth, (1, PECK); Puntarenas Monte Verde, 22 May 1989, J. Ashe, R. Brooks, and R. Leschen, (2, FMNH); Montes Verde, 21 Feb 1983, 1,500 m, D. Lindeman, (16, PECK). **Honduras:** Cortes, Parque Nacional Cusuco, San Pedro Sula, 2 Mar 1995, R. Cordero, (2, FMNH). **Mexico:** Chiapas, 6.6 km W El Bosque, 25 Aug 1973, 4,800 ft, A. Newton, (7, FMNH); Hidalgo, 4 mi SW Chapalhuacan, 1 Jul 1973, 3,500 ft, A. Newton, (1, FMNH); Nueva Leon, Santa Rosa Can. 29kn W Linares, 3 Jun 1983, S. and J. Peck, (2, FMNH); Oaxaca, 62.5 km SW Valle Nacional km 115.5, 28 Jul 1992, 2,650 m, R. Anderson, (1, CNCI); Oaxaca, 48 km E Valle Nacional, 2 Jun 1983, 2,012 m, S. and J. Peck, (2, PECK); Oaxaca, 26 km E Valle Nacional, 25 Jun 1983, 1,220 m, S. and J. Peck, (3, PECK); Oaxaca, 8 km S Suchixtepec, 10 Aug 1986, H. and A. Howden, (2, CNCI); Tamaulipas, near Gomez Farias Rancho del Cielo, 6 Jun 1983, 1,000 m, S. and J. Peck, (2, FMNH); Tamaulipas, nr Gomez Farias Rancho del Cielo, 6 Jun 1983, S. and J. Peck, (2, PECK); Vera Cruz, 7 km E Huatusco, 22 Jun 1983, 1,250 m, S. and J. Peck, (1, PECK). **Panama:** Chiriqui, 15 km NW Hato Volcan Harmann Finca, 25 May 1977, 1,550 m, S. and J. Peck, (13, PECK); Chiriqui, La Fortuna Dam, 14 Jun 1982, 1,200 m, B. Gill, (19, PECK); Chiriqui 81°50'W 8°34'N, 3.5 km E Escopeta, 20 Jun 1980, J. Wagner, (2, FMNH); Cocle. El Valle, 23 Feb 1959, 2,400 ft, H.S. Dybas, (1, AMNH); Chiriqui, 81°50'W 8°34'N 3.5 km E Escopeta, 20 Jun 1980, 1,856 m, J. Wagner, (2, AMNH).

Type Locality. Panama, Chiriqui, 15 km NW El Hato del Volcan, Harmann Finca, 1,550 m.

Diagnosis. This species differs from others in the genus in being very small (TBL < 1.9 mm) and in the distinctive male genitalia. The median lobe is relatively slender in lateral and ventral aspects and the operculum is apically broadly rounded, not emarginate or elongate and slender (Figs. 3–4). A portion of the endophallus is often distinctly visible extending from the orifice in the form of two moderately long, strut-like processes (Fig. 3). The metasternum is relatively broad medially (MTL/MTW = 0.34–0.35). The labrum is relatively broad and transversely rectangular and the head is moderately constricted posterad of eyes (Fig. 24).

Description. Body very small (TBL = 1.84–1.88 mm), broad (PNW/TBL = 0.41–0.48), laterally broadly rounded, weakly contractile.

Head, pronotum and elytra brown, clypeus yellow-brown; venter brown to yellow-brown; antennae, palpi and legs yellow-brown.

Head moderately broad (MDL/PHW = 0.61–0.68), dorsally flattened; constricted immediately posterad of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes very large, rounded, protruding; fronto-clypeal suture continuous, but indistinct medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 24); labrum moderately large, transversely subrectangular; antennae (ratios: length I:II:III = 1.1:1.0:0.9, width VII:VIII:IX = 1.0:1.0:1.9). Pronotum broad (PNL/PNW = 0.65–0.68), laterally not strongly produced, lateral margins nearly straight, anterolateral angle subquadrate, posterolateral corner distinctive, more angulate than anterolateral corner; punctation similar to that of head. Elytra robust (SEL/ELW = 0.89–1.03); lateral margins broadly rounded; punctation very fine and sparse, similar to pronotum; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion very narrow. Metasternum broad medially (MTL/MTW = 0.34–0.35).

Male tarsi 5–5–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, unmodified; metasternal fovea moderately prominent, located anteriorly, with prominent pencil of fine, long setae. Median lobe in lateral aspect moderately slender, elongate, medially bent, apical portion moderately broad, apex curved dorsad, narrowly rounded to pointed (Fig. 4); in ventral aspect slender, slightly expanded at base of apical portion, apex evenly narrowed to narrowly rounded apex, orifice moderately large (Fig. 3);

operculum elongate-oval, broad, apically broadly rounded, endophallus with two long strutlike processes which often extend out of orifice (Fig. 3); lateral lobes long, slender, curved, apically slightly expanded with 2 stout, spinous setae (Figs. 3–4).

Female tarsi 5–4–4.

Etymology. This species is named *fish*, a whimsical arrangement of letters that is pronounced like the English word, “fish,” a group of aquatic vertebrates.

Distribution. This species is known from the states of Chiapas, Hidalgo, Nuevo Leon, Oaxaca, Tamaulipas, Veracruz in Mexico, and from Costa Rica, Honduras and Panama.

Discussion. About 80 specimens were examined of this species which appears to be relatively common throughout southern Mexico and Central America. Label data indicate that specimens were collected mainly from cloud forest habitats. The only host data includes specimens collected from a “slime mold.”

Gelae belae Miller and Wheeler, **new species**

(Figs. 5–6, 25)

Material Examined. Holotype, ♂ in MZLU labeled “Mexico: Oaxaca 61 km S Valle Naci- onal, 2,800 m., 3-X.1986, R.Baranowki/ HOLOTYPE *Gelae belae* Miller and Wheeler, 2003 [red label with black line border].” Two additional paratypes (MZLU) were examined with the same label data as the holotype.

Type Locality. Mexico, Oaxaca, 61 km S Valle Nacional, 2,800 m.

Diagnosis. This species differs from others by being relatively small (TBL = 2.10–2.14 mm). The metasternum is moderately broad medially (MTL/MTW = 0.25–0.27). The head is moderately narrowed posterad of the eyes (Fig. 25) and the labrum is large and subquadrate (Fig. 25). The male genitalia are very distinctive (Figs. 5–6). The median lobe is very slender in lateral and ventral aspects (Figs. 5–6). In lateral aspect the apex is slender, gently curved dorsad and slightly expanded apically (Fig. 6).

Description. Body very small (TBL = 2.10–2.14 mm), robust (PNW/TBL = 0.39–0.40), laterally broadly rounded, weakly contractile.

Head, pronotum and elytra brown to yellow-brown; venter and legs yellow-brown; antennae and palpi yellow.

Head moderately broad (MDL/PHW = 0.66–0.67), dorsally flattened; constricted immediately posterad of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes large, rounded, protruding; fronto-clypeal suture continuous, but indistinct, medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 25); labrum broad, transversely rectangular; antennae (ratios: length I:II:III = 1:1:0.7, width VII:VIII:IX = 0.9:1.0:2.2). Pronotum broad (PNL/PNW = 0.66–0.76), not strongly produced laterally, lateral margins nearly straight, anterolateral angle subquadrate, posterolateral angle distinctive, more angulate than anterolateral corner; punctation similar to that of head. Elytra robust (SEL/ELW = 1.12–1.32); lateral margins broadly rounded; punctation very fine and sparse, similar to pronotum; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion moderately narrow. Metasternum broad medially (MTL/MTW = 0.25–0.27).

Male tarsi 5–5–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, slightly expanded medially but without tooth; metasternal fovea moderately large, located submedially with prominent pencil of fine, dense setae. Median lobe in lateral aspect elongate, slender, apical portion slender, slightly curved dorsad, apex distinctly expanded and rounded (Fig. 6); in ventral aspect slender, slightly expanded near base of apical portion, apically narrowed to moderately broad, sub-truncate apex, orifice moderately large (Fig. 5); operculum broad, rounded, apex narrowly emarginate (Fig. 5); lateral lobes slender, curved, shortened, narrowly rounded apically with two short, inconspicuous setae (Figs. 5–6).

Female tarsi 5–4–4.

Etymology. This species is named *belae*, a whimsical arrangement of letters that is pronounced like the English word “belly.”

Distribution. This species is known only from the type locality in Oaxaca, Mexico.

Discussion. The three specimens in the type series were collected from litter in a pine-oak forest.

Gelae parile (Fall), **new combination**
(Figs. 7–9, 26)

Agathidium parile Fall, 1934.

Material Examined. Lectotype (designated here to clarify assignment of this name to this species), ♂ in MCZC labeled “Sugar Pine, Cal. R.A.Fenyess/ Type parile [“parile”handwritten, red line under “Type”]/ M.C.Z. Type 24041 [red label]/ H.C. FALL COLLECTION.” There is a single paralectotype with the same label data as the lectotype. Additional specimens were examined from the following localities: **Canada:** **British Columbia:** Mt Robson P. Pk, Berg Lake Trailhead, 11 Jul 1984, R.S. Anderson, (2, CNCI); **Manitoba:** Devils Lake, 100 km S Grand Rapids, 7 Jun 1984, S. and J. Peck, (2, PECK); **Ontario:** 25 km W Ignace, 75 km E Dryden, 5 Jun 1984, S. and J. Peck, (1, PECK); 25 km W Ignace 75 km E Dryden, 5 Jun 1984, S. and J. Peck, (3, PECK); Stittsville, 5 Jul 1976, M. Sanborne, (1, CUIC). **United States:** **California:** Sugar Pines, (12, CASC); 10 mi N Yosemite, 2 Jul 1946, 6,000 ft, H.P. Chandler, (2, EMEC); **New Hampshire:** Coos Co., 1 mi NE East Inlet Dam, 25 Jun 1986, D.S. Chandler, (2, MCZC); Coos Co., Norton Pool, 3 mi NW East Inlet Dam, 25 Jul 1986, D.S. Chandler, (4, MCZC); Coos Co., Norton Pool, 2 mi E East Inlet Dam, 7 Sep 1984, D.S. Chandler, (5, MCZC); Coos Co., 1 mi E East Inlet Dam, 24 Jun 1986, D.S. Chandler, (5, MCZC); Strafford Co., 1 mi SW Durham, College Woods, 2 May 1985, D.S. Chandler, (2, MCZC); Strafford Co., 1 mi SW Durham, 11 Jun 1987, D.S. Chandler, (2, MCZC); Strafford Spruce Hole, 3 mi SW Durham, 10 Jul 1987, D.S. Chandler, (1, MCZC); **New York:** Cattaraugus Co., Allegheny St. Pk., 12 Jun 1968, S. Peck, (2, CUIC); **North Carolina:** Black Mtns, (1, CASC); Avery, Linville Falls, 2 Jun 1981, S. Peck, (3, CUIC); Buncombe, Great Craggy Mts., 2 Jun 1981, S. Peck, (1, CUIC); Haywood, Balsam Mt., 3 Jun 1981, S. Peck, (7, CUIC); Transylvania, Mt Pisgah, 3 Jun 1981, S. Peck, (3, CUIC); Wilkes, Jeffress Park, Blue Ridge Pk., 1 Jun 1981, S. Peck, (2, CUIC); Yancy Co., Black Mts. Blue Ridge Pk., 15 Aug 1981, S. Peck, (1, CUIC). **Pennsylvania:** Crawford Co., Wallace Woods Linesville, 11 Jul 1966, W. Suter, (1, CUIC); Hunt Co., Rothrock St. For. Seeger Nat. Area, 9 Jul 1984, 900 ft, D.S. Chandler, (3, MCZC); McKean Co., Allegheny N. For. Tionesta Scenic A., 29 May 1985, D.S. Chandler, (1, MCZC); Warren Co., Allegheny N. For., Hearts Content Scenic Area, 29 May 1985, D.S. Chandler, (1, MCZC); Westmoreland Co., 3 mi E Berlin, 10 Jul 1984, D.S. Chandler, (3, MCZC). **Vermont:** Addis Co., Bryant Mt. Summit 2 mi N Lake Dunmore, 25 Jun 1985, D.S. Chandler, (1, MCZC). **Virginia:** Giles Co., 20 Jun 1986, 3,700 ft, S.L. Stephenson, (3, AMNH); Giles Co., 6 Oct 1984, S.L. Stephenson, (1, AMNH).

Type Locality. United States, California, Sugar Pine.

Diagnosis. This species is very similar externally to *G. parvulum*, and each have the head not strongly constricted posterad of the eyes (Figs. 26–27), the labrum broad and transversely subrectangular (Figs. 26–27), the metasternum relatively narrow medially (MTL/MTW < 0.30) and the median lobe very broad and robust with the operculum long and slender apically (Figs. 7, 10). This species differs from *G. parvulum* in having the lateral margin of the median lobe not so strongly emarginate and the apex sharply pointed in ventral aspect (Fig. 7), and with the apex sharply pointed and distinctly curved dorsad in lateral aspect (Figs. 8, 9). The apical portion is denticulate along the

lateral margin visible in both ventral and lateral aspects (Figs. 7, 8). *Gelae parvulum* also lacks a distinctive tooth on the posterior margin of the male metafemur.

Description. Body moderately large (TBL = 2.28–2.47 mm), robust (PNW/TBL = 0.46), laterally broadly rounded, weakly contractile.

Head, pronotum, elytra and venter brown; antennae, palpi and legs yellow-brown.

Head moderately broad (MDL/PHW = 0.55–0.67), dorsally flattened; constricted immediately posterad of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes large, rounded, protruding; fronto-clypeal suture continuous, but fine, medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 26); labrum broad, transversely rectangular; antennae (ratios: length I:II:III = 1.3:1.0:1.0, width VII:VIII:IX = 1.0:1.0:1.4). Pronotum broad (PNL/PNW = 0.63–0.64), laterally not strongly produced, lateral margins nearly straight, anterolateral angle subquadrate, posterolateral corner distinctive, more angulate than anterolateral corner; punctation similar to that of head. Elytra robust (SEL/ELW = 1.06–1.12); lateral margins broadly rounded; punctation very fine and sparse, similar to pronotum; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion moderately narrow. Metasternum broad medially (MTL/MTW = 0.21–0.23).

Male tarsi 5–5–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, slightly expanded medially, but without tooth; metasternal fovea small, located slightly anterad of middle, with small pencil of fine, dense setae. Median lobe in lateral aspect robust, broad, moderately curved medially, apical portion narrowed, apically slender, strongly curved dorsad, apex pointed, dorsal margin with prominent dentitions and submedial emargination (Fig. 9); in ventral aspect very broad, lateral margins subparallel, apical portion broad basally, broadly acuminate, apex pointed, lateral margins of apical portion distinctly denticulate, with small but prominent emargination near base of apical portion, orifice very large, elongate (Fig. 7); operculum long, broad basally, abruptly constricted medially, apical half long, slender, straight (Fig. 7); lateral lobes long, curved, moderately broad, apically expanded, with 1 long and 1 short spinous setae (Figs. 7–8).

Female tarsi 5–4–4.

Distribution. This species is known from California and British Columbia east through Canada to New Hampshire and Vermont and south in the east along the Appalachians to North Carolina.

Discussion. This species has been collected from various forest types including hemlock, pine, aspen, fir, maple, etc., and from various litter sources including rotting stumps, leaf litter, etc. Host data from label information include the slime molds *Cribraria* sp. and *Dictydium cancellatum* (Batch) MacBride.

Gelae parvulum (LeConte), **new combination**
(Figs. 10–12, 27)

Agathidium parvulum LeConte, 1878; Horn, 1880 (synonymized with *A. politum* LeConte); Leng, 1920 (as synonym of *A. politum*); Fall, 1934 (resurrected from synonymy with *A. politum*).

Material Examined. Holotype, ♂ in MCZC labeled “A. parvulum Lec. [handwritten]/ 35 [handwritten]/ Type 3177 [number handwritten, half of label red]/ Agathidium parvulum Lec. [handwritten, red line around edge].” It appears that LeConte (1878) had only a single specimen of this species when he described it, so that specimen is the holotype by monotypy. Other material was examined from the following localities: **United States: California:** Amador Co., 1 mi W Pine Grove, 24 Jun 1975, A. Newton and M. Thayer, (2, FMNH); Amador Co., Panther Ridge, 27 Jun 1975, 6,200 ft, A. Newton and M. Thayer, (1, FMNH); El Dorado Co., Blodgett Forest, 27 Aug 1975, F. Andrews, (2, C DFA).

Type Locality. United States, Michigan, Marquette (Lake Superior).

Diagnosis. This species is externally very similar to *G. parile* (see the Diagnosis under that species). *Gelae parvulum* differs from that species in having very deep lateral emarginations on the male median lobe that subtend a very large lateral lobe (Fig. 12). Also, the median lobe in ventral aspect terminates in a small rounded process (Fig. 10). In lateral aspect the apical portion of the median lobe is relatively straight to a narrowly rounded apex (Fig. 11). Also, *G. parvulum* males have a prominent tooth along the posterior margin of the metafemur about 1/4 distance from the end of the femur, whereas males of *G. parile* lack a tooth.

Description. Body moderately large (TBL = 2.35–2.55 mm), robust (PNW/TBL = 0.48–0.52), laterally broadly rounded, weakly contractile.

Head, pronotum and elytra brown; venter brown; antennae and palpi yellow-brown; legs yellow-brown.

Head moderately broad (MDL/PHW = 0.61–0.62), dorsally flattened; constricted immediately posterad of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes large, rounded, protruding; fronto-clypeal suture continuous, but fine, medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 27); labrum broad, transversely rectangular; antennae (ratios: length I:II:III = 1.2:1.0:1.5, width VII:VIII:IX = 1.0:1.0:1.3). Pronotum broad (PNL/PNW = 0.60–0.62), laterally not strongly produced, lateral margins nearly straight, anterolateral angle subquadrate, posterolateral corner distinctive, more angulate than anterolateral corner; punctation similar to that of head. Elytra robust (SEL/ELW = 0.87–0.95); lateral margins broadly rounded; punctation very fine and sparse, similar to pronotum; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion moderately narrow. Metasternum moderately broad medially (MTL/MTW = 0.25–0.27).

Male tarsi 5–5–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, with prominent tooth on posterior margin about 1/4 distance from end of femur; metasternal fovea moderately prominent, located slightly anterad of middle, with moderately large pencil of fine, long setae. Median lobe in lateral aspect very broad basally and medially, submedially with extremely prominent emargination making lateral margin into broad, rounded lobe, emargination with 1–3 teeth on inner margin, lateral surface of lobe with longitudinal, shallow sulcus for reception of lateral lobe, apical portion of lobe more slender, somewhat expanded on dorsal margin, straight with apex narrowly rounded (Fig. 12); in ventral aspect very robust and broad, lateral margins evenly curved, with lateral emargination prominently visible, apical portion broad, lateral margins evenly rounded, apex a prominent, round to subtruncate process, orifice very large, elongate, constricted medially by intrusion of lateral margins (Fig. 10); operculum long, broad basally, abruptly constricted medially, apical half long, slender, straight (Fig. 10); lateral lobes broad, elongate, evenly curved, apically distinctly expanded, with two stout setae (Figs. 10–11).

Female tarsi 5–4–4.

Distribution. This species is known from Amador and El Dorado Counties in California and the type locality in Michigan.

Discussion. *Gelae parvulum* exhibits a disjunct distribution with several specimens known from California and the type specimen known from Marquette, Michigan. Numerous species of other agathidiine genera have broad, transcontinental distributions, and the regions between these two areas are not well collected for agathidiines, so the distribution may not be entirely unusual. The species has been collected from leaf litter in a mixed hardwood-conifer forest and from a Ponderosa pine log. The species has been recorded from the myxomycete *Lycogala epidendrum* (Linnaeus) Fries and from a “fungus” (Newton 1984).

Gelae baen Miller and Wheeler, **new species**

(Figs. 13–14, 28)

Material Examined. Holotype, ♂ in CNCI labeled “MEX.Oax.8 km S Suchixtepec 10.VIII.1986 H.&A.Howden/ HOLOTYPE *Gelae baen* Miller and Wheeler, 2003

[red label with black line border].” Thirty-six additional paratypes were examined with the same label information.

Type Locality. Mexico, Oaxaca, 8 km S Suchixtepec.

Diagnosis. This species is a member of a group of four similar species that also includes *G. rol*, *G. donut* and *G. cognatum*, each of which have the labrum very large and subquadrate (Figs. 28–31), the eyes strongly protuberant (Figs. 28–31), the head strongly narrowed posterad of the eyes (Figs. 28–31), the metasternum very broad medially (MTL/MTW > 0.35) and the male genitalia very similar in being very broad medially, having reduced lateral lobes and having a broad, platelike operculum that is apically emarginate (Figs. 13–20). In general, these species exhibit a dorsal color pattern where the pronotum or the pronotum and elytra are yellow marked with a diffuse medial brown macula on the pronotum and darker coloration around the margins of the elytra (*G. donut* is dorsally almost entirely brown in most specimens). *Gelae baen* differs from these species in having the dorsal surfaces of the head, pronotum and elytra relatively coarsely punctate. The male median lobe in ventral aspect is relatively slender compared to the other species (Fig. 13) and the apex is very strongly attenuated to a sharply pointed apex (Fig. 13).

Description. Body moderately large (TBL = 2.45–3.26 mm), robust (PNW/TBL = 0.47–0.51), laterally broadly rounded, weakly contractile.

Head brown; pronotum yellow with large, diffuse, medial brown macula; elytra brown, dark brown along margins; venter and legs yellow-brown; antennae and palpi yellow.

Head moderately broad (MDL/PHW = 0.67–0.73), dorsally flattened; constricted immediately posterad of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes large, rounded, protruding; fronto-clypeal suture continuous, but fine, medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 28); labrum broad, transversely rectangular; antennae (ratios: length I:II:III = 1.3:1.0:1.1, width VII:VIII:IX = 1.0:1.0:2.4). Pronotum broad (PNL/PNW = 0.55–0.58), laterally not strongly produced, lateral margins nearly straight, anterolateral angle subquadrate, posterolateral corner distinctive, more angulate than anterolateral corner; punctation similar to that of head. Elytra robust (SEL/ELW = 0.91–1.07); lateral margins broadly rounded; relatively coarsely punctate over entire surface, without distinct sub-sutural series of coarser punctures; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion moderately narrow. Metasternum broad medially (MTL/MTW = 0.39–0.40).

Male tarsi 5–5–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, unmodified; metasternal fovea small, located slightly anterad of middle, with small pencil of fine, dense setae. Median lobe in lateral aspect robust, broad, expanded medially on dorsal margin, ventral margin relatively straight, apical portion slender, apex distinctly curved dorsad (Fig. 14); in ventral aspect broad, lateral margins approximately parallel, apical portion broad, broadly acuminate, apex pointed, orifice very large (Fig. 13); operculum broad, apically bifid, medial emargination narrow (Fig. 13); lateral lobes short, broad, apically broadly rounded, without setae (Figs. 13–14).

Female tarsi 5–4–4.

Etymology. This species is named *baen*, a whimsical arrangement of letters pronounced like the English word “bean.”

Distribution. This species is known only from the type locality in Oaxaca.

Gelae donut Miller and Wheeler, **new species**

(Figs. 15–16, 29)

Type Material. Holotype, ♂ in FMNH labeled “PERU: Huanuco Dept. N side Cerro Carpish 2,500 m, vic. Chinchao site 669, 9–15.I.1983 cloud forest A.Newton & M.Thayer/ window trap/ HOLOTYPE *Gelae donut* Miller and Wheeler, 2003 [red label with black line border].” Fourteen additional paratypes were examined from the

following localities: **Bolivia:** Dept. Cochabamba, Prov Carrasco, Serrania de Siberia, Chua Khocha, 26 Aug 1990, 2,360 m, P. Parillo and M. Ledezma, (2, FMNH). **Peru:** Huanuco Dept., Cordillera Azul, 37 km NE Tingo Maria, 11 Jan 1983, 1,600 m, A. Newton and M. Thayer, (4, FMNH); Huanuco Dept., N side Cerro Carpish, 9 Jan 1983, 2,300 m, A. Newton and M. Thayer, (7, FMNH); Cuzco Dept., Consuelo, Manu Rd. km 165, 7 Oct 1982, E. Watrous and G. Mazurek, (1, AMNH).

Type Locality. Peru, Dept. Huánuco, N side Cerro Carpish, 2,500 m.

Diagnosis. This species is similar to several other species of *Gelae* (see Diagnosis under *G. baen*). It differs from these similar species in being very large (TBL > 3.00 mm). Also, the male median lobe is extremely robust and broad in both dorsal and lateral aspects (Figs. 15–16). The apex in ventral aspect is rather abruptly attenuated (Fig. 15), and the apex is abruptly curved dorsad in lateral aspect (Fig. 16).

Description. Body large (TBL = 3.03–3.46 mm), robust (PNW/TBL = 0.45–0.46), laterally broadly rounded, weakly contractile.

Head brown, clypeus yellow-brown; pronotum yellow with large, diffuse, medial brown macula; elytra brown, dark brown at base and along margins; venter and legs brown; antennae and palpi yellow, antennal club brown.

Head moderately broad (MDL/PHW = 0.66–0.68), dorsally flattened; constricted immediately posterad of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes large, rounded, protruding; fronto-clypeal suture continuous, but fine, medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 29); labrum broad, transversely rectangular; antennae (ratios: length I:II:III = 1.3:1.0:1.3, width VII:VIII:IX = 1.0:1.0:2.2). Pronotum broad (PNL/PNW = 0.58–0.63), laterally not strongly produced, lateral margins nearly straight, anterolateral angle subquadrate, posterolateral corner distinctive, more angulate than anterolateral corner; punctuation similar to that of head. Elytra robust (SEL/ELW = 0.93–1.16); lateral margins broadly rounded; punctuation fine and sparse, similar to pronotum; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion moderately narrow. Metasternum broad medially (MTL/MTW = 0.36–0.40).

Male tarsi 5–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, unmodified; metasternal fovea small, inconspicuous, located anterad of middle, with small pencil of fine, long setae. Median lobe in lateral aspect very broad, robust, straight, apical portion narrowed, apex abruptly bent dorsad and pointed (Fig. 16); in ventral aspect very broad, lateral margins sub-parallel, apically abruptly narrowed, very broadly acuminate, apex narrowly rounded (Fig. 15); operculum very broad, apically relatively broadly emarginate (Fig. 15); lateral lobes short, broad, directed slightly dorsad, without setae (Figs. 15–16).

Female tarsi 5–4–4.

Etymology. This species is named *donut*, a whimsical arrangement of letters that is pronounced like the English word “doughnut.”

Distribution. *Gelae donut* is known from highland areas in Bolivia and Peru.

Discussion. This species has been collected from cloud forest and montane rain forest. Elevation records are from 1,600–2,300 m.

Gelae rol Wheeler and Miller, new species

(Figs. 17–18, 30)

Material Examined. Holotype, ♂ in CNCI labeled, “AZ:GILA CO. Sierra Ancha Mts Workman Ck viii-5-77 6000’ Scott McCleve/ HOLOTYPE *Gelae rol* Wheeler and Miller, 2002 [red label with black line border].” Seven additional female paratypes were examined from the following localities: **United States: Arizona:** Flagstaff, Oak Ck. Can, Sterling Can., 17 Jul 1979, 5,900 ft, S. and J. Peck, (3, PECK); Coconino Co., Clovers Spring, Hwy87 N Strawberry, 6 Aug 1983, M.W. Sanderson, (1, FMNH); Gila

Co., Sierra Ancha Mts. Workman C, 5 Aug 1977, 6,000 ft, S. McCleve, (2, PECK); Graham Co., Pinaleno Mts. Shannon Camp, 7 Aug 1979, A.J. Gilbert, (1, AMNH).

Type Locality. United States, Arizona, Gila County, Sierra Ancha, Workman Creek, 6,000 ft.

Diagnosis. This species is similar to several other species of *Gelae* (see Diagnosis under *G. baen*). It differs from these species in being dorsally relatively impunctate except for an irregular longitudinal subsutural series of relatively coarse punctures on the elytra. Also, the male median lobe is apically distinctly curved dorsad in lateral aspect (Fig. 18) and gradually attenuate to a narrowly rounded apex in ventral aspect (Fig. 17).

Description. Body moderately large (TBL = 2.75–2.76 mm), broad (PNW/TBL = 0.46–0.48), laterally broadly rounded, weakly contractile.

Head brown; pronotum yellow with large, brown medial macula; elytra yellow, brown along anterior and lateral margins, apex and sutural margins brown; venter yellow to light brown; antennae and palpi yellow; legs yellow-brown to yellow.

Head moderately broad (MDL/PHW = 0.67–0.71), dorsally flattened; constricted immediately posterad of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes large, rounded, protruding; fronto-clypeal suture continuous, but fine, medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 30); labrum large, quadrate; antennae (ratios: length I:II:III = 1.3:1.0:1.0, width VII:VIII:IX = 1.0:1.0:2.6). Pronotum broad (PNL/PNW = 0.58–0.59), laterally not strongly produced, lateral margins nearly straight, anterolateral angle subquadrate, posterolateral corner distinctive, more angulate than anterolateral corner; punctation similar to that of head. Elytra robust (SEL/ELW = 0.88–1.02); lateral margins broadly rounded; punctation very fine and sparse, similar to pronotum, with irregular sub-sutural linear series of somewhat coarser punctation; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion very narrow. Metasternum broad medially (MTL/MTW = 0.40–0.41).

Male tarsi 5–5–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, unmodified; metasternal fovea small, inconspicuous, located anterad of middle, with small pencil of fine, long setae. Median lobe in lateral aspect robust, broadly expanded medially on dorsal margin, ventral margin nearly straight, apical portion narrowed, apex narrowly rounded, distinctly bent dorsad (Fig. 18); in ventral aspect broad, lateral margins evenly curved, apically moderately abruptly narrowed, apex moderately narrowly rounded, orifice large (Fig. 17); operculum broad, apically bifid, medial emargination narrow (Fig. 17); lateral lobes short, directed slightly dorsad, apex broadly rounded with 1 long, stout seta (Figs. 17–18).

Female tarsi 5–4–4.

Etymology. This species is named *rol*, a whimsical arrangement of letters that is pronounced like the English word “roll.”

Distribution. This species is known from the mountains of southern Arizona (Coconino, Gila and Graham Counties).

Discussion. This species occurs in forests in the mountains of southern Arizona. It has been collected from riparian woods and from 5,900–6,000 ft elevation. One specimen was collected at a black light trap.

Gelae cognatum (Matthews), **new combination**
(Figs. 19–20, 31)

Agathidium cognatum Matthews, 1887; Blackwelder, 1944.

Material Examined. Holotype, ♀, in BMNH labeled, “Type [circular disc with red line around border]/ Sp. Figured./ Tonicapam, 85–10,500 ft Champion./ Agathidium cognatum [handwritten, pink label with black line along bottom]/ B.C.A., Col., II, I./ ? *Liodes* [handwritten with another illegible word].” Matthews had only a single

specimen for this description, and it is a holotype by monotypy. Additional specimens were examined from the following localities: **Costa Rica:** Puntarenas, Monte Verde, 24 May 1989, 1,520 m, J. Ashe, R. Brooks, and R. Leschen, (1, FMNH); Monte Verde, 21 Feb 1983, 1,500 m, D. Lindeman, (4, PECK); Puntarenas, Monteverde, 12 Aug 1987, 1,400 m, H. and A. Howden, (2, CNCI); Alajuela Penas Blancas, 11 Oct 1986, E. Cruz, (1, CNCI); Puntarenas, Rio Guacimal, 26 May 1989, 1,430 m, J. Ashe, R. Brooks, and R. Leschen, (1, FMNH); Alajuela Penas Blancas, 20 May 1989, 1,420 m, J. Ashe, R. Brooks, and R. Leschen, (1, FMNH). **Guatemala:** Baja Verapaz, 7 km E Purulha, 23 May 1991, 1,600 m, R. Anderson, (1, CNCI). **Honduras:** Olancho, La Union Parque Nac. La Muralia, 20 Aug 1994, R. Corudro, (2, FMNH); Cortez, Cofradia 25 km N PN Cusuco, 26 Aug 1994, 1,550 m, S. and J. Peck, (1, FMNH). **Mexico:** Chiapas, Palenque, 2 Jul 1983, 100 m, Peck and Anderson, (1, PECK). Hidalgo, Tlanchinol 43 km SW Huejutla, 14 Jun 1983, S. and J. Peck, (16, PECK); Hidalgo, Tlanchinol 43 km SW Huejutla, 14 Jun 1983, S. and J. Peck, (1, FMNH); Hidalgo, Tlanchinol 43 km SW Huejutla, 1 Aug 1983, 1,490 m, S. and J. Peck, (2, PECK). Oaxaca, 26 km E Valle Nacional, 25 Jun 1983, 1,220 m, S. and J. Peck, (19, PECK); San Luis Potosi, Taman, 20 km SW Tamazunchale, 11 Jun 1983, 350 m, Peck, (1, PECK); San Luis Potosi, 20 km W Xilitla, 12 Jun 1983, 1,600 m, S. and J. Peck, (2, PECK); Tamaulipas, nr Gomez Farias Rancho del Cielo, 6 Jun 1983, 1,000 m, S. and J. Peck, (23, PECK); Tamaulipas, nr Gomez Farias Rancho del Cielo, 6 Jun 1983, 1,000 m, S. and J. Peck, (3, PECK); Tamaulipas, nr Gomez Farias Rancho del Cielo, 7 Jul 1983, M. Kaulbars, (1, PECK); Vera Cruz, 33 km NE Catemaco, Los Tuxtias Biol. Sta., 1 Jul 1983, S. and J. Peck, (13, PECK); Vera Cruz, 7 km E Huatusco, 22 Jun 1983, 1,250 m, S. and J. Peck, (13, PECK); Vera Cruz, 33 km N Catemaco, Los Tuxtlas Biology Stn., 22 Jun 1984, D.H. Lindeman, (1, CNCI); Vera Cruz, 7 km E Huatusco, 22 Jun 1983, 1,250 m, S. and J. Peck, (1, PECK). **Panama:** Chiriqui, La Fortuna Dam, 14 Jun 1982, 1,200 m, B. Gill, (21, PECK); Chiriqui, Cerro pelota, 1 Jul 1982, 1,500 m, B. Gill, (18, PECK); Chiriqui La Fortuna Dam, 14 Jun 1982, 1,200 m, B. Gill, (6, PECK); Panama, El Llano-Carti Rd., Jun 1982, B. Gill, (13, PECK); Chiriqui Cerro Normito 15 km NE Gualaca, Aug 1982, 1,200 m, B. Gill, (15, PECK); Chiriqui Prov. Hornito Finca La Suiza, 29 May 2000, 1,856 m, H. and A. Howden, (12, FMNH).

Type Locality. Guatemala, Totonicapam, elev. 10,500 ft (Champion).

Diagnosis. This species is similar to several other species of *Gelae* (see Diagnosis under *G. baen*). It differs from these species in being dorsally very finely, sparsely and inconspicuously punctate. Also, the male median lobe in lateral aspect has the apical portion nearly straight to a narrowly apex (Fig. 20). In ventral aspect the apical portion is evenly narrowed to a narrowly rounded apex (Fig. 19).

Description. Body moderately large (TBL = 2.30–3.01 mm), broad (PNW/TBL = 0.47–0.50), laterally broadly rounded, weakly contractile.

Head brown, clypeus yellow; pronotum brown with yellow around margins; elytra brown to yellow-brown; venter yellow to yellow-brown; antennae and palpi yellow, club of antenna brown; legs yellow-brown.

Head moderately broad (MDL/PHW = 0.65–0.70), dorsally flattened; constricted immediately posterd of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes large, rounded, protruding; fronto-clypeal suture continuous, but fine, medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 31); labrum large, quadrate; antennae (ratios: length I:II:III = 2.1:1.0:1.4, width VII:VIII:IX = 1.0:1.0:2.3). Pronotum broad (PNL/PNW = 0.56–0.61), laterally not strongly produced, lateral margins nearly straight, anterolateral angle subquadrate, posterolateral corner distinctive, more angulate than anterolateral corner; punctation similar to that of head. Elytra robust (SEL/ELW = 0.98–1.06); lateral margins broadly rounded; punctation very fine and sparse, similar to pronotum; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave

posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion very narrow. Metasternum broad medially (MTL/MTW = 0.39–0.40).

Male tarsi 5–5–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, unmodified; metasternal fovea small, inconspicuous, located anterad of middle, with small pencil of fine, long setae. Median lobe in lateral aspect very broad, robust, expanded medially along dorsal margin, apical portion narrowed, elongate, relatively straight (Fig. 20); in ventral aspect broad, apical portion broad, evenly narrowed to somewhat rounded apex, orifice very large (Fig. 19); operculum broad, flat, lateral margins broadly curved, apically deeply and broadly emarginate (Fig. 19); lateral lobes short, broad, apically broadly rounded, without setae (Figs. 19–20).

Female tarsi 5–4–4.

Distribution. This species has been collected from the states of Oaxaca, Hidalgo, San Luis Potosí, Vera Cruz, Tamaulipas and Chiapas, Mexico and from Costa Rica, Guatemala and Panama.

Discussion. The holotype specimen is a female. However, we are confident that the male specimens and other females assigned to this species are conspecific with the holotype based on similarity in coloration, shape of the head, punctuation, size and other characters. This species has been collected extensively from cloud forest or wet forest at low to intermediate elevations (100–1,900 m). The only host data indicate an association with a basidiomycete, *Hohenbuehilia* sp.

Decuria Miller and Wheeler, new genus

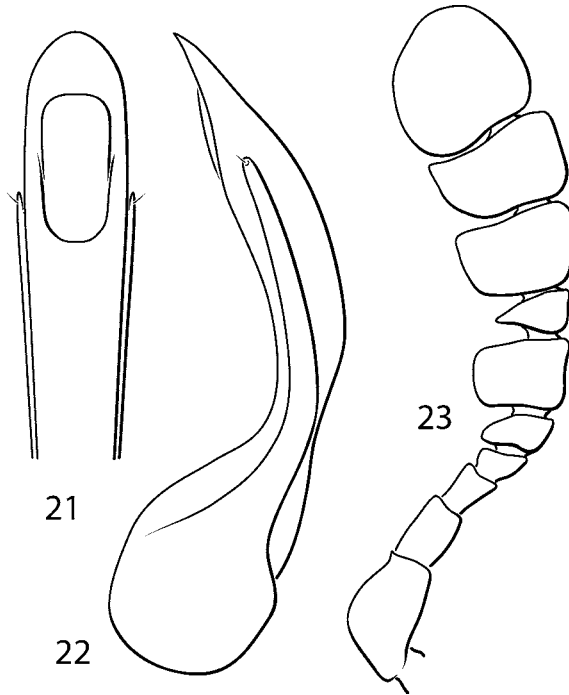
“Undescribed Genus 6,” Peck *et al.*, 1998.

Type Species. *Decuria newtoni* Miller and Wheeler, new species, by present designation.

Diagnosis. This genus can be easily distinguished from other genera of Agathidiini by the combination of the antenna with 10 antennomeres (Fig. 23), the antenna with a distinct interrupted 5-segmented club (antennomere VII smaller than antennomere VI) (Fig. 23), the postocular temporum absent (Fig. 32), the supraocular carina absent (Fig. 32), the anterior clypeal margin extending distinctly anterad of the anterolateral margin of the frons (Fig. 32), the elytra only moderately punctate and punctures not forming prominent longitudinal series, the first abdominal sternum with a prominent medial, longitudinal carina and the tarsi ♂ 4–4–4/♀ 4–4–4.

Discussion. Several other leioidid genera possess 10-segmented antennae, but no other known Agathidiini exhibit this feature. The genus contains only a single, previously undescribed species. Peck *et al.* (1998) suggested that there may be two species, but there appears to be only one. The species is similar to some species currently assigned to *Anisotoma* (i.e., the *A. horni-errans*-group), (this last similarity pointed out by Peck *et al.*) (1998). These taxa are all similar in having only moderately punctate dorsal surfaces, no postocular temporum or supraocular carinae and similar genitalia. Since the main distinguishing features of this taxon are the antennae with 10 antennomeres, the tarsi 4–4–4 in both sexes and the longitudinal carina on the 1st abdominal sternum, it seems possible that the taxon may be nested within a different genus as the agathidiine genera are currently classified. However, it is by no means clear to which genus it might belong, and it seems best to recognize this species in its own genus until such time as the tribe can be reorganized based on a comprehensive cladistic analysis.

Etymology. This genus is named *Decuria* (gender feminine), Latin for “a body of ten men,” in reference to the ten antennomeres present in the single species in this genus.

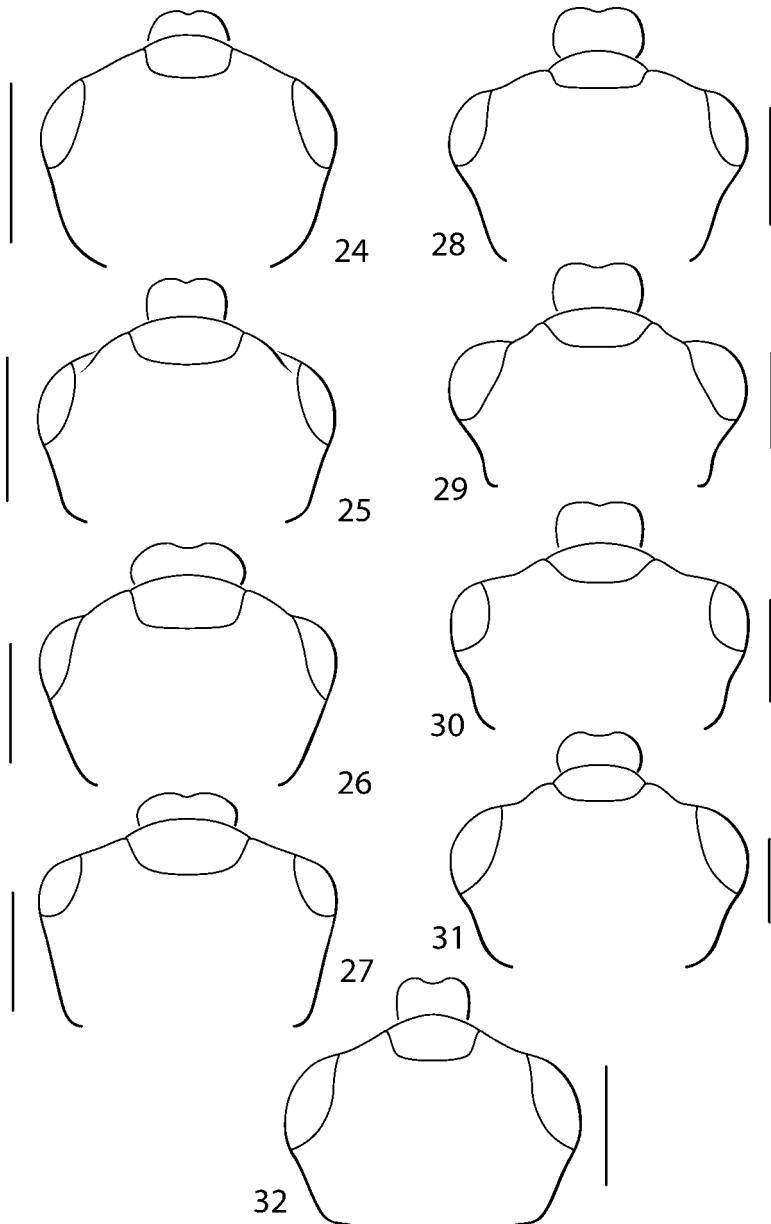


Figs. 21–23. *Decuria newtoni*. 21–22) Median and lateral lobes of aedeagus; 21) ventral; 22) lateral; 23) right antenna, dorsal.

Decuria newtoni Miller and Wheeler, **new species**
(Figs. 21–23, 32)

Material Examined. Holotype, ♂ in FMNH labeled, “COSTA RICA:Puntarenas Monte Verde, 1,540 m 6 May 1989, J.Ashe, R. Brooks, R. Leschen/ ex., “puffball”-like slime mold/ Snow Entomol. Mus. Costa Rica Exped. #016/DUPLICATE ex series at SEMC/ Anisotoma sp. 4 Det. by R. Leschen 19 [“Anisotoma sp. 4” handwritten]/ Anisotoma sp. det. Newton 1991 [“Anisotoma sp.” handwritten]/ HOLOTYPE *Decuria newtoni* Wheeler and Miller, 2002 [red label with black line border].” Nine additional paratypes were also examined from the following localities: **Bolivia:** Dept. Cochabamba, Prov. Carrasco, Serrania de Siberia, Chua Khocha, 26 Aug 1990, 2,360 m, P. Parillo and M. Ledezma, (2, FMNH). **Costa Rica:** Monte Verde, Puntarenas, 9 May 1989, J. Ashe, R. Brooks, and R. Leschen, (1, FMNH); Monte Verde, Puntarenas, 6 May 1989, J. Ashe, R. Brooks, and R. Leschen, (1, FMNH); Puntarenas, Guanacasta border, Monte Verde, 10 May 1989, 1,760 m, J. Ashe, R. Brooks, and R. Leschen, (1, FMNH); Alajuela Prov., Est. Biol. San Gerardo, Sandero Corredor Biologico, 10°52’N, 85°23’W, 1 Apr 2001, 590 m, M. Thomas, (1, FMNH). **Mexico:** Chiapas, Chris: Palenque, 2 Jul 1983, 80 m, S. and J. Peck, (1, PECK); Chiapas, Chris: Bonampok Rd. 100 km SE Palenque, 8 Jul 1983, 230 m, S. and J. Peck, (1, PECK); San Luis Potosi, 20 km W Xilitla, 12 Jun 1983, 1,600 m, S. and J. Peck, (1, PECK).

Type Locality. Costa Rica, Puntarenas, Monte Verde, 1,540 m.



Figs. 24–32. *Gelae* and *Decuria* species, heads, dorsal. 24) *G. fish*; 25) *G. belae*; 26) *G. parile*; 27) *G. parvulum*; 28) *G. baen*; 29) *G. donut*; 30) *G. rol*; 31) *G. cognatum*; 32) *D. newtoni*. Bars = 0.25 mm.

Diagnosis. This is the only species in the genus and is diagnosed by those character states diagnostic for the genus.

Description. Body small (TBL = 2.00–2.39 mm), broad (PNW/TBL = 0.40–0.41), laterally broadly rounded, weakly contractile.

Head and pronotum dark brown to black; elytra dark brown, some specimens with distinctive iridescent sheen on surface of head, pronotum and elytra; venter dark red-brown; antennae, palpi and legs red-brown.

Head moderately broad (MDL/PHW = 0.67–0.70), dorsally flattened; constricted immediately posterad of eye; very finely and sparsely punctate, surfaces shiny and smooth between punctures; eyes very large, rounded, protruding; fronto-clypeal suture continuous, but fine, medially; clypeal margin moderately protruding, extending beyond level of anterolateral margins of frons (Fig. 32); labrum large, quadrate; antennae with 10 antennomeres (Fig. 23) (ratios: length I:II:III = 1.1:1.0:0.8, width VII:VIII:IX = 1.3:1.0:1.5). Pronotum broad (PNL/PNW = 0.67–0.74), laterally not strongly produced, lateral margins nearly straight, relatively short, anterolateral angle subquadrate, posterolateral corner distinctive, more angulate than anterolateral corner; punctuation similar to that of head. Elytra robust (SEL/ELW = 1.07–1.17); lateral margins broadly rounded; moderately punctate, many punctures forming very indistinct longitudinal series; sutural stria prominent, extending about 1/2 length of elytron. Mesosternum strongly concave posteriorly, with prominent lobe extending ventrally between mesocoxae, anterior portion very narrow. Metasternum broad medially (MTL/MTW = 0.30–0.38). Abdominal sternum 1 with prominent, longitudinal, medial carina.

Male tarsi 4–4–4; pro- and mesobasotarsomeres only slightly expanded and with small ventral field of adhesive setae; metafemur slender, unmodified; metasternal fovea moderately large, slightly transverse, located anterad of middle, with small pencil of fine, long setae. Median lobe in lateral aspect long, slender, evenly curved, constricted medially, apical portion slightly curved, evenly narrowed to pointed, slightly dorsally-directed apex (Fig. 22); in ventral aspect slender, apically slightly broadened, apex very broadly rounded, orifice moderately large (Fig. 21); operculum broad, flat, apically slightly expanded, apex broadly truncate (Fig. 21); lateral lobes long, slender, evenly curved, apex narrowly rounded, with 1 short, inconspicuous seta (Figs. 21–22).

Female tarsi 4–4–4.

Etymology. This species is named after A.F. Newton, eminent coleopterist and collector of several specimens in the type series.

Distribution. This species has been collected in the states of Chiapas, and San Luis Potosi, Mexico, Costa Rica and Bolivia.

Discussion. The specimens from Bolivia differ somewhat in coloration from the northern specimens. They are darker black with a moderate iridescent sheen. However, they are extremely similar in other features including the shape of the male genitalia. This species is based on only nine specimens at this time, so examination of additional specimens in the future will likely shed more light on the extent of variation. The type specimen was collected from a “puffball-like slime mold” which could be a *Lycogala* species.

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