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A new species of *Aximopsis sensu lato* Ashmead (Hymenoptera, Chalcidoidea, Eurytomidae) parasitic on *Euglossa* spp. (Hymenoptera, Apidae)

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Abstract

Aximopsis masneri Gates, **sp. n.**, (Hymenoptera, Chalcidoidea, Eurytomidae) is described and illustrated. This species was reared from field-collected nests of *Euglossa* sp. (Hymenoptera, Apidae) in the Neotropical region with additional label data indicating *E. variabilis* and *E. cybelia* as hosts. It is compared with the nominate species of the *nodularis* species group of *Aximopsis sensu lato* to which it belongs.

Keywords

Aximopsis, Chalcidoidea, Eurytomidae, *nodularis*, orchid bee

Comments on Dr. Lubomír Masner

What can one say about about a legendary fixture of the microhymenoptera community that has not been said already? We all know of his burning, lifelong love of Proctotrupoidea s.l. and unquenchable desire to collect every last ounce of "black gold" humanly possible. I first met Lubo in 1996 at the Entomological Collections Network meeting in Louisville, Kentucky. His manic energy and enthusiasm for his proctos made a deep, lasting impression. During the intervening 13 years, little has changed. Lubo, I salute you and wish you continued health and happiness!

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Introduction

The genus *Aximopsis sensu lato* is potentially very large and species-rich, but recent descriptive and nomenclatural works list 27 nominal species (Noyes 2003; Gates et al. 2006 (*s.s.*); Lotfalizadeh et al. 2007 (*s.l.*); Gates and Delvare 2008). These are distributed in the Old World and the New World neotropics minimally, but are certainly cosmopolitan. Nominal *Aximopsis s.l.* species are distributed as follows: twelve African (Lotfalizadeh et al. 2007; Gates and Delvare 2008), ten Neotropical (Gates et al. 2006; Noyes 2003), three Oriental (Noyes 2003), two Palaearctic (Noyes 2003), reported from several different hosts, including Coleoptera, Lepidoptera, and Hymenoptera. Four species are known to attack Hymenoptera: *A. collina* (Zerova) on *Diplolepis* (Zerova 1984), *A. affinis* (Brues) and *A. aztecicida* (Brues) on *Azteca* ants (Brues 1922), and *A. nodularis* (Boheman 1836) on various aculeates (bees, wasps) and parasitic wasps.

Though *A. masneri* has likely been previously reported in the literature (see Discussion and Biological Information) as a *Eurytoma* or Eurytomidae attacking species of *Euglossa*, it remained undescribed until now. Like the hosts of other *Aximopsis s.l.* parasitizing Hymenoptera, *Euglossa* spp. often construct their nest in hollow twigs, but some construct dome-shaped nests under leaves, on stems, or nest underground. Given that over 100 species of *Euglossa* are described (Roubik and Hanson 1994), and that many of these have unknown nests, it is likely that more eurytomids parasitizing *Euglossa* await discovery.

Methods

Images of specimens were produced by scanning electron microscopy (SEM) and an EntoVision Imaging Suite. A Nikon SMZ1500 stereomicroscope with 10× oculars (Nikon C-W10X/22) and a Chiu Technical Corp. Lumina 1 FO-150 fiber optic light source were used for card- and point-mounted specimen observation. Mylar film was placed over the ends of the light source to reduce glare from the specimen. Scanning electron microscope (SEM) images were taken with an Amray 1810 (LaB_6 source). Specimens were affixed to 12.7 × 3.2 mm Leica/Cambridge aluminum SEM stubs with carbon adhesive tabs (Electron Microscopy Sciences, #77825-12). Stub-mounted specimens were sputter coated using a Cressington Scientific 108 Auto with a gold-palladium mixture from at least three different angles to ensure complete coverage (~20–30nm coating). Wing and habitus images were obtained using an EntoVision Imaging Suite, which includes a firewire JVC KY-75 3CCD digital camera mounted to a Leica M16 zoom lens via a Leica z-step microscope stand. This system fed image data to a desktop computer where Cartograph 5.6.0 (Microvision Instruments, France) was used to capture a fixed number of focal planes (based on magnification); the resulting focal planes were merged into a single, in-focus composite image. Lighting was achieved using an LED illumination dome with all four quadrants set to 99.6% intensity.

Terminology for surface sculpturing follows Harris (1979) and for morphology follows Gibson (1997) and Lotfalizadeh et al. (2007). Body lengths were measured in lateral view from the anterior projection of the face to the tip of the gaster. Head width was measured through an imaginary line from gena to gena bisecting both toruli. Head height was measured through an imaginary line from the vertex to the clypeal margin bisecting the median ocellus and the distance between the toruli. Head height in frontal view was measured between the vertex and apex of the clypeus. The malar space was measured in lateral view between the ventral margin of the eye and lateral margin of the oral fossa. Posterior ocellar line (POL) was measured as the shortest distance between the posterior ocelli. Ocular ocellar line (OOL) was measured as the shortest distance between the lateral margin of the posterior ocellus and the eye orbit. The marginal vein was measured as the length coincident with the leading forewing edge to the base of the stigmal vein; the stigmal vein was measured between its base on the marginal vein and its apex; the postmarginal vein was measured from the base of the stigmal vein to its apex on the leading forewing edge. Mesosomal and metasomal sclerites were measured dorsally along the midline. Petiole length was measured from the base of the anterior condyle to the junction of the petiole with Gt_1. Petiole width was measured at the midlength. The use of [] in the description denotes structures that are not visible in the holotype specimen.

Abbreviations for collections are BMNH (The Natural History Museum, London), CNC (Canadian National Collection, Ottawa), MIUP (Museo de Invertebrados G.B. Fairchild, Universidad de Panama), MZCR (Museo de Zoología, Universidad de Costa Rica), USNM (National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA).

Results

***Aximopsis masneri* Gates, sp. n.**
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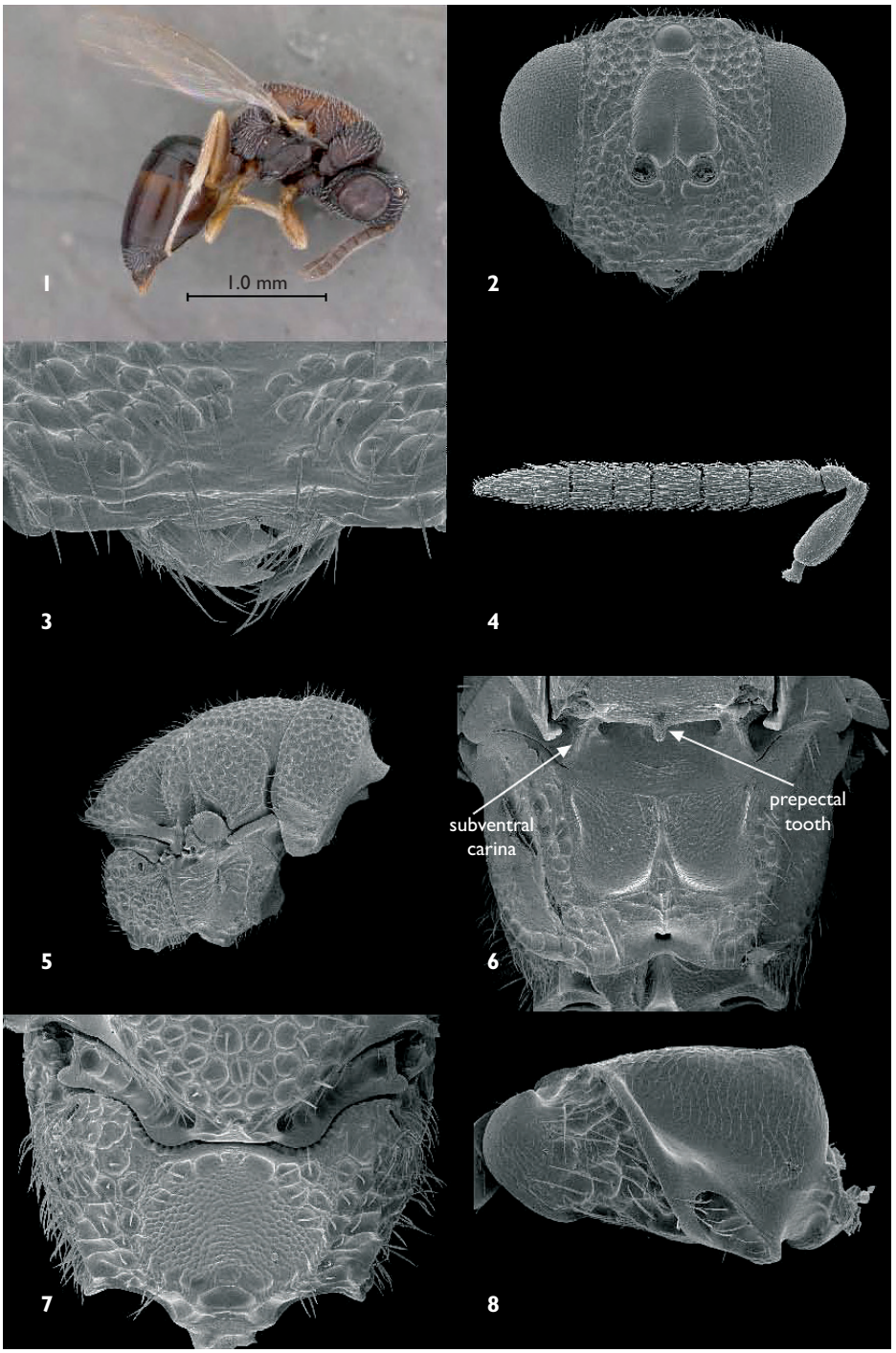
Figs 1–16

Etymology. *masneri* (Latinized, noun) = genitive, singular, masculine, named in honor of Lubomír Masner for his boundless enthusiasm and years of dedication to "black gold."

Female holotype. Body length 3.9 mm (2.7–4.2 mm; n=10). Color: Red-brown except for the following darker red-brown to black – head, flagellum apically, pronotum dorsally and ventrolaterally, procoxae basally, along epicnemial carina, femoral depression ventrally, ventrad wing bases, metapleuron, propodeum, petiole, Gt1–3, Gt4 dorsoposteriorly, Gt5–6, syntergum (Fig. 1); gold – antenna, tegula, femora, tibiae, venation; white – extreme tibial apices, tibial spurs, tarsomeres and wing veins.

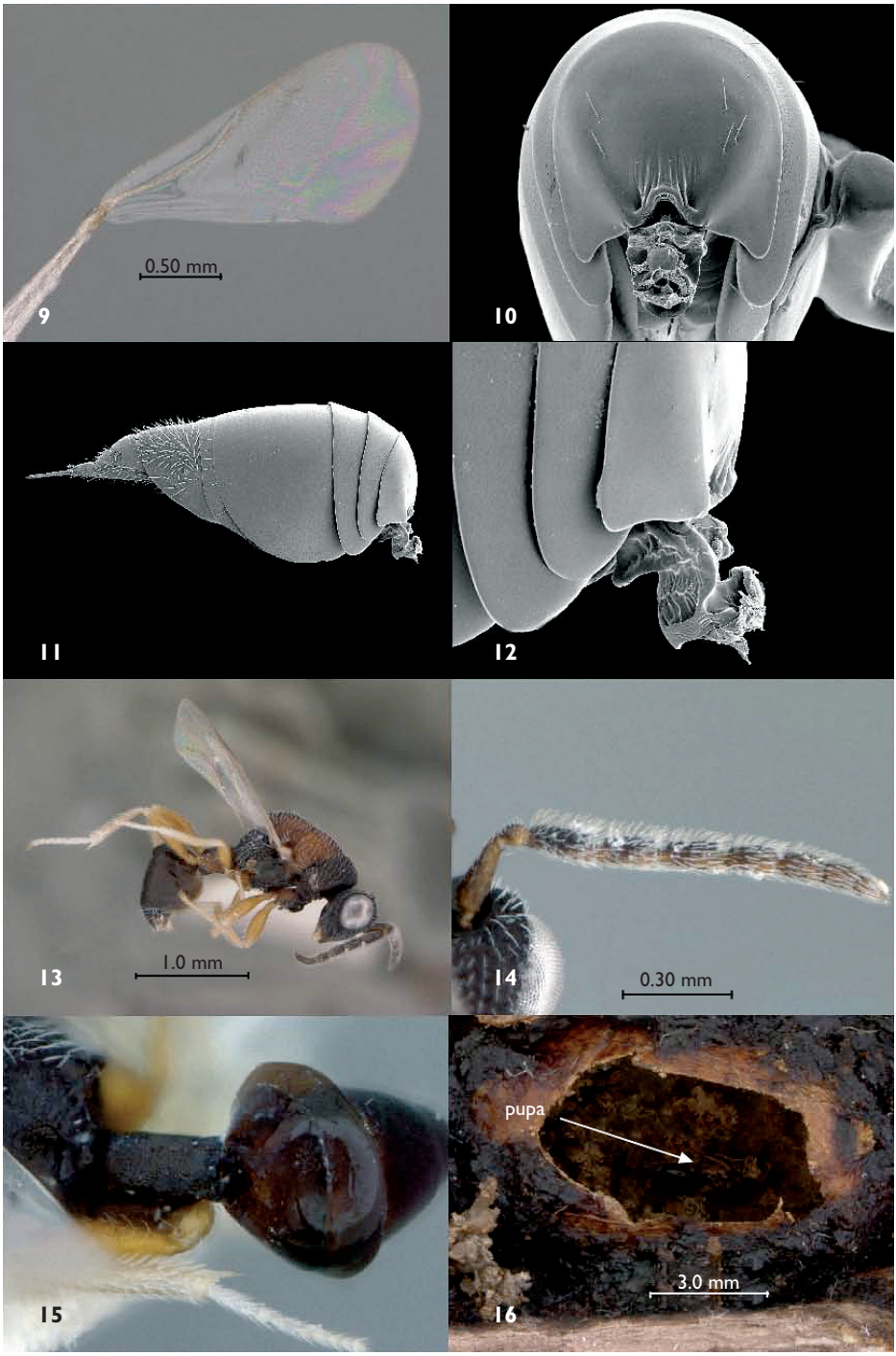
Head 1.6× as broad as high (Fig. 2), clypeal region slightly elevated, triangular and lacking punctures, extending to intertorular space; ventral margin clypeus very shallowly bilobed (Fig. 3), even with margin of oral fossa; anterior tentorial pits small



Figures 1–8. *Aximopsis masneri*, female. **1**[1] habitus **2**[2] head, frontal **3**[3] clypeus **4**[4] antenna **5**[5] mesosoma, lateral **6**[6] mesosoma, anteroventral **7**[7] propodeum **8**[8] procoxa, rotated 90° clockwise.

but present; genal carina indistinct, gena with impunctate area; malar space 0.63× eye height; mandible tridentate, basal tooth smallest and separated from middle tooth by emargination; toruli positioned above lower ocular line; intertorular space sulcate and bearing two rows of hairs, pointed above. Scrobal depression carinate laterally, carina as slightly raised lobe in dorsal 1/4. Antenna with scape reaching ventral margin of anterior ocellus; ratio of scape (minus radicle):pedicel:anellus: F1:F2: F3:F4:F5:club as 30:8:2:17:12:12:13:10:28; pedicel chalice-shaped; F1 slightly narrowed basally; funicular segments with 2–3 irregular rows of longitudinal sensilla (Fig. 4) and evenly setose; clava apparently bisegmented (C2+C3 fused, former separation faintly indicated). Ratio of lateral ocellus:OOL:POL as 9:10:26. [Head posteriorly lacking postgenal lamina but postgenal grooves evidently ridged, slightly converging ventrally, extending to ½ length maxillary stipes; dorsal and lateral margins of lateral foraminal plate visible, convex; subforaminal plate absent; postgenal sulci narrow, superficial.] Mesosoma with umbilicate sculpture (Fig. 5), 2.0× as long as broad; midlobe of mesoscutum 1.14× as long as broad; scutellum 1.30× as long as broad; notauli complete, indicated as a row of punctae; axillar grooves with pit at mid length; lateral surface of prepectus triangular, narrowly rounded posteriorly, smooth, deep sublaterally; [subventral carinae of prepectus broad, ventral surface of prepectus with median tooth] (Fig. 6). Mesepimeron reticulate to finely striate ventrally, becoming striate dorsally and with indistinct punctae posteriorly, femoral depression finely striate mid-height. Mesepisternum anterior to femoral depression with umbilicate sculpture (Fig. 5), epicnemium imbricate, concave, defined by carinae laterally and ventrally, carina produced medially between procoxae a rounded lamina, forming depressions to receive procoxae (Fig. 6). Metapleuron and lateral areas of propodeum (Figs 5, 7) with umbilicate sculpture, propodeum broadly flattened medially, reticulate, bordered laterally and posteriorly by carinae, 2–3 setose, incomplete cells anterolaterally (Fig. 7), elliptical cell anterad nucha; spiracle about 1/3 its greatest diameter from metanotum. Procoxa imbricate on basal anterior surface, reticulate laterally, oblique carina at midlength defining a shelf for reception of lower head, with ovate setose cell laterally defined by oblique carina, remaining procoxa with setose punctae anteriorly (Fig. 8). Mesocoxa smooth, becoming imbricate apically. Metacoxa elongate-imbricate laterally and dorsally, with indistinct setose punctae along dorsolateral surface. Forewing with ratio of marginal vein:postmarginal vein:stigmal vein as 21:20:18 (Fig. 9). Metasoma smooth to microreticulate, Gt1 smooth with arcuate carina on anterior edge with associated longitudinal rugae, row of three setae present dorsolaterally (Fig. 10); remaining terga and syntergum effaced microreticulate (Fig. 11); [petiole 0.63× as long as broad in dorsal view, with projecting median carina dorsally and indistinctly carinate dorsolaterally (Fig. 12); two subventral carinae converge anteroventrally on petiole, forming triangular prong in lateral view;] measurements of gastral terga along midline as 15:20:20:55:15:20:13.

Male. Body length 2.4–2.9 mm (n=5). Color: as described for female, but with following black – pronotum (especially dorsally), mesopleuron, gaster (Fig. 13); brown – scape, pedicel, flagellum (yellowish ventrally) (Fig. 14). Sculpture as described for fe-



Figures 9–16. *Aximopsis masneri*, female. **9**[9] fore wing; **10**[10] metasoma, anterior; **11**[11] metasoma, lateral; **12**[12] petiole, lateral. Male: **13**[13] habitus; **14**[14] antenna; **15**[15] petiole, dorsal. **16**[16] dissected nest of *Euglossa* sp. with pupa of *Aximopsis masneri* inside.

male. Antenna with funicular segments (Fig. 14) minutely pedicellate, each with multiple rows of suberect setae and about 1.0× as long as width of segment; ratio of scape (minus radicle):pedicel:anellus:F1:F2:F3:F4:F5:club as 28:5:2:20:18:17:15:35; scape with ventral plaque unapparent. Gastral petiole in lateral view roughly cylindrical (Fig. 15), in dorsal view length about 1.50× as long as greatest width, subequal in length to metacoxa; evenly reticulate dorsally and ventrally, smoother laterally.

Variation. Most variation observed occurs in coloration. The clava may be abruptly darker than the funiculars, but sometimes darker brown coloration begins with funicular three or four. The pronotum sometimes much more red-brown than black, with this usually beginning laterally and continuing dorsolaterally; only occasionally is the entire pronotum black. The mesopleuron is completely black in one Aripo Valley paratype and all of the Aripo Valley paratypes have a darker brown flagellum. Some specimens have Gt1–3 appearing almost solid black or occasionally the entire gaster is a concolorous brownish.

Type material. Holotype ♀ (USNM); PANAMÁ: Panamá: Riveras Río Capira, Capira Cabecera, 21.IV.1992, J. Coronado/Parasitando celdas de *Euglossa*.

Paratypes (52♀♀ 7♂♂) (BMNH, CNC, MIUP, MZCR, USNM), same data as holotype: [mounted 3♀♀/pin on 7 pins] (21♀♀ MIUP); [mounted 2♀♀ 1♂/pin on two pins] (4♀♀ 2♂ MIUP); [3♀♀/pin on 2 pins, date is 20.IV] (3♀♀ BMNH, 3♀♀ CNC); [3♂♂/pin on 1 pin date is 20.IV] (USNM); [4♀♀ 1♂/pin 20.IV] (MZCR); [3♀♀/pin 20.IV (2♀♀ now mounted, partially dissected, on separate pins)] (USNM); [3♀♀/pin 20.IV (with additional labels: Eurytomidae, Rileya sp.?, det. D. Quintero and Eurytoma sp., det. E. Grissell, 1994) (USNM). PANAMÁ: Colon, Feb. 1973, nest Euglossa cybelia, R. L. Dressler (1♀ USNM). TRINIDAD AND TOBAGO: Aripo Valley, April 1965, Ex cells of Euglossa variabilis (3♀♀/pin with FDB-7 label; 2♀♀ 1♂/pin with FDB-4 label; 2♀♀ with FDB-6 label; 3♀♀/pin with FDB-5 label) (8♀♀ 1♂ USNM, 2♀♀ BMNH).

Hosts. *Euglossa* sp., *Euglossa cybelia* Moure (1968), *Euglossa variabilis* Friese (1899) (Fig. 16)

Discussion and biological information. The head with preorbital carinae, lower face punctate and without striae, procoxae with oblique shelflike carina, prepectus pitlike sublaterally, and mesepimeron striate indicate that *Aximopsis masneri* belongs to the *nodularis* species group as outlined in Lotfalizadeh et al. (2007). *Aximopsis masneri* may be separated from species of the *nodularis* species group by its majority red-brown coloration, and broadly flattened, reticulate median area of the propodeum. Other *nodularis* group species are nearly completely black and have a differently sculptured propodeum, usually coarsely punctate and/or with a narrow median channel.

Most reports detailing parasitoid Hymenoptera, specifically Chalcidoidea, known to parasitize Euglossini list certain taxa of Leucospidae (Bouček 1974; Cameron and Ramírez 2001), Torymidae (Sakagami and Sturm 1965; Zucchi et al. 1969; Grissell 2007, Otero 2001), and Eulophidae (Garófalo et al. 1998). Roubik and Hanson (2004) reported that they reared *Eurytoma* sp. from nesting boxes of *Euglossa hemichlora* Cockerell (1917) in Panama. Gonzalez et al. (2007) reported rearing a gregarious eurytomid from the nests of *Euglossa cybelia*. The nominate member (*Aximopsis nodularis* (Boheman)) of the *nodularis* group is known to attack a variety of Hymenoptera

such as Apidae (*Ceratina* sp., *Heriades* sp., *Megachile* sp., *Osmia* spp., *Prosopis* sp.), Cynipidae (*Cynips quercusfolii* L. (1758)), Sphecidae (*Nitela spinolai* Latreille 1809, *Pemphredon lethifer* (Shuckard 1837), *Psenulus schencki* (Tournier 1889), *Trypoxylon* spp.), and Vespidae (*Symmorphus debilitatus* (Saussere 1856)) (Noyes 2003).

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Endnotes

[1] Figure 1: Morphbank image: http://morphbank.net/Show/?id=471166
[2] Figure 2: Morphbank image: http://morphbank.net/Show/?id=471181
[3] Figure 3: Morphbank image: http://morphbank.net/Show/?id=471182
[4] Figure 4: Morphbank image: http://morphbank.net/Show/?id=471192
[5] Figure 5: Morphbank image: http://morphbank.net/Show/?id=471177
[6] Figure 6: Morphbank image: http://morphbank.net/Show/?id=471179
[7] Figure 7: Morphbank image: http://morphbank.net/Show/?id=471184
[8] Figure 8: Morphbank image: http://morphbank.net/Show/?id=471186
[9] Figure 9: Morphbank image: http://morphbank.net/Show/?id=471175
[10] Figure 10: Morphbank image: http://morphbank.net/Show/?id=471187
[11] Figure 11: Morphbank image: http://morphbank.net/Show/?id=471189
[12] Figure 12: Morphbank image: http://morphbank.net/Show/?id=471191
[13] Figure 13: Morphbank image: http://morphbank.net/Show/?id=471169
[14] Figure 14: Morphbank image: http://morphbank.net/Show/?id=471168
[15] Figure 15: Morphbank image: http://morphbank.net/Show/?id=471171
[16] Figure 16: Morphbank image: http://morphbank.net/Show/?id=471173