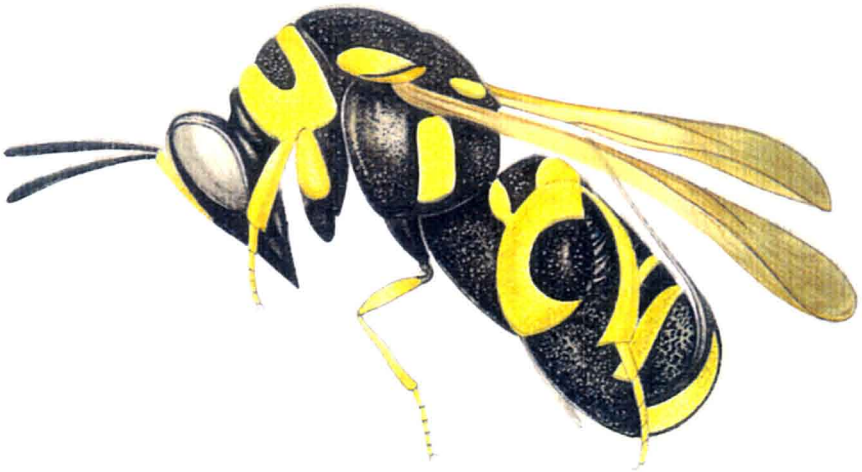
Chalcid Workshop



Leucospis gigas Fabricius ♀

September 12-16, 2005, UC Riverside

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The focus of this workshop is to develop a set of morphological characters and state codes that are relevant across the higher level groups of Chalcidoidea. We will spend some time on characters useful for placing Chalcidoidea within Hymenoptera, but I regard this is a sideline topic. It will be important to eventually resolve the immediate sister groups to Chalcidoidea if we are to make meaningful polarity decisions, but this should not impact our ability to resolve relationships within the group (hopefully). We must use our joint expertise to propose and evaluate the various characters applicable to family level groups within Chalcidoidea, but always keeping the outgroup perspective in mind. Because we wish to avoid characters that change within these terminal groups, we should be able to eliminate (hopefully) numerous irrelevant characters and much of the raw homoplasy that we know exists across Chalcidoidea (Girault's Law- "for every synapomorphy, there is an equal and opposing homoplasy"). The difficulty will lie in what characters are left after we are done, and whether they will provide enough useful phylogenetic information? Potentially, the combination of these characters with a molecular dataset will help to resolve the worst nodes. Molecular data may also be useful in sorting out morphological homoplasy. However, no data set alone will likely yield a comprehensive phylogeny.

Workshops: Character workshop discussions in a round robin format. Each of two groups will get a set of character systems to discuss, then they will summarize and report their results. A moderator will be in charge of each working group. Their responsibility is to be brutal and keep the discussion moving at a productive pace. A scribe will modify the character list as the discussion proceeds. The characters will be formatted and finalized after the discussion. Then, the other group will get the other groups revised character systems and will reanalyze their results. Two participants (student and researcher) will exchange groups to help explain why the other group may have made certain decisions. A final list will be presented on Friday afternoon.

Accommodations: Researchers are being put up at the Mission Inn, mostly with shared accomodations (Gibson & Huber; Rasplus & Delvare; Andrew & Maude Polaszek; Zolnerowich & van Noort; Gates). Pinto, Darling & Woolley will be staying at my house (poor sots). Gumovsky & Krogman will stay with Doug Yanega. Hernandez and DalMolin will be staying with students. We will shuttle everyone back and forth.

You should all be flying in to Ontario airport. We will arrange to have you picked up. The Mission Inn has an airport service (free) if we can't do it.

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Orange Blossom Express, Bus Timetable

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Chalcid Workshop Program
(September 12-16, 2005, UC Riverside)

Sunday September 11

Barbeque, mixer and swim, Heraty house (5-10 PM). 3038 Haverhill Ct., Riverside, CA.

Monday September 12 (Room 103 Entomology Museum)

8:00-8:15	*coffee*
8:15-8:30	introduction (Heraty)
8:30-9:00	general introductions of participants
9:00-9:20	molecular results - what's real and what's not (Heraty)
9:20-9:40	assembling a morphological matrix - trials and tribulations (Liljeblad)
9:40-10:00	character coding - refresher course and reminder of the problems (Heraty)
10:00-10:30	*coffee*
10:30-11:15	defining Chalcidoidea and choosing a sister group (Gibson)
11:15-11:30	Agaonidae and related subfamilies (Rasplus/van Noort)
11:30-11:45	Aphelinidae I (Woolley)
11:45-12:00	Aphelinidae II [Coccophaginae] (Polaszek)
12:00-1:00	*lunch*
1:00-1:15	Azotinae (Munro)
1:15-1:30	Calesinae (Heraty)
1:30-1:45	Chalcididae (Delvare)
1:45-2:00	Leucospidae/Eurytomidae (Gates)
2:00-2:15	Encyrtidae (Zolnerowich/Woolley)
2:15-2:30	Eucharitidae & related groups (Heraty)
2:30-2:45	Eulophidae (Gumovsky)
2:45-3: 00	Eupelmidae (Gibson)
3:00-3:30	*coffee*
3:30-3:45	Mymaridae (Huber)
3:45-4:00	Ormyridae (Hernández)
4:00-4:15	Perilampidae [including Chrysolampinae & related taxa] (Darling)
4:15-4:30	Pteromalidae (overview - Heydon/ Rasplus/Burks/Darling/Gibson)
4:45-5:00	Cleonyminae and related groups (Gibson)
5:00-5: 15	Pteromalinae and related subfamilies (Burks)
5:15-5:30	Diparinae and Ceinae (Darling).
5:30-5:45	questionable pteromalid subfamilies - Eunotinae, etc. (Burks)
5:30	*adjourn for dinner*

Tuesday September 13 (Room 103 Entomology Museum)

8:00-8:15	*coffee*
8:15-8:30	Rotoitidae (Gibson)
9:00-9:15	Signiphoridae (Woolley)
9:15-9:30	Tanaostigmatidae (Liljeblad)
9:30-9:45	Tetracampidae (Gumovsky)
9:45-10:00	Torymidae (Rasplus)
10:00-10:30	*coffee*
10:30-10:45	Trichogrammatidae (Owen)
10:45-11:00	Web pages for Chalcidoidea (DalMolin)
11:00-11:10	Ecuador canopy aphelinids (Vu)
11:15-11:30	Coccobius morphology (Holt)
11:30-11:45	Scutellar sensilla (Romero)
11:45-12:00	Grooming behaviour and involved structures in chalcids (Gumovsky)
12:00-1:00	*lunch*
1:00-1:30	Chalcidoid thorax morphology (Krogman)
1:30-1:45	Antennae in Chalcidoidea (George)
1:45-2:00	Larvae of Eulophidae (Gumovsky)
2:00-2:10	Structure of manubrium [orbicula] (Gumovsky)
2:10-2:25	Matrices for Eurytomidae and Podagrionini (Delvare)
2:25-2:40	Relationships within Chalcidoidea (Gibson)
2:40-3:00	Glossary of terms (Liljeblad)
3:00-3:30	*coffee*
3:30-3:40	outline of ‘rotating’ discussion format for deriving character state lists
3:40-5:30	two breakout groups, as assigned, for discussion of character state coding (Room 103 Entomology Museum and Conference Room (Entomology))
5:30-6:00	reconvene to discuss format and potential revision of discussion format
6:00	*dinner*

Wednesday September 14 (Room 103 Entomology Museum)

8:00-8:30	*coffee*
8:30-10:00	continuation of character coding discussion groups
10:00-10:30	*coffee*
10:30-12:00	continuation of character coding discussion groups
12:00-1:00	*lunch*

1:00-1:20 report of discussion of group A1 and presentation of revised character list
1:20-2:40 report of discussion of group B1 and presentation of revised character list

1:40-5:30 reshuffling of topics and some personnel (for continuity) for discussion groups to review finding of other groups and suggest changes.

5:30-6:00 reconvene to discuss progess and revised format of characters.

6:00 *dinner*

Thursday September 15

8:00-8:30 *coffee*

8:30-10:00 continuation of character coding discussion groups

10:00-10:30 *coffee*

10:30-12:00 continuation of character coding discussion groups

12:00-1:00 *lunch*

1:00-1:30 report of discussion of group A2 and presentation of revised character list
1:30-2:00 report of discussion of group B2 and presentation of revised character list

2:00-2:30 open discussion: critical taxa - what do we need?
2:30-6:00 break out the scopes.... sort through alcohol or dry samples for whatever
please bring anomalous taxa (show and tell)

7:00 *banquet at botanical gardens*

Friday September 16

8:00-3:00 collections open for examination
3:00-5:00 reconvene to discuss any revisions, future directions, publication, etc.

6:00 *barbeque at Heraty house*

Saturday September 17

9:00-?? Museum open

Working groups:

The idea behind these groups is to have *independent discussions* of character assemblages that will be **assigned**, in order, to each working group. Each group will designate a scribe to document changes to the existing character list, or to create a new character list [each group will have a laptop made available]. The discussions will be summarized by the designated group leader at the end of the day, and presented in detail on the following day along with the revised detailed character list. In the second round of discussions, each group will be assigned the character assemblages presented by the other group in the previous session. All characters will be reexamined and a revised list developed. This round robin will continue until there is a final acceptance, or a stalemate is reached on all of the characters.

One student and research scientist (*italics*) from each group will switch sessions to maintain a flow of information on character state choice between the two groups. Holt and Vu are undergraduate students that will help with any material problems (pens, etc).

After the working groups have finished with the character systems, they will be partitioned and given to one or two character 'leaders' that will be in charge of verifying the final character list and state assignments for presentation on Friday afternoon.

Working group A1: Darling, Delvare, **Gates**, Gumovsky, Huber, Liljeblad, Polaszek, Woolley DalMolin, Carmichael, Owen, Munro, Romero (Vu)

Working group B1: **Gibson**, Heraty, Heydon, Pinto, Rasplus, van Noort, Burks, George, Hernandez, Krogman, Mottern (Holt)

Working group A2: Darling, Delvare, **Gates**, *Gumovsky*, Huber, Liljeblad, Polaszek, DalMolin, Carmichael, *George*, Munro, Romero (Vu)

Working group B2: **Gibson**, Heraty, Heydon, Pinto, Rasplus, Triapitsyn, van Noort, *Woolley*, Burks, Hernandez, Krogman, Mottern, *Owen* (Holt)

Character assemblage order:

a) antenna, head, mouthparts, legs, wings, genetalia, hosts
b) mesosoma, legs, petiole, gaster, ovipositor, behaviour

Character leaders (responsible for assembly of final list):

Antenna (van Noort)
Head (Liljeblad)
Mouthparts (Darling)
Mesosoma (Gibson)
Legs (Delvare)
Wings (Rasplus)
Petiole (Gates)
Gaster (Heraty)
Ovipositor (Woolley)
Genitalia (Pinto)
Behaviour (Polaszek)
Hosts (Huber)

Molecular phylogeny based on 18S D2-D3

Macromesus.americanus.D1901
Pteromalidae: Macromesinae
Haltichella.D1781
Asphirrina.D1780
Haltichellinae
Conura.delumbis.D1470
Conura.D1778
Conura.D1779
Chalcidinae
Chalcididae
Hetreulophus.D1450
Pteromalidae: Colotrechninae
Lanthanomyia.D2193
Pteromalidae: Coelocybinae
Megastigmus.JM135.2
Megastigmus.trans.RIV.D1604
Torymidae: Megastigminae
Eusandalum.D1521
Eupelmidae: Calosotinae
Parurios.D1552
Pteromalidae: Diparinae
Diplesiostigma.bisetosum.D1465
Tetracampidae: Tetracampinae
Neocalosoter.D1523
Pteromalidae: Cerocephalinae
Lelaps.JM251
Pteromalidae: Diparinae
Protanaostigma.D2038
Tanaostigma.JM226.2
Tanaostigmodes.JM228.2
Tanaostigmodes.JM230.1
Tanaostigmodes.JM231.1
Tanaostigmatidae
Chromeurytoma.D1522
Pteromalidae: Chromeurytominae
Eupelmus.JM239.2
Eupelmidae: Eupelmidae
Herbertia.D1981
Pteromalidae: Herbertiinae
Enoggera.D1484
Pteromalidae: Asaphinae
Macroglenes.D1533
Gastrancistrus.D730
Pteromalidae: Pireninae
Euryischia.JM123.2
Euryischiomyia.D1806
Aphelinidae: Euryischiinae
Callocleonymus.D2045
Cleonymus.D1452
Chalcedectus.D1527
Pteromalidae: Cleonyminae
Epitranus.D1774
Chalcididae: Epitraninae
Coccobius.JM243
Coccobius.fulvus.D1900
Coccobius.JM250
Coccobius.1.JM173
Coccobius.2.JM217.1
Aphelinidae: Coccophaginae
Rileyinae.JM224.2
Rileya.longiterga.D1639
Rileya.t.complex.JM220.2
Rileya.D1471
Austrophotismus.daicles.D1633
Rileya.arcuagaster.D1644
Rileyinae.CHILE.D2027
Eurytomidae: Rileyinae
Leucospis.affinis.D1784
Leucospis.ARG.D1368
Leucospid.D1268
Leucospidae
Agamer.clep.D1016
Parepisten.D1015
Proshizonotus.D2063
Pteromalidae: Cleonyminae
Epistenia.D397
Leptofoenus.D398
Leptofoenus.D393
Pteromalidae: Leptofoeninae
Metapelma.D2185
Eupelmidae: Neanastatinae
Netomocera.D2017
Pteromalidae: Diparinae
Axanthosoma.D1635
Sycophila.D1643
Sycophila.texana.D1636
Masneroma.angulifera.D1637
Aiolomorphus.rhopaloides.D1634
Tetramesa.D1502
Tetramesa.D1642
Systole.coriandri.D1638
Eurytominae.JM222.1
Eurytominae.JM223.1
Eurytoma.gigantea.D1646
Eurytoma.squamosa.D1645
Eurytoma.rhois.D1640
Eurytomidae: Eurytominae
Chartocerus.JM056.3
Chartocerus.JM143.2
Thysanus.JM193.2
Clytina.JM198.1
Thysanus.JM032.1
Signiphora.JM028abc
Signiphora.JM174.2
Signiphora.JM039b.2
Signiphora.JM152.2&ab
Signiphora.JM046.2
Signiphora.JM155ab
Signiphoridae
Neodusmetia.JM068.2
Anagyrus.pseudococci?JM097.2
Leptomastix.JM178.1
Anagyrus.JM179.2
Tetracneminae
Acerophagus.JM101.2
Metaphycus.JM103.2
Trechnites.JM089.2
Copidosoma.flodidanum.JM072.2
Copidosoma.truncatellum.JM091.2
Cheiloneurus.JM237.2
Plagiomerus.diaspidis?JM079.2
Comperiella.JM115.2
Encyrtinae
Encyrtidae
Ablerus.JM006.3
Ablerus.JM164.1
Ablerus.JM156.1
Azotus.JM218.2
Ablerus.JM168.1
Azotus.JM005.2
Aphelinidae: Azotinae
Tetrastichinae.JM127.2
Tetrastichinae
Zagrammasoma.JM129.2
Cirrospilus.coachellae.D1647
Elasmus.JM131.2
Pnigalio.JM255
Eulophus.D1619
Eulophinae
Ophelimus.D1559
Entedonocremnus.D041.VER
Neopomphale.D2192
Entedoninae
Bellerus.D2028
Hubbardiella.D806
Euderus.D703.VER
Astichus.tric.D693
Astichus.mirris.D695
Euderinae
Eulophidae
Coccophagus.JM070.2
Coccophagus.D1601
Coccophagus.JM191.2
Coccophagus.rusti.JM213.2
Coccophagoides.JM081.2
Encarsia.quercicola.D140
Encarsiella.JM083.2
Encarsia.bimaculata.D152
Encarsia.hispida.D153
Encarsia.inaron
Encarsia.smithi.D299
Encarsia.pergandiella.D221
Aphelinidae: Coccophaginae
Ceratogramma CHILE AO90
Mirufens.AO51.QLD
Trichogrammatoidea.AO28
T.pretiosum.JM204.2
T.platneri.JM206.2
Oligosita.sang.AO12
Ufens.B.AO7
Aphelinoidea.JM202.2
Chaetogramma.AO10
Paracentrobia JG12
Zagella.spir.AO16
Lathromeroidea.AO47.VER
Haeckeliania.JG028
Haeckeliania.ACT.AO55
Trichogrammatidae

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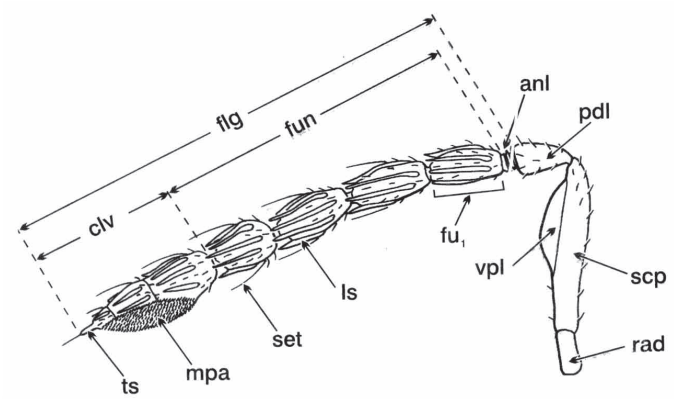
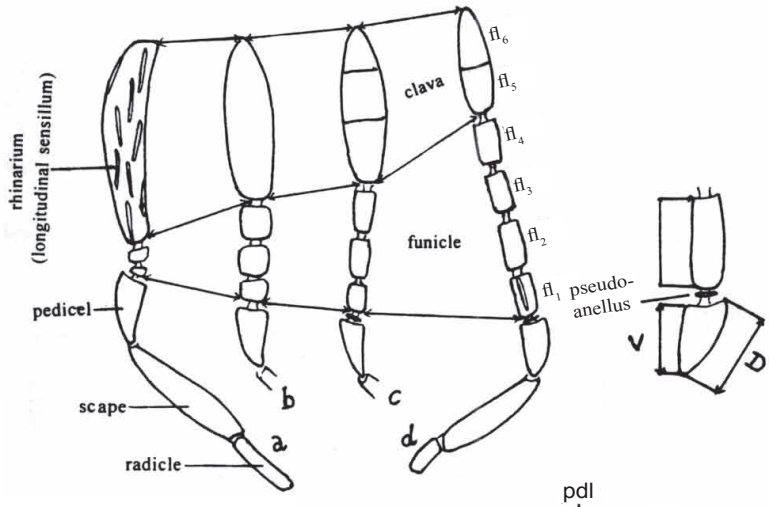
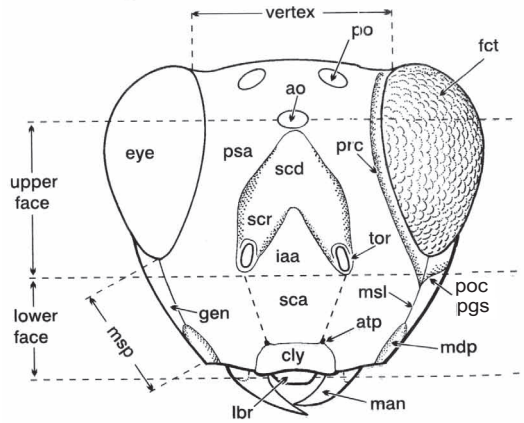
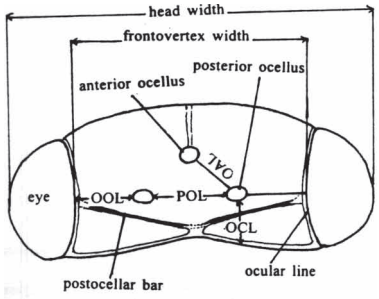
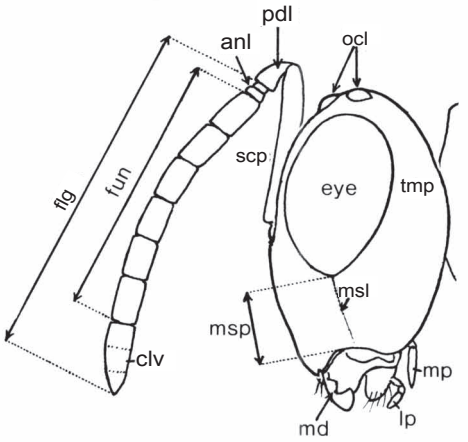
Morphological terminology

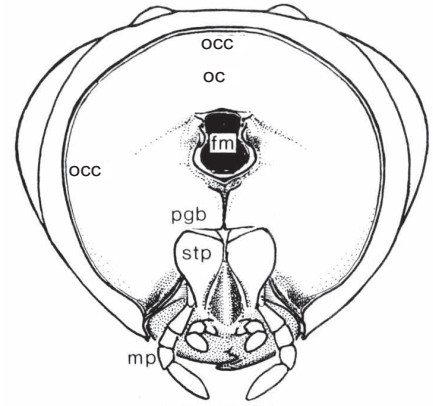


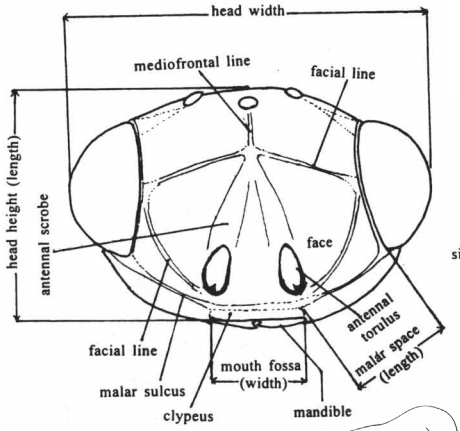


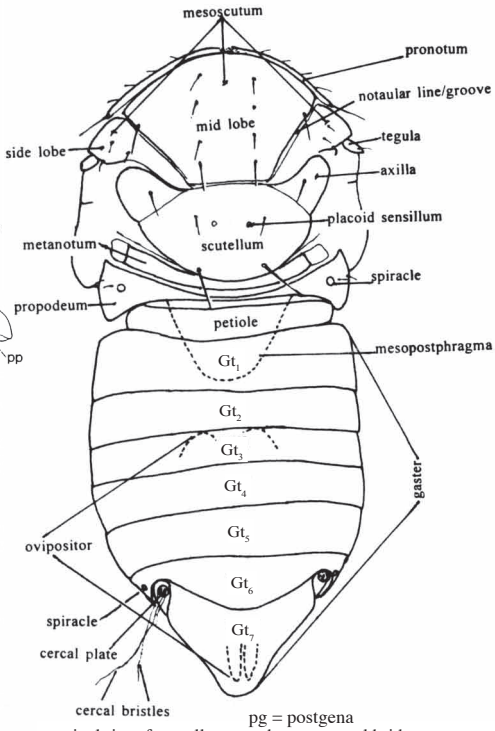


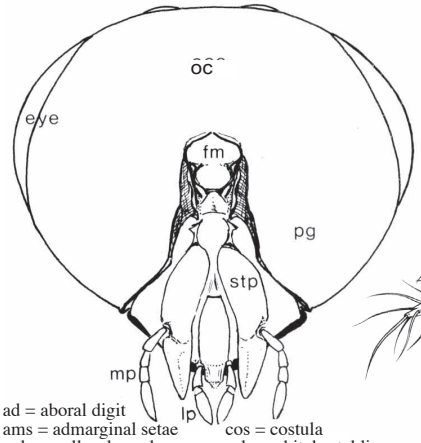


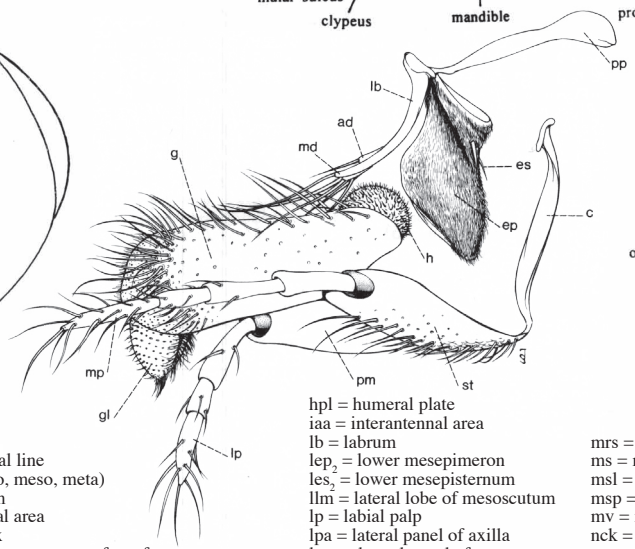




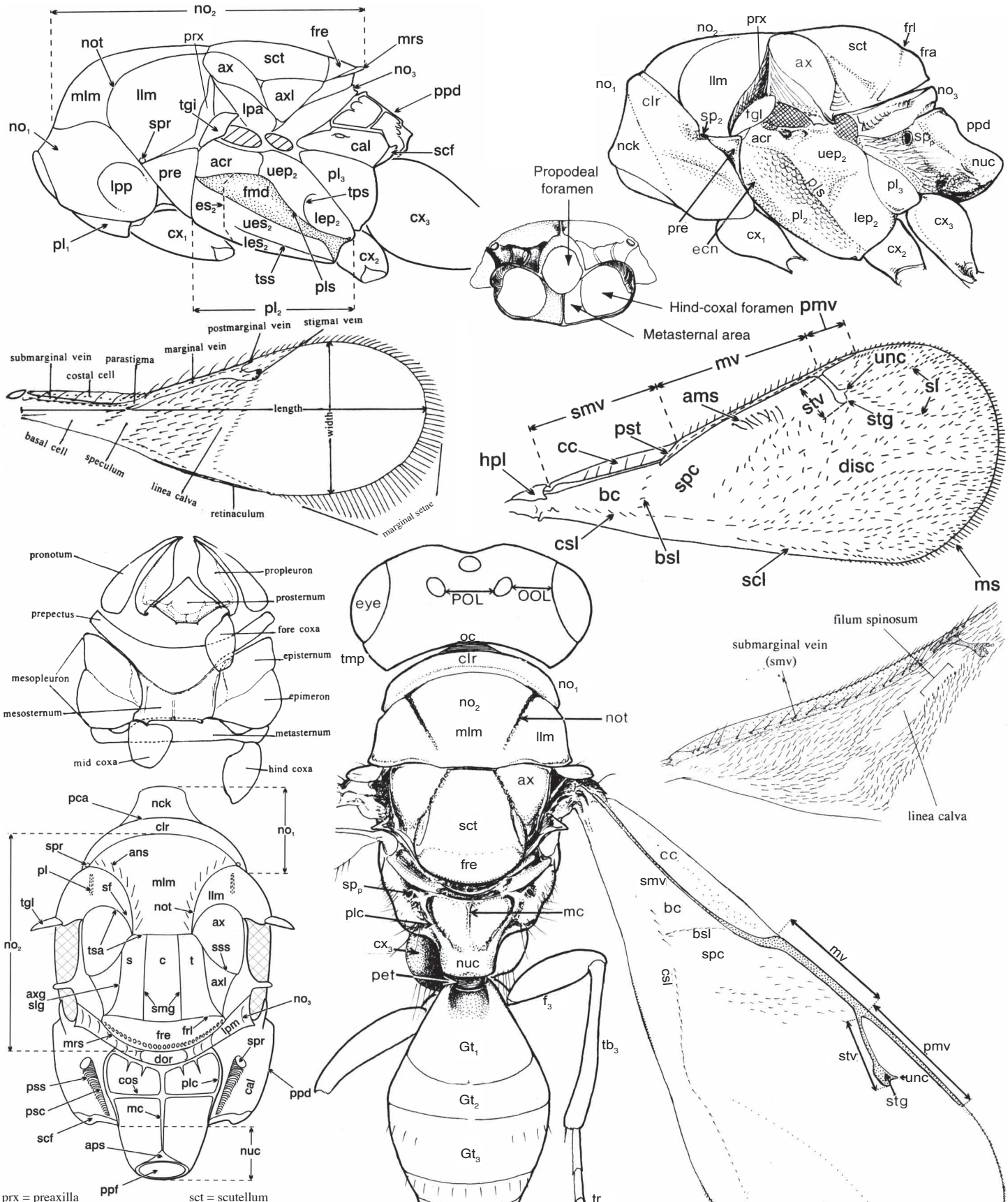








ad = aboral digit
ams = admarginal setae
anl = anellusclv = clava
ao = anterior ocellus
aps = adpetiolar strip
atp = anterior tentorial pit
ax = axilla
axl = axillula
bc = basal cell
bsl = basal setal line
c = cardo
cal = callus
cc = costal cell
cer = cercus
clr = collar of pronotum
cly = clypeus
cos = costula
csl = cubital setal line
cx_{1-3} = coxa (pro, meso, meta)
dor = dorsellum
ecn = epicnemial area
ep = epipharynx
epi = epipygium
es = epipharyngeal seta
es_2 = mesepisternum
eye = facet eye
f_3 = metafemur
fct = facet
fl_n = flagellum segment *n*
flg = flagellum
fmd = femoral depression
fre = frenum
frl = frenal line
fu_n = funicle segment *n*
fun = funicle
g = galea
gen = gena
gl = glossa
Gt_n = gastral tergite *n*
h = hypopharynx
hpl = humeral plate
iaa = interantennal area
lb = labrum
lep_2 = lower mesepimeron
les_2 = lower mesepisternum
llm = lateral lobe of mesoscutum
lp = labial palp
lpa = lateral panel of axilla
lpm = lateral panel of metanotum
lpp = lateral panel of pronotum
ls = longitudinal sensillum
man = mandible
mc = median carina
md = marginal digit
mlm = midlobe of mesoscutum
mp = maxillary palp
mpa = micropilose area
mrs = marginal rim of scutellum
ms = marginal setae
msl = malar sulcus
msp = malar space
mv = marginal vein
nck = neck
no_{1-3} = notum (pro, meso, meta)
not = notaulus
nuc = nucha
oc = occiput
occ = occipital carina
ocl = ocelli
pca = pronotal carina
pdl = pedicel
pet = petiole
pg = postgena
pgb = postgenal bridge
pgs = postgenal sulcus
pl = parapsidal line
pl_{1-3} = pleuron (pro, meso, meta)
plc = plica
pls = pleural suture
pm = prementum
pmv = postmarginal vein
po = posterior ocellus
poc = postorbital carina
pp = pharyngeal plate
ppd = propodeum
ppf = propodeal foramen
prc = preorbital carina
pre = prepectus



prx = preaxilla
psa = parascrobal area
psc = paraspiracular carina
pss = para(post)spiracular sulcus
pst = parastigma
rad = radicle
sca = supraclypeal area
scd = scrobal depression
scf = supracoxal flange
scl = subcubital line
scr = scrobe
scp = scape

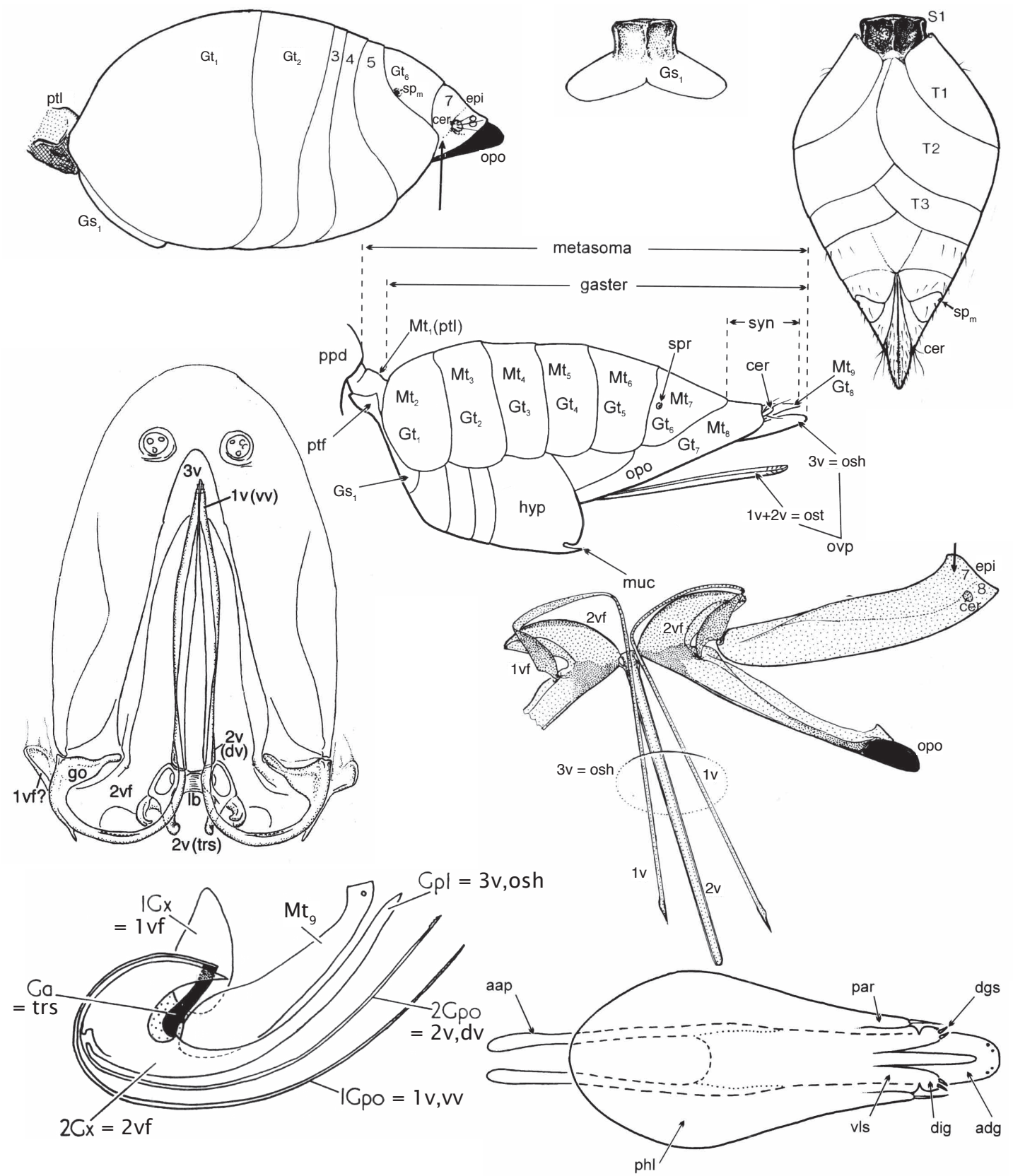
sct = scutellum
set = seta
sf = scapular flange
sl = setal line
slg = sublateral groove
smv = submarginal vein
sp_{2-3} = thoracic spiracle (meso, meta)
spc = speculum
sp_p = propodeal spiracle
sss = scutoscutellar suture
st = stipes
stg = stigma

stv = stigmal vein
tb_3 = metatibia
tgl = tegula
tmp = temple

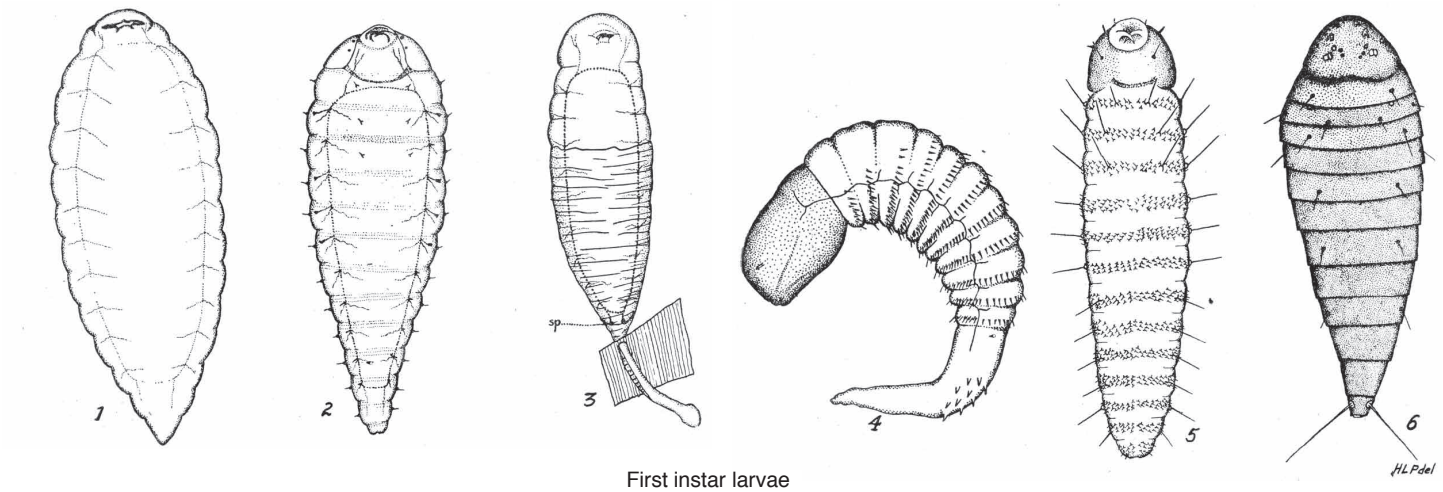
tor = torulus
tps = transepimeral sulcus
tr_3 = metatarsus
ts = terminal spine
tsa = transscutal articulation

tss = transepisternal sulcus
uep_2 = upper mesepimeron
ues_2 = upper mesepisternum

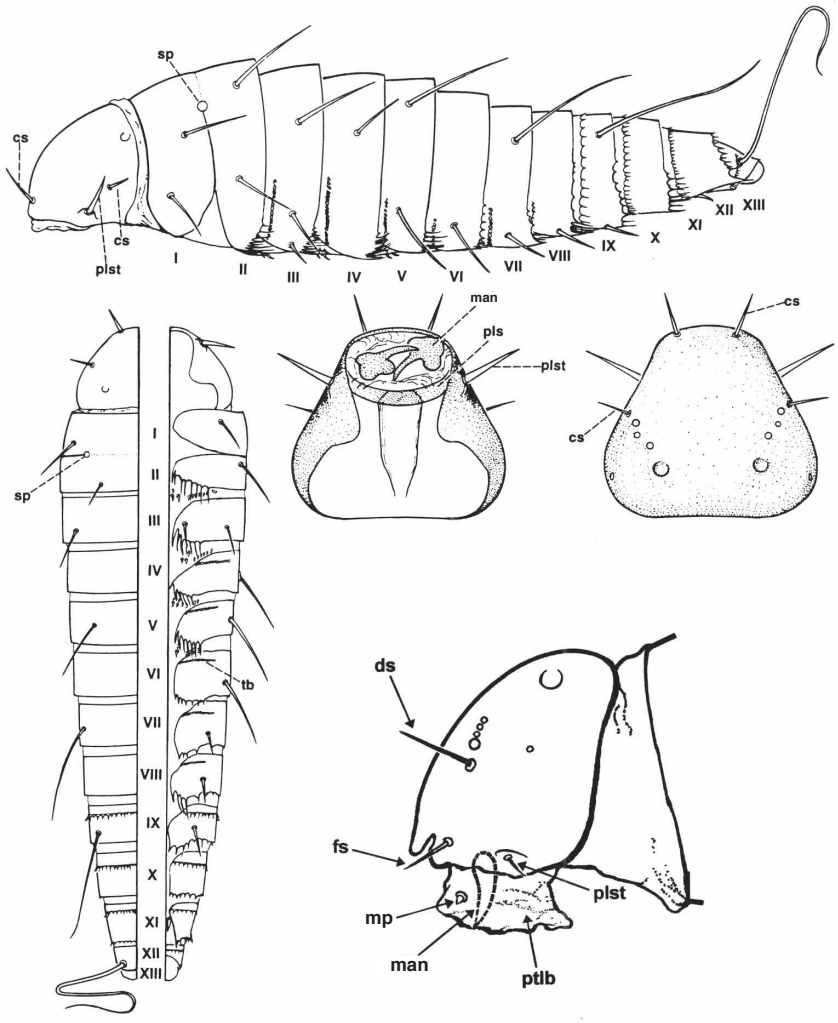
unc = uncus
vpl = ventral plaque
vs = vestigial sockets

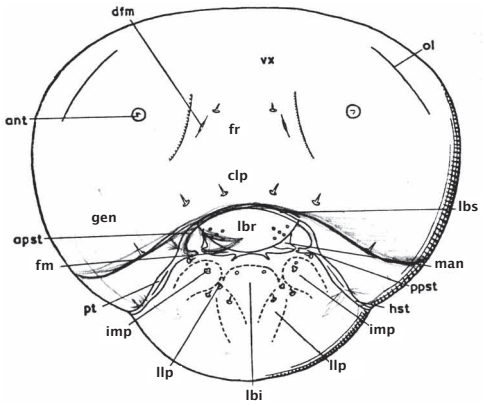


aap = aedeagal apodeme
adg = aedeagus
ant = antenna
apst = anterior pleurostomal process
cer = cercus
cs = cranial seta
dfm = depressions of cranial wall at origins of frontal muscles
dgs = digital spine
dig = digitus
ds = dorsal seta
dv = dorsal valvula
epi = epipygium
fm = food meatus
fr = frons
fs = frontal seta
Ga = gonangulum
gen = gena
go = gonostyle
Gpl = Gonoplac
Gpo = gonapophysis
Gs_n = gastral sternite *n*
Gt_n = gastral tergite *n*
Gx = gonocoxa
hst = hypostoma
hyp = hypopygium
imp = imaginal maxillary palp
lb = laminar bridge
lbi = labium
lbr = labrum
llp = larval labial palp
man = mandible
Mt_n = metasomal tergite *n*
muc = mucro
mp = maxillary palp
ol = ocular line
opo = outer plate of ovipositor
osh = ovipositor sheath
ost = ovipositor stylet
ovp = ovipositor
par = paramere
phl = phallobase
pls = pleurostoma
plst = pleurostomal seta
pt = posterior tentorial pit
ptf = petiolar flange
ptl = petiole
ppd = propodeum
ppst = posterior pleurostmal process
ptlb = postlabium
sp = spiracle
sp_m = metasomal spiracle
tb = tubercles
trs = triangular sclerite
*n*v = *n*th valvula
*n*vf = *n*th valvifer
vls = volsella
vv = ventral valvula
vx = vertex



First instar larvae





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Abbreviations

Character information
M = Character pulled from list; character states coded for taxa (into matrix).
L = Character pulled from list with explicit states.
D = Character pulled from description of character with states.
K = Character pulled from key or otherwise without clear definition and/or contrasting states.
E = Character extracted indirectly from illustrations and/or text.
* = Not informative at this level of analysis
$ = Approved
R = suggestion by Roger Burks
H = considered a reasonable character by Heraty

Morphology
Fl_x = flagellar segment no. x
Fu_x = funicular segment no. x
fu_x = furcal muscle attachment x
*x*tg = abdominal tergum *x*
Mt_x = metsomal tergum x
Gt_x = gastral tergum x
*x*st = abdominal sternum *x*
Ms_x = metasomal sternum x
Gs_x = gastral sternum x

General habitus, adult

1. Metallic body color: 0 = absent (most Chalcididae, Trichogrammatidae, Mymarommatidae, some Aphelinidae, most Eurytomidae); 1 = present, weak (Eucharitini); 2 = present, distinct (some Pteromalidae, some Torymidae). *R[G&H93:8K] H, but hard to define in marginal cases

2. Coloration of male and female: 0 = similar, brown or black; 1a = female yellow or orange, conspicuously paler than male; 1b = female and male concolorous, yellow or orange. Not ordered. [N&H94:1]

3. Without squamiform white setae (-); squamiform white setae present on head and/or body (+). [LS87:22]

4. Without punctures on head and/or body (-); small setiferous or non-setiferous punctures on head and/or body (+); large, setiferous punctures present on head and/or body (+). [LS87:23]
It is unclear whether large and small punctures represent two separate derived characters, or whether they are part of a multistate character. They have both arisen more than once in unrelated lineages.

Head, adult

Antennae, general

5. Flagellomere one (anellus) sensilla: 0 = without multiporous plate sensilla (MPS); 1 = with MPS. Chalcidoidea character; code taxa with no anellus as missing data. MPS is defined by Barlin and Vinson.

7. Flagellomere one (anellus) setae: 0 = present; 1=absent.

8. Flagellomere one (anellus) shape: 0 = cylindrical (quadrate or longer than broad); 1 = ringlike (much broader than long and much shorter than at least the apical funicular segments).

9. Third claval segment: 0 = entire; 1 = subdivided, with additional complete apical segment (terminal button).

Antennae, female

10. Articulation of pedicel and scape: 0 = straight, relatively immobile and scape without apicoventral depression; 1 = geniculate, articulated and associated with apicoventral depression of scape. The antenna is non-geniculate in *Chiloe* and some Eucharitinae. Also, the scape may be geniculate in outgroups (*i.e.* Scelionidae), but the scape is apically cylindrical. Correlated with scape length. See also shape of scape [JHun:4L], from long and slender to short and stubby. *[GG86:3M] [H, works for outgroups but autapomorphic in Chalcidoidea; shape of scape will be autapomorphic]

11. Antennal specialization: 0 = 'normal'; 1 = peculiar, usually including tooth-like third segment of antenna (Agaoninae). *?[GH&W99:53] [autapomorphic]

Radicle (female)

12. Length of radicle: 0 = 'normal'; 1 = very long, 4 times as long as broad (Louriciinae, some Calesinae (*Cales noacki*)). $R[RBun:35K]

Scape (female)

13. Female scape without strong ventral expansion, more than 3 times longer than wide (-); female scape with distinct ventral expansion, less than 3 times longer than wide (+). [LS87:5]

14. Female scape without emarginate ventral expansion (-); female scape with ventral expansion which is emarginate apically (+). [LS87:6]

15. Scape length: 0 = more than three times as long as greatest width; 1 = less than two times as long as broad. *[JHun:4L]
It is difficult to arbitrarily assign a value to describe a "long" versus "short" scape, but in general these are easily partitioned, with the shorter scapes being only about as long as broad. In some cases, the apex of the scape is expanded, resulting in the lower ratio (about 3 times as long as broad), but usually the scape is several times longer than broad. Within Eucharitidae, all Oraseminae have an elongate scape and within Eucharitinae, only the more highly derived forms (i.e. *Tricoryna, Stilbula*) have a short scape.

16. Scape subcylindrical (0), scape broadened and flattened (1). [N&H94:16]

17. Scape normal, about half as long as head width (0), at most about one third as long as head width (1a), scape elongate, at least about as long as head width (1b). [N&H94:17]

18. Sculpture of antennal scape: 0 = with weak or obsolescent sculpture; 1 = with raised or coarser reticulation, or cross-ridges, in the distal pan. *[MG87:13L]

Pedicel (female)

19. Sculpture of antennal pedicel: 0 = with weak or obsolescent sculpture; 1 = with raised or coarser reticulation. or cross-ridges, in its distal pan. *[MG87:15L with modified wording; H, can't see that this will be meaningful]

Flagellum (female)

20. Flagellum cylindrical (0), flagellum flattened (1). [N&H94:18]

21. Number of funicular segments with multiporous plate sensilla (MPS): 0 = all; 1 = some (including none). Need to resolve problem of homology for some vs. none. Is there any case where the clava lacks MPS? [N&H94:24]

22. Flagellum of female unicolorous brown (0), flagellum with dark and pale segments (1). [N&H94:25]

Flagellomere one (anellus) (female)

23. Flagellomere one (anellus): 0 = present; 1 = absent.

24. Anellus - first flagellomere, Fl_1, lacking multiporous plate sensillae and ring-like: 0 = anellus present, if not ring-like then at least without MPS; 1 = anellus absent, Fl_1 with MPS. [modified from MG00:1M, GG03:11M, GG86:2M, JHun:5L, G&H93:77K, EG95:2M, RBun:33K, RBun:41K]
Torymidae have "flagellar" segments that are not ring-like yet lack sensillae while others possess "anelli" that are ring-like and possess sensillae. Most eurytomid taxa have anelli fitting this operational definition. The majority of rileyines possess easily distinguishable anelli which are ring-like and lack MPS (*Rileya, Neorileya, Austrophotismus*), however certain taxa in Eurytominae (*Macrorileya, Archirileya*) have "anelli" that are not ring-like and are almost the size of subsequent flagellomeres, but lack MPS. The presence of three anelli in Rileyinae is not unique within Chalcidoidea (also seen in Pteromalidae, Torymidae, Trichogrammatidae and Eulophidae). Thus this feature is only locally phylogenetically informative. (Only present in some Chalcidoidea and Heloridae). The definition of an anellus will be difficult to define in trichogrammatids, eulophids and aphelinids that have '3/4' segments (basically wedges). The loss of the anellus (fusion with F2) is a derived condition within Eucharitinae (all genera except *Psilocharis, Neolosbanus* and *Gollumiella*) and within Oraseminae (*Indosema* and one species of *Orasema*) (Heraty 2000).).

Funicle (female)

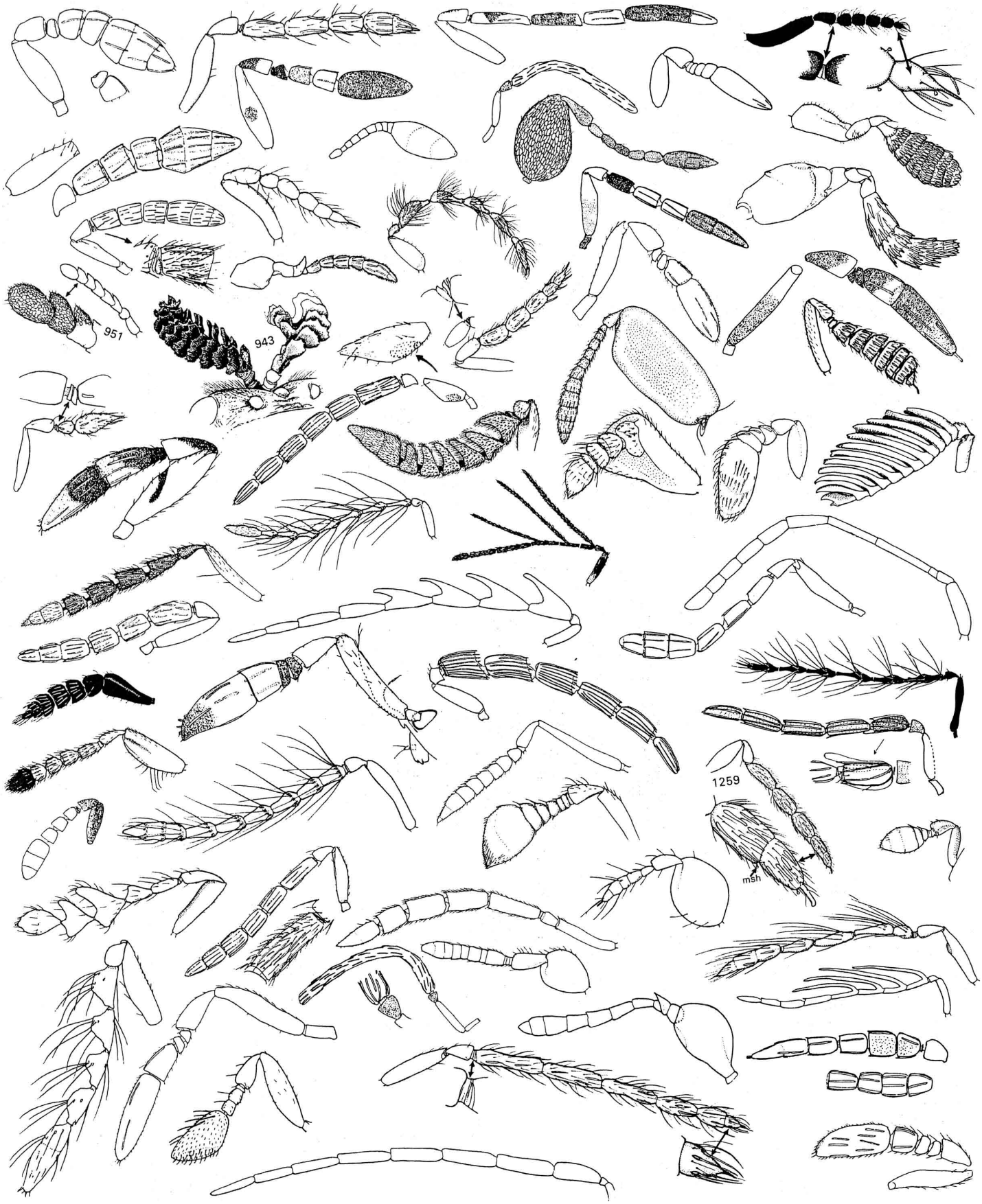
25. Number of flagellar segments post Fl_1 (anellus): record actual number in matrix. Clava counted as the inferred number of fused segments.

26. Number of funicular segments: record actual number in matrix. $[modified from G&H93:36K, GG86:1M, MG00:4M, MG87:16L, G&H93:37K, JWK03:2M, JHun:7L, GG03:14M]
The larger number of funicular segments (7) is presumed to be plesiomorphic (Boucek & Heydon, 1997). All Rileyinae have thirteen flagellomeres, varying only in the number of anelli and subsequent funiculars (*Neorileya* and certain *Rileya* spp. 11263; *Rileya* spp., *Austrophotismus* 11353). Eurytominae and Chalcididae are variable in the number of antennal segments, ranging from 11-13 segments, though eurytomines typically have 11 and chalcidids usually possess 13. Included outgroup taxa in Cleonyminae have the same number of antennal segments (*Epistenia* = 11; *Agamerion* = 11); this character is potentially homoplastic. Based on the outgroups, a 7-segmented funicle is plesiomorphic (Fig.), with the greater number of segments resulting from the incorporation of segments from the clava (as many as 9 funiculars with only a single claval segment in some *Orasema*). A three-segmented clava, which is presumed to be the ancestral state is found in all of the higher taxa, and only in Eucharitidae are the appressed claval segments often lost as the apical segments become undifferentiated from the funicular segments (Fig.). This will be a challenge to code universally.

27. Funicle 6-segmented (0), funicle 5-segmented (1), funicle 4-segmented (2). [N&H94:19]

28. Funicle segments of subequal size and length (0), funicle segments becoming longer or larger distad (1a), funicle segments becoming shorter distad (1b). [N&H94:20]

29. Shape of basal funicular segments: 0 = 'normal', not anellus-like; 1 = Fl_2 anellar, like Fl_1; 2 = Fl_2-Fl_3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anellar, like Fl_1; 3 = Fl_2-Fl_4 anellar, like Fl_1; 4 = Fl_2-Fl_5 anellar, like Fl_1. Ordered 01234. [modified from MG00:2M-3M; H, same as #8, anellus]
Correlated with the absence of MPS on anelliform segments.

30. Shape of basal non-anellar funicular segment (Fl_2): 0 = elongate, longer than broad; 1 = quadrate, about as broad as long; 2 = transverse, at least 1.2X as broad as long. Ordered 012. *R[modified from JHun:6L, RBun:24K; H, same as #10?]
The length of the basal flagellomere is generally indicative of a more compressed antenna with all of the funicular segments transverse (Fig.), as compared to a more elongate antenna (Fig.). As well, the length of the compressed antenna (flagellum + pedicel) is always less than the height of the head, whereas the elongate antenna is longer. The flagellar segments are transverse and closely appressed in Philomidinae, Perilampinae and Akapalinae. The flagellum of Chrysolampinae is variable, ranging from fusiform in some *Chrysolampus* to rather elongate and cylindrical in *Chrysomalla* (although the flagellomeres are slightly broader than long and the flagellum shorter than the head height). The closely appressed (fusiform) segments are probably derived states. No Eucharitidae s.s. have a similar antenna, and the flagellomeres are rarely broader than long, if ever basally. [Note: flagellar length could be a separate character, as could transvese segments - we need to think about this one - is it fully correlated??]

31. Flagellomere two : 0 = without coeloconic sensillum; 1 = coeloconic sensilla present (Calesinae and Trichogrammatidae, *Marietta*?)

32. Relative size of basal funicular segments: 0 = ratio of Fu_3 to Fu_1+Fu_2 less than 1.0X; 1 = ratio between 1.0-1.2X; 2 = ratio more than 1.2X. Ordered 012. *[JWK03:4M with modified wording; H, correlated with previous characters!]

Clava (female)

33. Number of distinct claval segments (the apical segment is always considered part of the clava): record actual number in matrix. $R[modified from JWK03:1, G&H93:43, GG03:12]
Need to assess whether the extra tip segment in many Pteromalidae whould be counted as an extra segment [get matching SEM and cleared images]. Correlate with number of rows of MPS? Should we count completely separated segments, partially fused segments or inferred number?

34. Clava 3-segmented (0), clava 2-segmented (1), clava entire (2). [N&H94:22]

35. Apical flagellomeres of female antenna: 0 = 'normal' segments, not differentiated from basal funicular segments; 1 = differentiated into a club. *[G&H93:42K]

36. Preclaval segment for female: 0 = apical margin truncate relative to sides; 1 = apical margin projecting slightly on one side so as to be angulate; 2 = apical margin prolonged into attenuated, fingerlike process along one side of clava; 3 = apical margin abruptly narrowed into spinelike process. *[GG03:15M]

37. Club length of female: 0 = between 2.5-5X as long as wide; 1 = more than 5X as long as wide; 2 = less than 2.5X as long as wide. *[JWK03:5M]

38. Club apex of female: 0 = not pointed; 1 = strongly pointed and asymmetrically tapered. *R[JWK03:6M]

39. Claval sutures: 0 = externally visible; 1 = externally fused. *[RBun:25K]

40. Claval spine(s): 0 = absent; 1 = present.
Problem of homology, e.g. Cales vs. Pteromalinae. Spine defined as having an apical pore? Single vs. multiple spines.

41. Claval structure for female: 0 = narrowly rounded apically or at most attenuated into fingerlike process; 1 = abruptly constricted apically to form non-articulated terminal spinelike process; 2 = with subapical, non-articulated spinelike process that forms bifurcation in combination with attenuated dorsoapical portion of clava; 3 = with superficially terminal spinelike process that in dorsal view appears articulated because of very short region of clava projecting over base of process, but in ventral view uniformly projected from clava; 4 = with articulated spinelike process. NP[GG03:16M]

42. Apical seta of claval spine: 0 = shorter than or at most as long as the spine; 1 = about twice as long as the spine. *R[MG87:21L]

43. Specialized setae on apical antennal segments: 0 = present; 1 = absent (Eucharitidae). NP[GH&W99:97K] needs better definition!

Sensilla (female)

44. Multiporous plate sensilla: 0 = present (Chalcidoidea); 1 = absent (Mymarommatoidea). [B&Q99:14, GG86:4]
Confusion with character above?

45. External encircling collar: 0 = not evident (Xyelidae, Chalcidoidea); 1 = evident. [B&Q99:2]

46. External encircling groove: 0 = not evident (Xyelidae, Orussidae, Stephanidae, Chalcidoidea, Aulacidae, Gasteruptiidae); 1 = evident (some Eucharitinae). [B&Q99:3]46.

47. Cuticular apparatus: 0 = completely attached into antennal wall; 1 = distal end free (Chalcidoidea). [B&Q99:6]

48. Distal part of the multiporous plate: 0 = attached to antennal segment; 1 = free (Chalcidoidea). [B&Q99:13, GH&W99:2]

49. Antennal sensillar pattern: 0 = preclaval segment without distinctly differentiated region of modified trichoid sensilla; 1 = preclaval segment with a distinctly differentiated region of modified trichoid sensilla similar to that on clava, but region non-collapsing; 2 = preclaval segment with region of modified trichoid sensilla similar to that on clava, and sensillar regions on both clava and preclaval segment flat or collapsed in air-dried specimens. [GG03:17M]

50. Micropilosity of antennal club: 0 = no ventral micropilosity; 1 = an area of micropilosity present ventrally. NP[modified from EG95:3M; H, same as #28, sensillar pattern, below]

51. Sensory area on clava at apex only (0), sensory area on clava extended along ventral surface towards base (1). [N&H94:23]

52. Claval sensilla: 0 = uniform; 1 = arranged into distinct ventroapical field of specialized sensilla.

53. Hygrothermic (mushroom) sensilla: 0 = absent; 1 =present.

54. Shape of hygrothermic sensilla: 0 = mushroom-like; 1 =spearshaped.
Need to look at distribution?

Antenna, male

Radicle *[same as female]*

Scape

55. Shape of scape: 0 = cylindrical; 1 = apically expanded and sometimes excavated. *[modified from JHun:1L, MG87:14L]
The apical half of the male scape is expanded in several taxa, with the expansion usually associated with the presence of pores on the ventral surface (see character JHun:2). In Eucharitidae, the antennae are not expanded in Oraseminae, and within Eucharitinae, are expanded only in some species of *Neolosbanus* (cf. Heraty 1994). The shape varies widely, and it is hard to see how this will be globally informative.

56. Male scape glands: 0 = smooth and without any pores; 1 = with ventroapical pores that are externally visible (Figs.); 2 = with ventroapical pores (*correct term*??) that are internally visible on slide mounts, but have no external opening (Fig.). [modified from JHun:2L, GH&W99:101K, GH&W99:165K]
Pores are found in many taxa, and may be specialized into prominent structures (i.e *Aphelinus*). Presence or absence is the most important, but the intermediate case (visible only in slide mounted specimens) may have value. Homology of these structures, without detailed TEM work will be weak, although it is almost certain that they are associated with male kairomone release [oozing sex glands]

57. Pores on scapes of males: 0 = not restricted; 1 = restricted to an isolated ridge situated in a narrow groove along the ventral edge (Entedoninae). [GH&W99:116K]
Hard to see how this will be important, especially as it is also found in male Aphelininae. Do we need this for subfamily justification??

58. Sensory plaque (flange) on the leading edge of the antennal scape of males: 0 = absent; 1 = present (Tetrastichinae). [GH&W99:135K] H, does this differ from presence or absence of pores?

59. Male scape sculpture (ventral): 0 = smooth; 1 = reticulate. *[JHun:3L]

Pedicel (male)

Flagellum (male)

60. Male number of flagellar segments compared to female: 0 = same (most Chalcidoidea); 1 = male with more segments (dimorphic); (Mymarommatidae, Mymaridae, Rotoitidae). [modified from GH&W99:40K, MG87:18L]

61. Arrangement and kind of setae on funicle and clava: 0 = small and uniformly distributed, 'normal'; 1 = long, dark and arranged in whorls. [MG87:20L with modified wording]
Normal MPS are present. Need to assess gross homology, although it almost certain that there are independent derivations.

Flagellomere one (anellus) (male)

62. Anellus - first flagellomere, Fl_1, lacking multiporous plate sensilla and often ring-like: 0 = anellus present, if not ring-like then at least without MPS; 1 = anellus absent (truly lost), Fl_1 with MPS. [modified from MG00:1M, GG03:11M, GG86:2M, JHun:5L, G&H93:77K, EG95:2M, RBun:33K, RBun:41K, MG87:19L]

Funicle (male)

63. Basal number of anellar-like funicular segments compared to female: 0 = same; 1 = different. [modified from MG87:19L]

64. Male funicular segments with long rami (?); male funicular segments without rami (?). [LS87:9]

65. Male funicular segments with dorsal projections (?); male funicular segments without dorsal projections (?). [LS87:10]

66. Dorsal branch on basal two or four funicular segments in male: 0 = absent; 1 = present (Elasminae). *[GH&W99:85]

Clava (male)

66. Number of segments comprising clava of male relative to female: 0 = less; 1 = same; 2 = more. [modified from GG03:13M]67.

Sensilla (male)

68. Multiporous plate sensilla (MPS): 0 = large and conspicuous (Fig.); 1 = minute, often recessed into depressions (Fig.). [JHun:8L] Revisit!
MPS are present and usually large in Chrysolampinae and Perilampinae. The MPS are minute and numerous in Philomidinae, and minute and sparse in Akapalinae. In Oraseminae and Psilocharitini (Eucharitinae), the MPS are large and scattered, whereas in Eucharitini, the MPS are minute and recessed into depressions in the flagellum. In all three lineages of Eucharitidae, MPS are usually present in males of most species and lost in others, thus an apomorphic condition within each taxon.

69. Multiporous plate sensilla: 0 = attached along most of length; 1 = projecting as whorls (Calesinae, Trichogrammatidae). [reference? GG86? or Barlin & Vinson 198?] I am assuming that this refers to trichos, Cales and eurytomids??

Head capsule: dorsally, anteriorly and laterally

70. Direction of head: 0 = hypognathous; 1 = prognathous (male Agaonidae). *[G&H93:95K]

71. Frontal and posterior surfaces of the head joined by an arc of pleated membrane extending along the occiput from the base of each mandible: 0 = absent; 1 = present (Mymarommatidae). $R[GH&W99:29K]

72. Head channeled: 0 = no; 1 = yes (Agaoninae). *R[GH&W99:54K]
Meaning??

73. Dorsal shape of head: 0 = head in dorsal view transverse, much wider than long; 1 = head in dorsal view almost as long as wide; 2 = head in dorsal view intermediate between other states. Ordered 0 - 2, 1. *[EG95:5M]

74. Shape of head in anterior view: 0 = ‘normally’ rounded, narrower ventrally; 1 = more or less quadrate to rectangular with subparallel sides (some Agaonidae). *[G&H93:48K]

75. Shape of head: 0 = about as long as broad subcircular; 1 = head longer than broad. [N&H94:2]

76. Height of head: 0 = not higher than broad; 1 = slightly to distinctly higher than broad. *[MG87:10L]

77. Shape of head in lateral view: 0 = ‘normal’, not elongated; 1 = wedge-like, elongated (some Agaonidae). *[G&H93:47K]

78. Large piliferous punctures on head : 0 = absent; 1 = present. *[MG87:7L with modified wording]

Vertex

79. Vertex: 0 = 'normal'; 1 = carinate behind the ocelli (Elasminae, *Euryischia*); 2 = carinate (*Promuscidea, Eunotiscus*, Eunotinae). Ordered? [GH&W99:68K]

80. Transverse carinae on vertex: 0 = absent; 1 = with a transverse carina at junction of vertex with occiput, this carina nearly or quite reaching the eyes, often another across the ocellar triangle; 2 = with a weak transverse ridge in middle, at junction of vertex with occiput. [MG87:11L]

81. Vertex: 0 = rounded posteriorly; 1 = sharply margined posteriorly, but without carina (Eunotinae, some Encyrtidae, some Eriaporinae); 2 = with a sharp, well-defined carina. [RBun:32L]

82. Subtriangular foveae on vertex, outside of lateral ocelli: 0 = absent; 1 = present. *R[MG87:12L with modified wording]

83. Rasp-like sculpture in upper face: 0 = absent; 1 = present (Leptofoeninae). [RBun:34K]

84. Frontovertex with shallow sculpture (0), frontovertex with deep sculpture of silky or granular appearance (1). [N&H94:11]

85. Frontovertex with inconspicuous piliferous punctures (0), frontovertex with deep/conspicuous piliferous punctures (1). [N&H94:12]

86. Frontovertex with coriaceous sculpture (0), frontovertex with polygonally reticulate sculpture (1a), frontovertex with vermiculate-reticulate sculpture (1b). [N&H94:13]

Ocelli

87. Size of ocelli: 0 = 'normal'; 1 = minute. *R[MG87:3L with modified wording]

88. Ocelli normal in size (0), ocelli conspicuously enlarged (1a), ocelli reduced in size, rudimentary or absent (1b). [N&H94:9]

89. Ocelli more or less forming a right angle (0), ocelli forming a strongly obtuse angle (1a), ocelli forming a strongly acute angle nb). [N&H94:10]

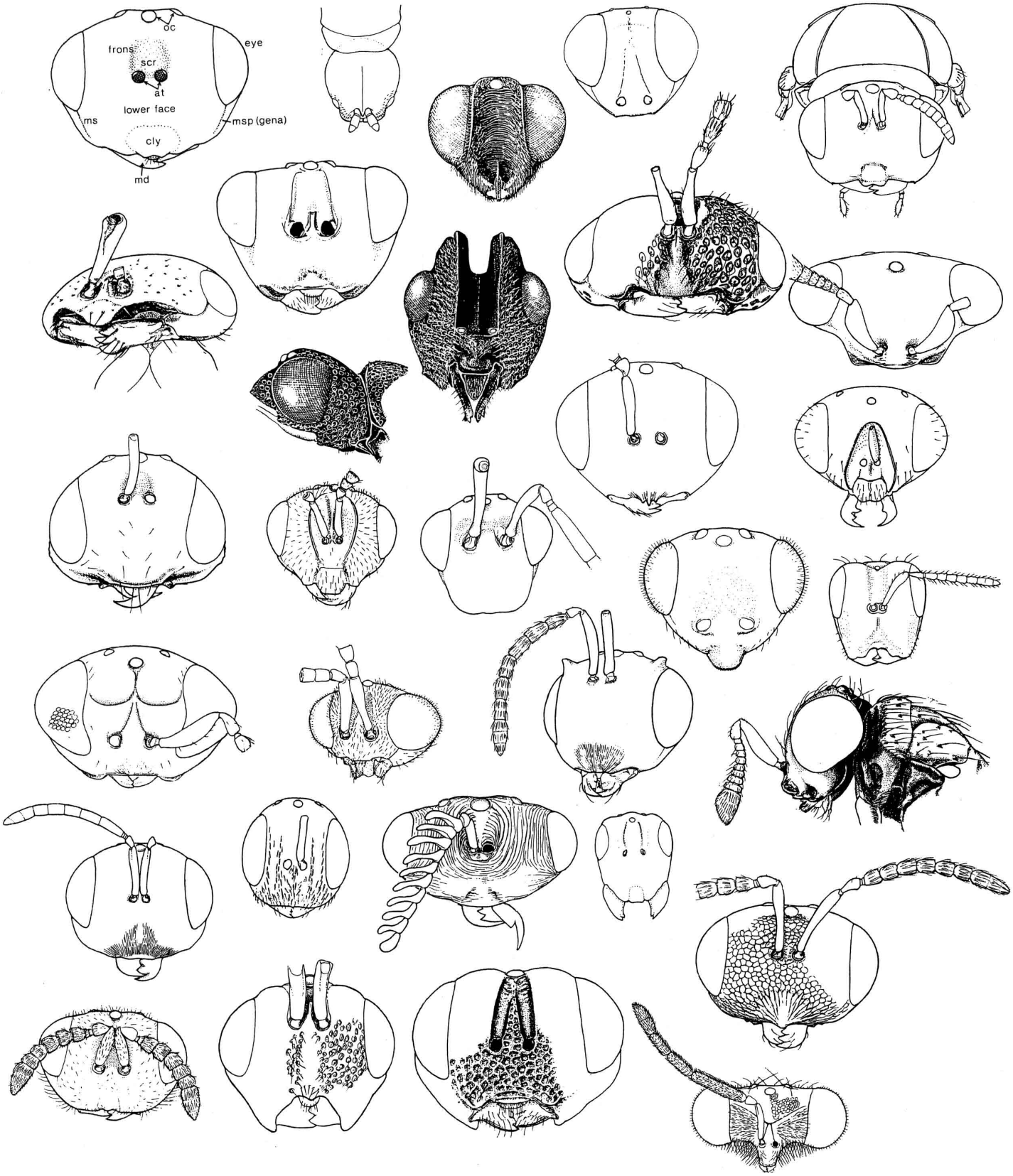
Frons

90. Membranous region above toruli on head: 0 = absent; 1 = present (some Agaonidae). [G&H93:49K]

91. Frons: 0 = flat, slightly convex or concave; 1 = produced into two strong horns. *RJ[GW97:6L]

92. Interantennal projection: 0 = not modified, area between toruli continuous with face and appearing raised due to scrobal depressions; 1 = modified into a round plate with blunt margins; 2 = modified into a round plate with sharp elevated margins; 3 = reduced to a thin sheet-like elevation between toruli; 4 = modified into a thick plate which is higher than upper toruli margin; 5 = absent, scrobal depression continuous between antennae. [GW97:4L]

93. Structure of dorsal angle on interantennal region: 0 = unmodified, at most carinate; 1 = dorsal angle above plane of interantennal region convex or more distinctly recurved into anteriorly projecting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process (Lyciscini). [GG03:4]

94. Longitudinal ridge or large bump between toruli: 0 = absent; 1 = present (Cerocephalinae and others). [RBun:7]

95. Face between toruli: 0 = convex (Panstenoninae); 1 = other. *R[RBun:42]

Eyes

96. Inner orbits of eyes: 0 = ventrally divergent (Eupelmidae, Cleonyminae); 1 = ventrally subparallel; 2 = ventrally convergent. Ordered 012. $R[GH&W99:142, GG03:5]

97. Size of eyes: 0 = normal, longer than width of frontovertex; 1 = reduced, shorter than width of frontovertex. [N&H94:6]

98. Male eye: 0 = eye of "normal" size, postgenal area much narrower than width of eye; 1 = eye "reduced" in size, postgenal area as wide or wider than eye width. *R[EG95:4, MG87:2]

99. Pubescence of eyes: 0 = absent; 1 = present (Austroterobiinae). *R[RBun:20, MG00:10, GG03:6]
State 1 refers to the presence of an even coverage of setae (may be dense or sparse) on the eye surface. Eye pubescence is hypothesized to be the plesiomorphic condition as it is found in the outgroup Cleonyminae (*Agamerion. Epistenia*), plesiomorphic Eurytominae (*Macrorileya. Archirileya, Tetramesa*), Rileyinae (*Austrophotismus, Rileya oeulasela, R. glabra*) and Leucospidae.

Toruli and scrobes

100. Position of toruli relative to oral cavity: 0 = near middle of head or higher, if closer then far apart from each other (male Otitesellinae)??; 1 = near oral cavity and closer to each other than to eyes (some male Sycoryctinae); 2 = extremely close to the mouth margin, on overhanging lobes (Spalagiinae). *R[G&H93:102]
This character has been used in the past (Habu, 1960; Wijesekara, 1997; Delvare, 1992) and the toruli below the lower eye margin is presumed to be the plesiomorphic condition based upon outgroup comparison, however this character is homoplastic as members of the Haltichellinae (Chalcididae) possess state 1. Grissell (1995) attempted to use this character by subdividing it into five states based upon measurements of the toruli from the vertex and clypeus, but could not recognize discontinuities in the states.

101. Position of toruli relative to oral cavity: 0 = near middle of head or higher; 1 = immediately adjacent (touching) clypeus. (see above)

102. Orientation of antennal toruli: 0 = lateral and ventral margins of toruli not produced and toruli facing forward or upwards; 1 = lateral and ventral margins of toruli produced forward. *R[GW97:3, MG00:8]
The taxa with produced torular margins in this analysis are the Haltichellinae and Epitraninae.

103. Separation of toruli relative to eye and diameter of toruli: 0 = well separated, distance more than two(?) times the diameter of torulus (most Chalcidoidea); 1 = close, distance not more than two times the diameter of torulus; 2 = subcontiguous, separated by only a slender keel-like median region (Mymarommatidae, Platygastroidea). Ordered 012. R[GH&W99:38, MG00:18, GG86:7, G&H93:23, GG03:1, GW97:2]
The cleonymine outgroup is symplesiomorphic in being separated by more than one torular diameter relative to all the other taxa in this study, except for *Rileya antennata* n. sp. (not included in character matrix). This species has the most dramatically modified antenna in the genus and the toruli located

greater than one torular diameter apart. Problem of non-homology in coding (similar ratios do not even look the same, i.e. a priori non-homology). Should we just be coding the mymarids seperately, but then, why bother?

104. Antennal scrobes well defined (0), antennal scrobes shallow and poorly defined (1). [N&H94:14]
These are probably what should be termed scrobal channels.

105. Antennal toruli clearly separated from mouth margin (0), antennal toruli almost touching mouth margin (1). [N&H94:15]

106. Scrobal depression: 0 = two separate channels, 1 = one complete depression. *R[modified from MG00:13]
By outgroup comparison, the presence of a distinctly separated scrobal depression, where each scape is received into a discrete depression, at least basally, is hypothesized to be plesiomorphic. The fusion of separate scrobal depressions into a single depression appears to have occurred both within the Eurytomidae and Chalcididae at least once.

107. Scrobal carina: 0 = absent; 1 = present, a distinct carina bordering the scrobal depression (Figs.) (Erotolepsiinae). [JHun:12, MG00:13]
The scrobal carina of *Akapala* differs from that of other taxa because dorsally it passes below the anterior ocellus and laterally extends to the ventrolateral corners of the clypeus, whereas in Perilampinae (and *Elatomorpha*?) it passes dorsal to the anterior ocellus and laterally does not extend below the eye.

108. Depth of scrobal depression: 0 = shallow; 1 = deep (Erotolepsiinae). *R[modified from MG00:13]

109. Scrobal channel: 0 = distinct; 1 = very short and inconspicuous, above interantennal region; 2 = possibly with very shallow concave scrobal depression above interantennal region, without differentiatied scrobes and channel; 3 = absent. [modified from GG03:3]

Clypeus and area below frons

110. Clypeus margin in general: 0 = concave - broadly emarginate; 1 = essentially straight and at about same level as ventral margin of head; 2 = slightly convex and projecting but not much beyond ventral margin of head; 3 = greatly convex and projecting well beyond the ventral margin of the head. Ordered 0123. [reference?]

111. Shape of clypeus: 0 = continuous; 1 = bilobed (many Megastigminae, some Agaonidae); 2 = with three denticles arranged asymmetrically (Miscogastrinae); 3 = with minute teeth; 4 = truncate; 5 = pointed medially; 6 = clypeus medially with tooth-like projection. Not ordered. *R[modified from GH&W99:187, MG87:1, RBun:40, MG00:9, EG95:6]
The relative production of the clypeus has been used to assess relationships from a phylogenetic perspective in Pteromalidae (Heydon, 1989) and Torymidae (Grissell, 1995) with some success. However, this character is homoplastic in this analysis and appears that it might be better utilized at a lower taxonomic level. State 0, indistinct, clypeal area emarginated, is found in all Neorileya, some Rileya and some taxa of Eurytominae (e.g. *Conoaxima*). State 1, entire, produced ventrally as a flap, is found primarily in Chalcididae and some *Rileya*, while states 2-3 are found in Rileyinae, Eurytominae. State 4, slightly produced, pointed medially, is autapomorphic for *Heimbra bicolor* and *H. opaca*, and state 5, straight, is found primarily in Chalcididae.

112. Lateral margins of clypeus: 0 = notched, distinct transition into ventral margin of head; 1 = smooth

transition into ventral margin of head; 2 = lateral margins somewhat angulate; 3 = lateral margins produced into tooth-like structures. Ordered 0123. [reference?]

113. Depth of notch of bilobed clypeus: 0 = notch as deep as wide; 1 = notch deeper than wide. [Modified from MG00:9]

114. Apical lamina of clypeus: 0 = absent; 1 = present, semitranslucent but not entirely curved (Austroterobiinae). [RBun:21]

115. Radiating striae on face from clypeal margin: 0 absent; 1 = present. *R[MG87:8L]

116. Lower face structure: 0 = rugose or umbilicate (Fig. 26); 1 = reticulate to finely punctate (Fig. 67, reticulate); 2 = longitudinally to obliquely striate (Figs. 82, 179, 183); 3 = rugose-reticulate (Fig. 23) (0.74, 0.76). *R[MG00:5]
In general, toarse, umbilicate sculpture is hypothesized to be plesiomorphic (Boucek 1988b, Zerova 1988) while finer reticulation is apomorphic. In coding this character, states 0-3 are commonly seen across all included taxa. Specifically, states 0-3 are seen within Eurytomidae (0, Conoaxima; 1, *Rileya megastigma* (Ashmead); 2, *Rileya* spp., *Neorileya* spp.) as well as across taxa of Chalcididae, Cleonyminae and Leucospidae.

117. Anterior tentorial pits: 0 = visible; 1 = not visible externally. [RBun:29]

118. Anteclypeus (distinct transverse apical region of clypeus): 0 = absent; 1 = present.

119. Supraclypeal area: 0 = flat, not horizontally raised (Fig. 22); 1 = horizontally raised (See Wijesekara, 1997; Fig. 2) (1.00,1.00). *R[GW97:1, MG00:6]
The region between the clypeus and the torulus is raised as a horizontal ridge in the Chalcidini (Delvare 1992; Wijesekara 1997) and referred to as bulging or convex. Certain species of Rileya have the supraclypeal area slightly elevated above the remainder of the lower face but not produced as a horizontal ridge. Some Eurytominae (*Aximopsis, Conoaxima*, some *Eurytoma* spp.) and Rileyinae (*Neorileya*; Figs. 77-78) have a distinct median carina between the clypeal region and interantennal prominence, but this is not considered horizontally raised.

Gena

120. Shape of gena: 0 = rounded; 1 = sharp (angulate) (Chalcididae). *R[G&H93:12]120.

121. Genal carina: 0 = absent; 1 = present (Chalcididae, some Eurytomidae and Pteromalidae). $R[GH&W99:73, GW97:9] same as previous character?

Sulci

122. Trabeculae (internal cell wall ingrowths): 0 = absent; 1 = present, head with an H-like pattern of dark cuticular bars and associated sutures (Mymaridae). $R[GH&W99:159K]

123. Shape of patterns of marks of face: 0 = transverse; 1 = V-shaped; 2 = X-shaped; 3 = H-shaped (Mymaridae); 4, W-shaped. [G&H93:22K] see below

124. Frontofacial suture: 0 = absent; 1 = only indicated by change in sculpture; 2 = present (most Entedoninae). *R[GH&W99:119] see below

125. Position of frontofacial suture: 0 = separated from anterior ocellus by one-third the distance between

the ocellus and torulus (Entedoninae); 1 = other? *R[GH&W99:120] see below

126. Frons: 0 = with median longitudinal line; 1 = with median area. [MG87:6] see below

127. Transfacial line: 0 = present; 1 = absent. $R[JWK03:7] see below

128. Upper ocular sulcus (uos): 0= absent; 1=present.

129. Transfacial sulcus (tfs): 0=absent; 1 = present.

130. Scrobal sulcus (scs) [reaching toruli]: 0 = absent; 1 = present.
May be indistinct, but the character should be defined based on presence of a clear distinct sulcus or groove. This is not homologous with a **scrobal channel** (broad depression).

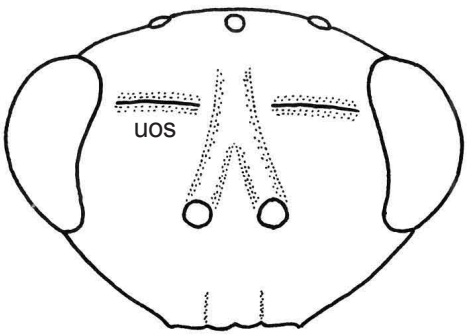
131. Lower ocular sulcus (los) [lateral to toruli]: 0=absent; 1 = present.

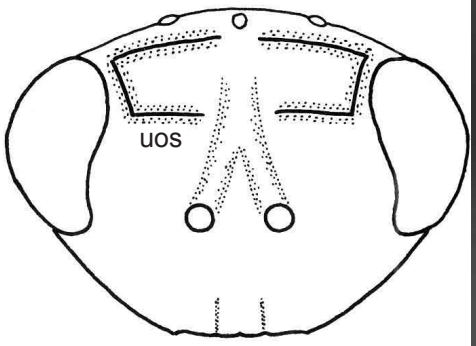
132. Subocellar sulcus (sos) [vertical below median ocellus]: 0 = absent; 1 = present.

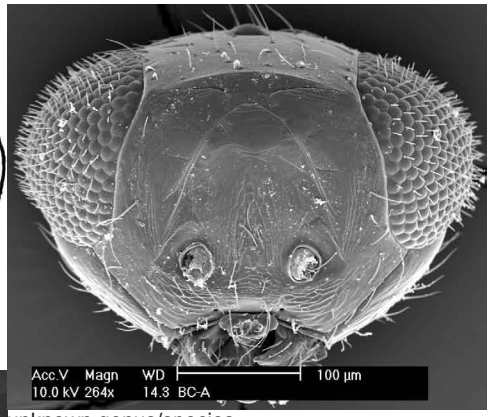
133. Subantennal sulci (sas) [vertical grooves below toruli]: 0 = absent; 1 = present.

Comparison of facial lines in Chalcidoidea

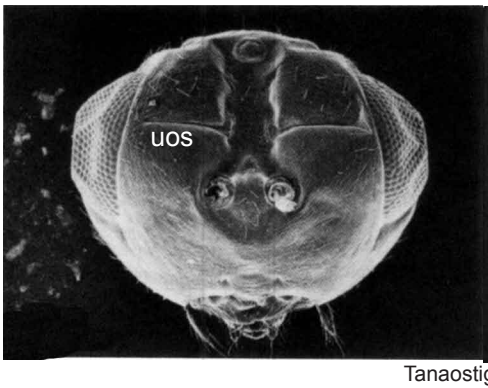
aos = anterior ocellar sulcus (homology? see *Coccophagus* & Tetrastichinae
mls = malar sulcus
los = lower ocular sulcus
sch = scrobal channel
scs = scrobal sulcus
tfs = trans facial sulcus
uos = upper ocular sulcus
vos = vertical ocellar sulcus







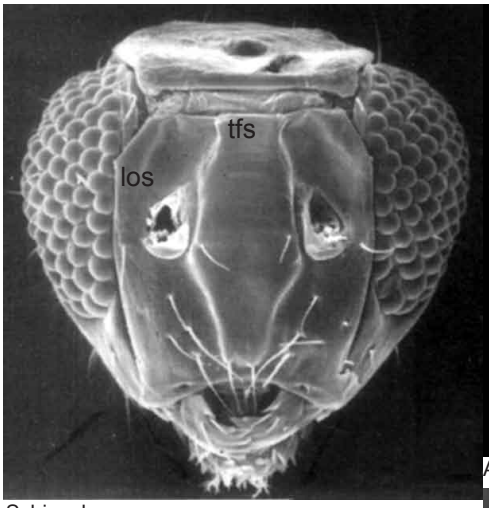
unknown genus/species



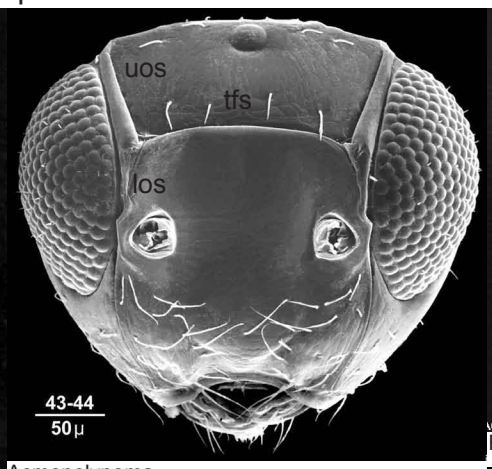
Tanaostigmodes

Kerya

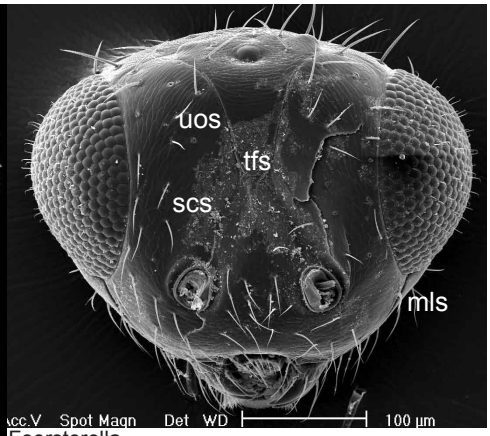
continued on next spread



Schizophragma

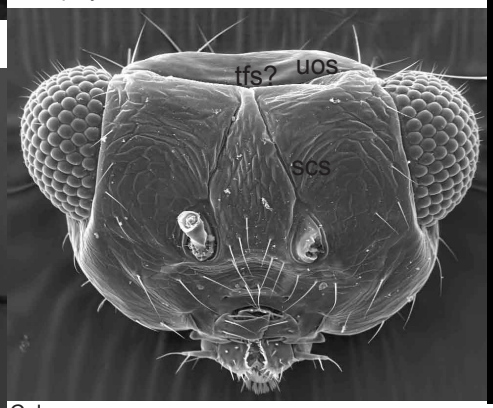


Acmopolynema

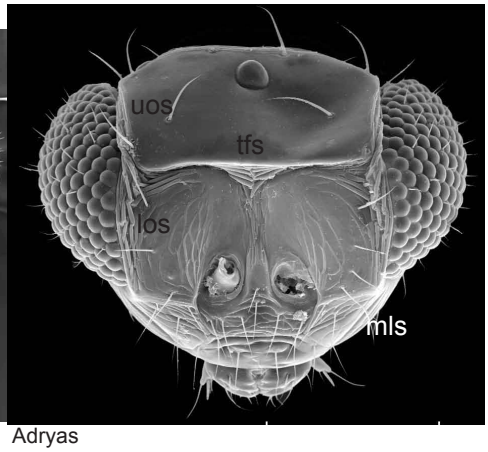


Foersterella

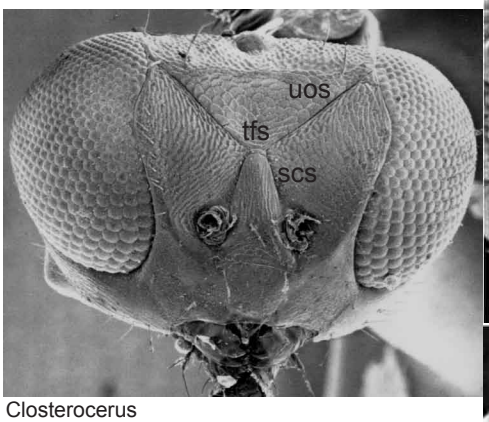
Zagella



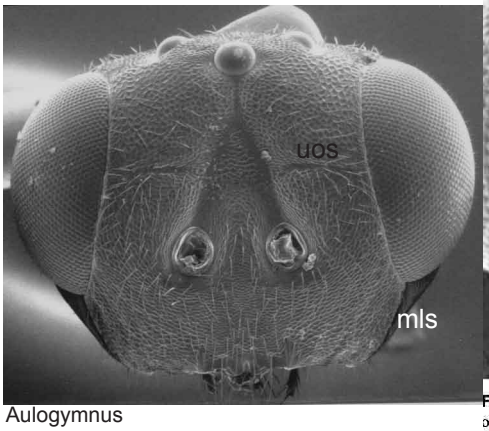
Cales



Adryas



Closterocerus



Aulogymnus

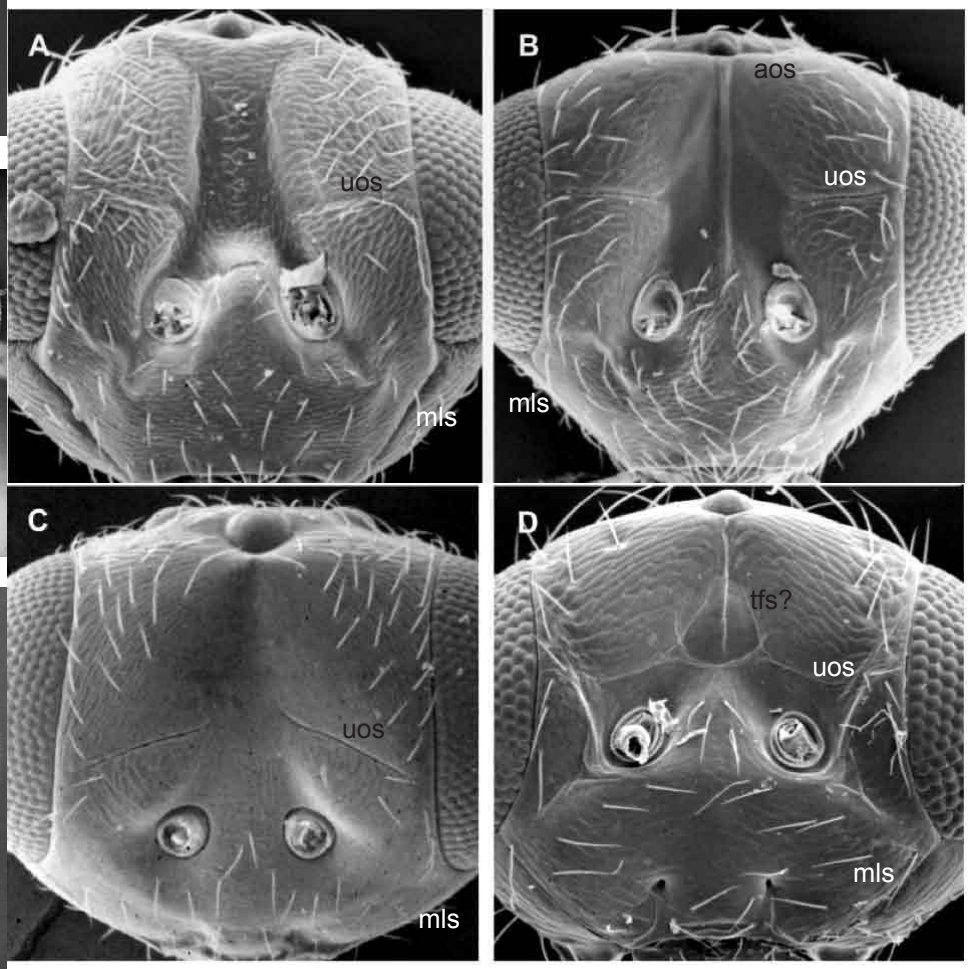
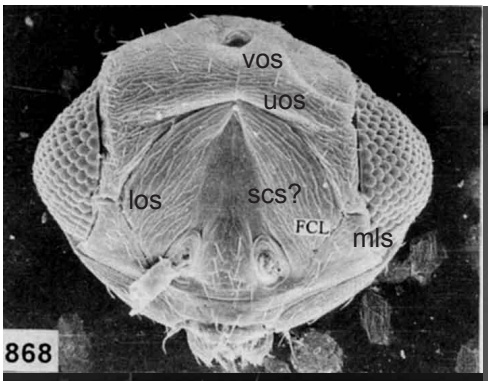
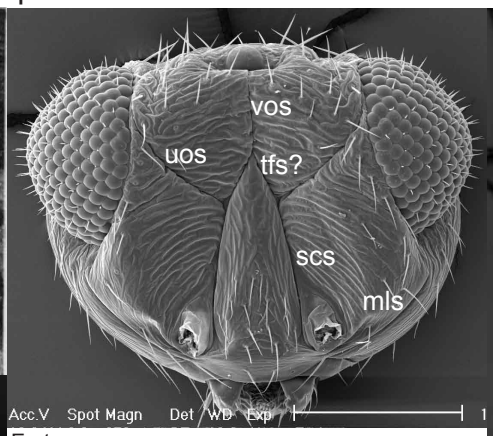


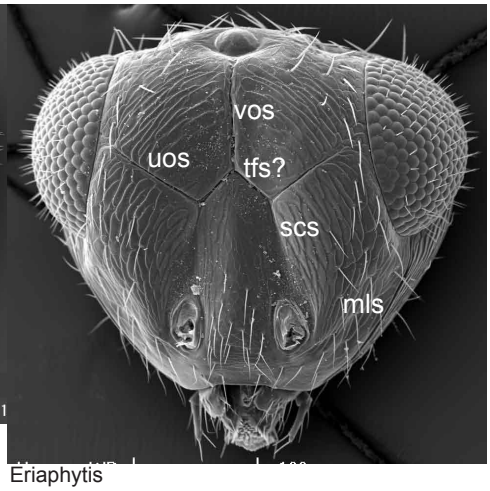
Fig. 8. Frontofacial sutures in Cirrospilini. The presence of a transverse frontofacial suture about halfway between the torulus and the anterior ocellus is a putative synapomorphy for Cirrospilini. A, *Cirrospilus pictus*; B, *Diglyphus isaea*; C, *Ascotolinx funeralis*; D, *Semielacher petiolatus*.

Comparison of facial lines in Chalcidoidea

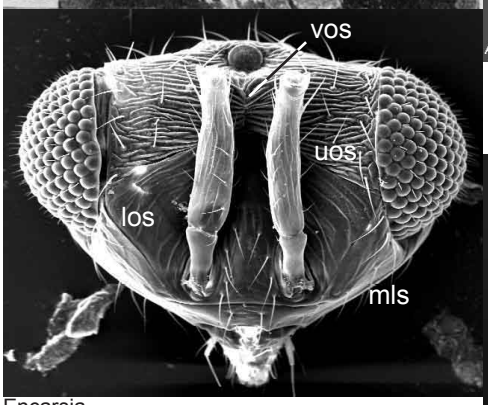




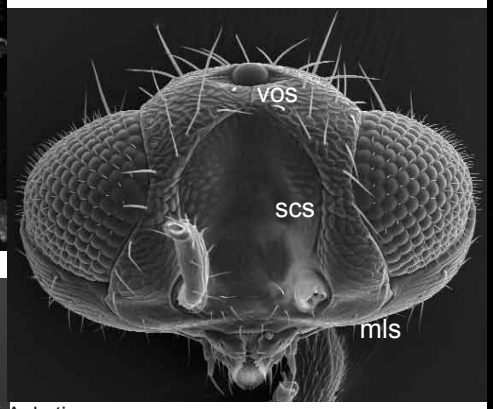
Eretmocerus



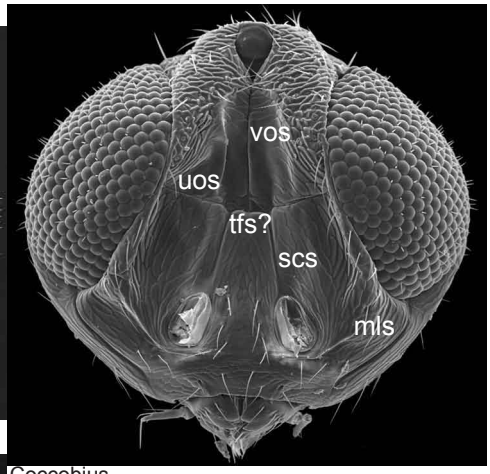
Eriaphytis



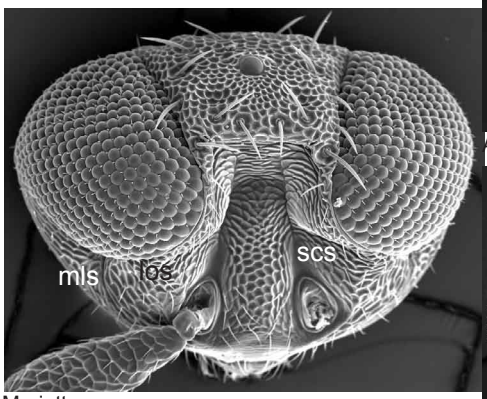
Encarsia



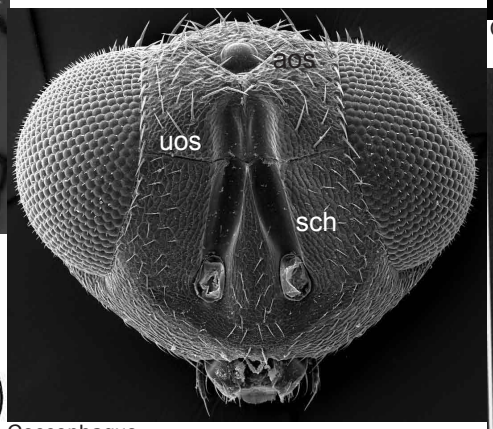
Aphytis



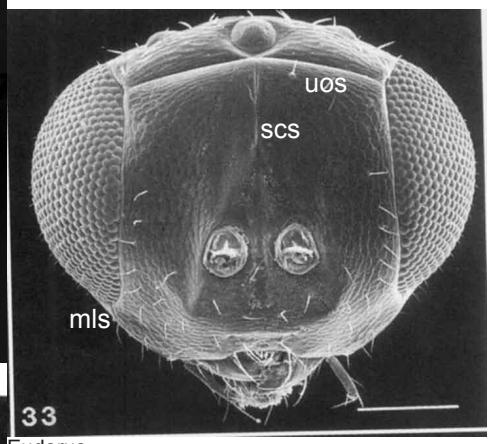
Coccobius



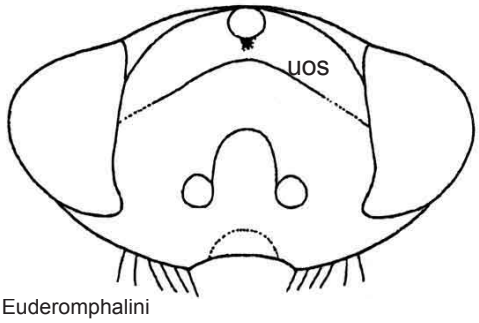
Marietta



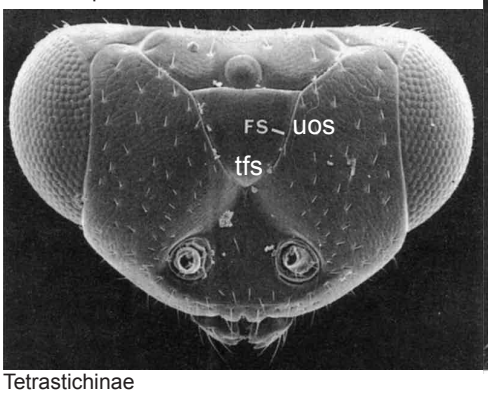
Coccophagus



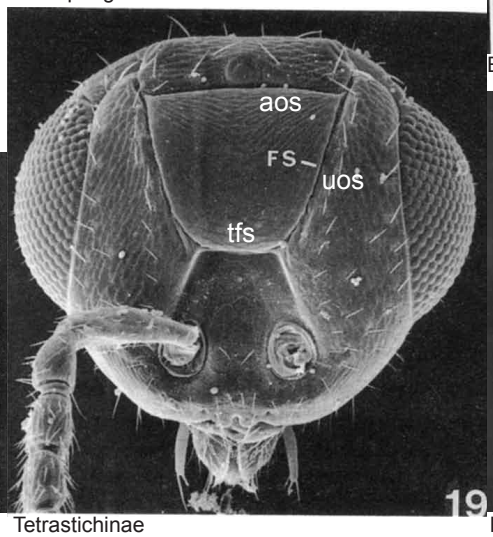
Euderus



Euderomphalini



Tetrastichinae



Tetrastichinae

Emersonella

134. Anterior ocellar sulcus (aos) [anterior to median ocellus]: 0=absent; 1 = present. Possible autapomorphy for a small group of genera in Tetrastichinae.

135. Subantennal sulcus: 0 = oblique, at most indicated by a shallow linear depression and connecting to tentorial pits ventrally (Fig.); 1 = vertical, delineated by a narrow sulcus externally and connecting to the epistomal sulcus medial to the tentorial pits (Fig.). [JHun:15]
This is an autapomorphic feature of *Philomides*. The sulci delimit the supraclypeal area, which is often indistinct or completely absent. If absent externally, as in *Aperilampus*, the sulci can be traced by the internal ridge.

136. Epistomal sulcus: 0 = impressed and smooth (Fig.); 1 = forming a sharp sulcus with the supraclypeal area partially overlapping the dorsal clypeal margin (Fig.). [JHun:16] The sharp sulcus is a derived characteristic within (of?) Perilampinae and occurs in both species of Akapala.

137. Lateral clypeal sulcus: 0 = absent; 1 = present

138. Malar sulcus: 0 = present and defined by lateral carinae (Fig.); 1 = present and smoothly impressed (Fig.); 2 = absent. Not ordered. *R[JHun:13, MG87:5, JWK03:15, EG95:7]
In some taxa, the malar sulcus may be obscured by strong sculpture. The most distinctive form of the sulcus is a very narrow groove bordered by pair of fine parallel ridges (Fig.). Within eucharitids, the malar depression is present as a smooth relatively broad impression without ridges (Fig.), but this occurs only in some species of *Orasema, Psilocharis* and *Neolosbanus* (Heraty 1994). *(Code as polymorphic or ancestral for these genera?)*. This seems like a good character, but is there any case where it will be useful as a grouping character, either as a sulcus or as a carina.

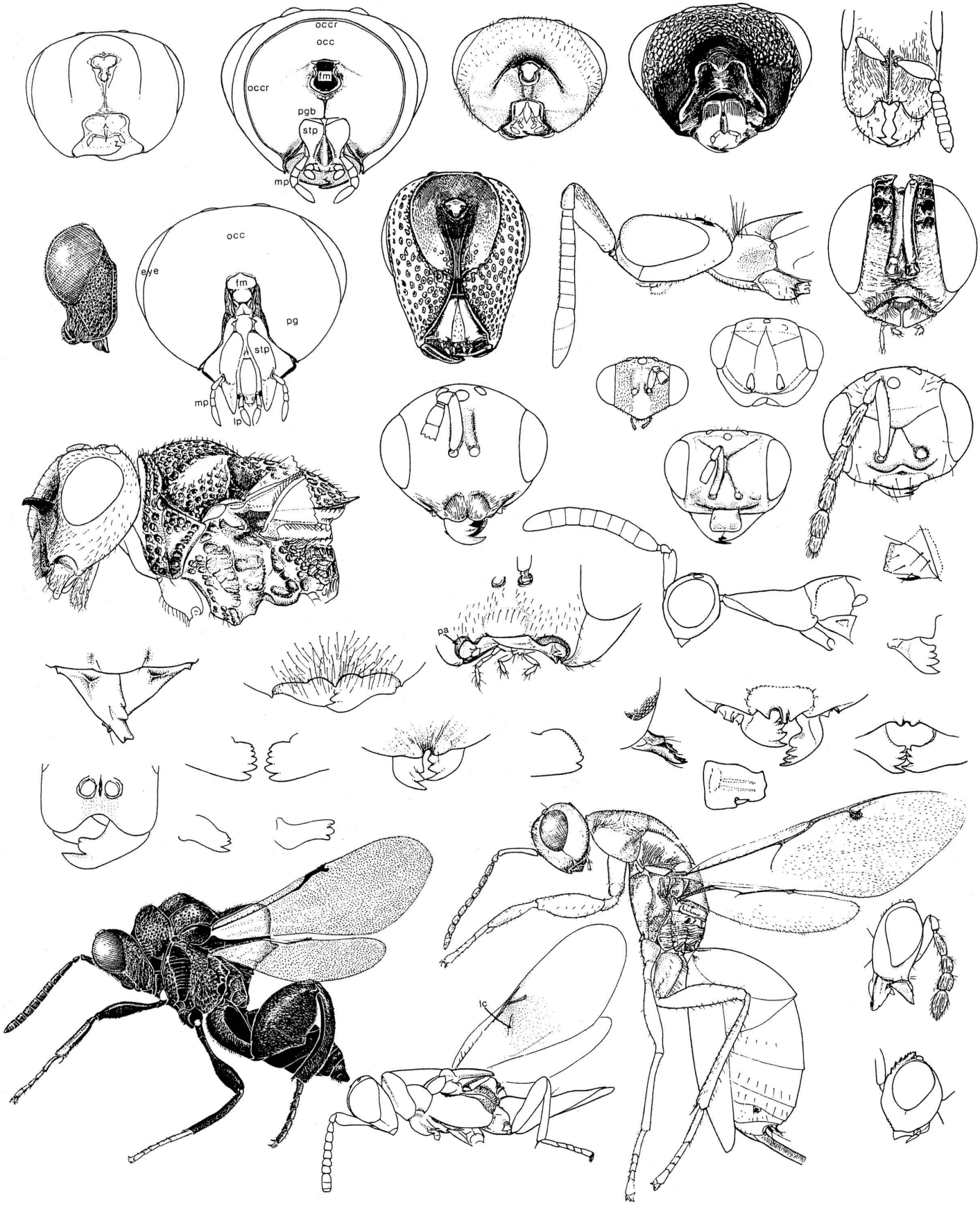
139. Groove running parallel to malar sulcus on head; 0 = absent; 1 = present (Macromesinae). [RBun:37]

140. Malar depression: 0 = a distinct depression adjacent to oral fossa (Fig.); 1 = a distinct carinate triangular depression (Fig.); 2 = absent (unordered). [JHun:14]
A non-carinate mandibular depression is found in many Pteromalidae and is presumed to be plesiomorphic. A mandibular depression is considered to be absent in all Oraseminae, although it could be considered as part of the ventral region of the malar sulcus; there is not a triangular depression. In Eucharitinae, a depression is lacking in the taxa considered as basal (*Psilocharis, Neolosbanus* and *Pseudometagea*), but reoccurs in more highly derived eucharitines such as *Pseudochalcura*. Problem of homology across Chalcidoidea.

Head capsule: ventrally and posteriorly

141. Shape of posterior surface of head: 0 = more or less flat; 1 = somewhat concave; 2 = strongly concave (Eunotinae). [RBun:15]

142. Occipital carina: 0 = complete (-like carina present. 1 = vertical lateral portion of carina present on either side of occipital foramen; 2 = absence of any carina (Eurytomidae). unordered? $R[Modified from GG03:9, G&H93:64, JHun:10, EG95:1]
The occipital carina is located medially on the occiput, just dorsal to the occipital foramen. In all of the ingroup taxa it is merely a short transverse ridge, and potentially it is a unique feature and not the actual occipital carina. In Eucharitidae, only *Pseudometagea* has a similar ridge. How does this compare to above occipital carina discussion?? What is the polarity of this character, especially with respect to outgroups?


occr
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143. Dorsal margin of occiput: 0 = broadly rounded; 1 = with a transverse carina. The derived feature is a single strong carina just posterior to the ocelli. $R[JHun:9]

144. Occipital and posterior genal margins: 0 = rounded; 1 = very sharp (Eunotinae). $R[RBun:14] already coded.

145. Transoccipital sulcus: 0 = absent; 1 = present. $R[JWK03:16]

146. Posterior vertical occipital sulcus (pvs) [medial on occiput, usually connecting to transoccipital sulcus]: 0 = absent; 1 = present.

146. Position of occipital foramen: 0 = slightly to much above middle of height of head; 1 = about in middle; 2 = slightly below the middle. Ordered 012. *R[Modified from MG87:9]147.

148. Position of occipital foramen: 0 = at most only slightly above middle of head; 1 = near top of head. [N&H94:3]

149. Shape of occipital margin: 0 = rounded; 1 = sharp. [N&H94:4] repeated earlier

150. Relation between eye and occipital margin: 0 = eye not reaching occipital margin; 1 = eye reaching or overreaching occipital margin. [N&H94:5]

151. Posterior tentorial pits: 0 = pits ventral to occipital foramen; 1 = pits lateral to foramen. $R[JWK03:9] see later version

152. Postgenal spur: 0 = absent (Figs. 27, 29); 1 = present (Figs. 1, 30) (0.67, 0.75). [MG00:12]
This character occurs as a spur-like protrusion on the lateroventral surface of the head and is continuous with the genal carina, if present (Fig. 30). To date, it has only been observed in some Rileyinae and Chalcididae (*Acanthochalcis nigricans* Cameron); thus it is homoplastic. It is possible that this character occurs in other related taxa (Pteromalidae) that have not been surveyed extensively.

153. Genal carina/flange: 0 = absent, at least when head is appressed to pronotal panel; 1 = gena with shiny carina or more distinct flange extending for variable length form mouth margin at level of basoventral angle of mandible. $R[GG03:10] move to match with earlier character

154. Postgenal lamella: 0 = absent (Figs. 28-30); 1 = present (Figs. 1, 31) (0.80, 0.75). [MG00:11; = genal carina?] same as earlier character???
This character occurs as a flattened lobe, directed laterally or ventrolaterally, in the postgenal region of the head below the occipital foramen (Fig. 31). It appears to function in tongue-and-groove fashion with a corresponding groove on the prosternum. This character was initially observed by Thomson (1878) and defined by Claridge (1958) as a hypostomal lamella, an apparent development of the hypostomal carina (Richards, 1956). Claridge (1961) later termed the same structure 'postgenal lamella' when it became apparent that it probably was not an extension of the hypostomal carina. Delvare (1988) termed it as the "lamina postgenal" in differentiating species of African Eurytomidae described by Risbec (1951, 1952, 1953, 1956ab, 1957). Delvare (1992) also referred to a hypostomal process located at the dorsolateral margin of the oral fossa in his study of the Chalcidini, however, it remains to be seen if there is any correspondence between these two structures. Boucek et al. (1981) felt that the postgenal carina of Claridge was actually the occipital carina. This character appears to occur primarily in Eurytominae, although not exclusively as some Chalcididae (*Acanthochalcis nigricans* Cameron) also possess it. None of the outgroup Cleonyminae have this feature, and I hy-

pothesize it to be apomorphic.

Postgenal bridge and hypostomal bridge/carina

155. Position of the posterior tentorial pits: 0 = close to the foramen magnum: 1 = concealed in a longitudinal deep groove (gular sulcus) extending from the foramen magnum to the oral fossa; 2 = contained in deep grooves. better version of earlier character [R&KLM98:1]

156. 'Post-occipital' bridge structure: 0 = (postgenal) bridge due to the closeness of the postgenae; 1 = bridge mainly constituted by a subrectangular sclerite (= gula?) situated between the postgenal and the postoccipital sutures (= the posterior part of the hypostomal suture); 2 = bridge due to a closeness of the genae both above and below the posterior tentorial pits while the gula is lengthened and sometimes absent; 3 = (postoccipital) bridge mainly composed of a carinated sclerite, probably of postoccipital origin, situated between deep grooves. [R&KLM98:2, GH&W99:46, GH&W99:62]
Do we need to define more states??

157. Longitudinal median suture of 'gula': 0 = absent; 1 = present. [R&KLM98:3]

158. Sinking of 'gula': 0 = absent; 1 = present (Pteromalinae). ???? what is this [R&KLM98:4]

159. Anterior part of the hypostomal suture (= the postgenal suture): 0 = well developed; 1 = reduced. ???? [R&KLM98:5]

160. Hypostomal bridge and postgenal bridge: 0 = postgenal bridge absent, hypostomal bridge distinct, hypostomal carina continuous around occipital foramen; 1 = postgenal bridge present, converging below occipital foramen and narrowly uniting in the middle; 2 = postgenal bridge present, postgenae converging below the occipital foramen, hypostomal bridge slightly exposed; 3 = postgenal bridge absent, hypostomal bridge distinct, and hypostomal carina continuous with a distinct carina around occipital foramen; 4 = postgenal bridge completely covering the hypostomal bridge. [GW97:10]

161. Hypostomal and postgenal bridge: 0 = postgenal bridge absent, postgenae separated and not converging, hypostomal bridge completely exposed (Fig. 27); 1 = postgenal bridge absent, but postgenae converging, hypostomal bridge exposed medially (Fig. 29); 2 = postgenal bridge present, with postgenae narrowly uniting below occipital foramen, hypostomal bridge slightly exposed (Fig. 28); 3 = postgenal bridge present complete, postgenae broadly uniting hypostomal bridge obscured (Fig. 31) (0.89, 0.81). [MG00:16] same as above

162. Vertical length of postgenal bridge: 0 = long, 1.2X as long as the width of lower foramen; 1 = short, at most less than 1.0X of width of lower foramen. R[JWK03:10]

163. Extent of hypostomal carina: 0 = hypostomal carina distinct, complete, encircles occipital foramen (Fig. 27); 1 = hypostomal carina distinct, incomplete, terminates laterad of occipital foramen (See Wijesekara 1997, Fig. 13); 2 = hypostomal carina distinct, complete, does not approach occipital foramen, unites below occipital foramen (Fig. 28); 3 = hypostomal carina distinct, incomplete, approach one another below occipital foramen (Fig. 29); 4 = hypostomal carina distinct, incomplete, present only laterad of ventral mouthparts (Fig. 30) (0.73, 0.82). $R[MG00:17, GH&W99:154, JHun:11]
Wijesekara (1997) used characters 16-17 as a single character which might needlessly eliminate phylogenetic signal. I have chosen to separate the single character into two characters as the hypostomal carina might not necessarily be correlated with character state changes in postgenal bridge production/hypostomal bridge exposure. The postgenal bridge, when present, is formed by the fu-

sion of the genae (postgenae) between the occipital foramen and the ventral mouthparts and typically obscures the hypostomal bridge (depending on the degree of development of the postgenal bridge) (Wijesekara 1997). The hypostomal carina proceeds dorsoventrally along the lateral margin of the oral fossa and either turns medially at the base of the ventral mouthparts or continues dorsally to approach/encircle the occipital foramen. Leucospids possess state 0 for both characters. Cleonyminae, Heimbrinae, most Rileyinae and some eurytomines possess state 2 for character 16. Character 17: state 1 is seen only in Chalcididae; state 2 is homoplastic across Chalcididae and Eurytomidae; state 3 is mainly seen in Eurytomidae; and state 4 is autapomorphic for *Acanthochalcis*. As a homoplastic character, postgenal bridge production cannot be regarded as a synapomorphy for Eurytomidae.

Mouthparts

Labrum and epipharynx

164. Relation of labrum and clypeus: 0 = labrum exposed and contiguous with anterior clypeal margin (Chalcididae); 1 = labrum mostly concealed behind clypeus. $R[GH&W99:70, GW97:7, MG00:14]
Darling (1988) hypothesized that the broad labrum contiguous with the apical margin of the clypeus is the ground plan for Chalcidoidea. This character was used by Wijesekara (1997) as a synapomorphy supporting the monophyly of Chalcididae and is included here to aid in differentiating Chalcididae. No other taxa in the analyses presented here possess an exposed labrum. This character is globally homoplasious as it also occurs in *Aperilampus* (Perilampidae).

165. Sclerotization of labrum: 0 = heavy (plate-like); 1 = weak. [CD88:1]

166. Thickness of labrum: 0 = flaplike; 1 = inner and outer surfaces separate, not appressed to form single narrow flap. [CD88:2]

167. Outline of labrum in anterior view: 0 = rectangular; 1 = subquadrate; 2 = triangular - semicircular. Not ordered. [CD88:3]

168. Labral digits: 0 = absent; 1 = margin digitate (Eucharitidae and Perilampidae). $R[JHun:19, G&H93:59, CD88:12]

169. Adoral labral digits: 0 = digits marginal or absent (Figs.); 1 = adoral digits present (Fig.). [JHun:20]

170. Marginal labral setae: 0 = present; 1 = absent. [CD88:8]

171. Adoral labral setae: 0 = present; 1 = absent. [CD88:9]

172. Number of labral setae: 0 = many; 1 = 13-15; 2 = 8-10; 3 = 6; 4 = 4. Ordered 01234. [CD88:5]

173. Distribution of labral setae: 0 = evenly distributed; 1 = restricted to area of margin; 2 = along apical margin, possibly with a few adoral setaes. [CD88:6, JHun:18]

174. Situation of labrum: 0 = not internalized, “free”; 1 = within the buccal cavity. [CD88:10]

175. Shape of labral setae: 0 = tapered/acuminate; 1 = spatulate. [CD88:11, JHun:21]

176. Setae in sockets: 0 = no; 1 = yes. [CD88:13]

177. Lateral lobes of labrum: 0 = absent; 1 = present. [CD88:14]

178. Setae on lateral lobes: 0 = present; 1 = absent. [CD88:15]

179. Translucent circular areas of labrum: 0 = present; 1 = absent. [CD88:16, JHun:17]

180. Tormae: 0 = distinct sclerites; 1 = fused to the pharyngeal plate. [CD88:17]

181. Sclerotized process on inner surface of labrum: 0 = absent; 1 = present. [CD88:18]

182. Labral and epipharyngeal surfaces: 0 = contiguous: 1 = epipharyngeal surface differentiated into a distinct lobe, the epipharynx. [CD88:4]

182. Epipharyngeal setae: 0 = many smaller setae, 2 or more on each side; 1 = a few differentiated, stout setae. [CD88:7, JHun:22]183.

184. Location of epipharyngeal setae: 0 = medially located (Fig.); 1 = laterally displaced (Fig.). [JHun:23]

Mandibles

185. Left mandible dentition: use actual number $R[JHun:24, G&H93:60, JWK03:11]
Mandibles are 2/2 dentate in Philomidinae and Chrysolampinae and 3/2 dentate in Perilampinae, Akapalinae and Eucharitidae, with the left mandible always with the extra tooth. A 3/2 formula is considered plesiomorphic based on outgroup comparison. In some Oraseminae and Eucharitinae, the mandibles can be reduced in both dentition and shape, with a few species (i.e. *Timioderus ramosus* Heraty, *Indosema indica* Husain & Agarwal, *Pseudometagea nefrens* Heraty) having only a peg or rounded lobe for a structure. In *Timioderus peridentatus* Heraty (Oraseminae), the mandibles are 3/3 dentate, whereas in *T. refringens* Waterston, they are 2/2 dentate. A 3-toothed right mandible appears to be derived within groups and not informative for higher taxa.

186. Dentition of right mandible relative to left: 0 = one less; 1 = equal number. [reference?]

187. Tridentate mandible[which?]: 0 = with inner/upper tooth obtuse; 1 = with acute outer/apical tooth and serrulate inner/upper lobe; 2 = with two inner/upper teeth very small and approximated, outer/apical tooth long and falcate, widely separated from the other two. Recode! [MG87:4]

188. Upper tooth of mandible[which?]: 0 = narrower; 1 = very wide, mandible short and wide. [MJ98:2]

189. Shape of wide upper tooth of mandible[which?]: 0 = notched, appearing as two teeth; 1 = obliquely chisel-shaped with a weak emargination, so that it is almost divided into two teeth [used for cutting an exit-hole in the host's integument]. [MJ98:3]

190. Ventral mandibular tooth: 0 = about equal in size and shape to secondary tooth ((Perilampidae); 1 = apical tooth acuminate and at least twice as long as subapical tooth (falcate or sickle-like if open and widely crossed over, one on top of other, if closed) (Eucharitidae, Philomidinae, Akapalinae); 2 = mandibles reduced to stumps or pegs, teeth not apparent (Fig.). $R[JHun:25, G&H93:57]
The latter category occurs only in some Eucharitidae (*Timioderus, Indosema, Pseudometagea nefrens*, and several other more derived genera of Eucharitinae).

191. Mandible orientation: 0 = horizontally oriented and subapical teeth visible in lateral view [perpen-

dicular to base of mandibles across condyles) (Fig.); 1 = subapical teeth not visible in lateral view. $R[JHun:26]
The plesiomorphic condition is to have the mandibles slightly twisted from the base of the mandibles so that the teeth are opposing each other in a horizontal or oblique plane to the oral fossa. In Eucharitidae, the mandibles are flattened and oppose each other in a vertical plane to the head so that all teeth are oriented in the same plane. Only one eucharitid, *Timioderus peridentatus*, has the mandibles slightly twisted with the teeth just visible laterally.

192. Mandibular ducts: 0 = ducts parallel-sided; 1 = ducts with distal portions spherical. [JW88:2]

193. Mandibles: 0 = endodont; 1 = exodont (Mymarommatidae); 2 = 'subexodont' state 2 need better definition, and is it worth coding as different from exodont?? (Chalcididae: Dirhininae); 3 = long and wide-sweeping huh?. Not ordered. *R[MJ98:1, GG86:5, GH&W99:35]

194. Mandibles: 0 = with apical teeth only; 1 = with transversely ridged appendage (some Agaonidae): 2 = with posteriorly directed teeth (some Agaonidae). Not ordered. $R[G&H93:50] autapomorphy

195. Mandibular appendage: 0 = absent; 1 = present (female Agaoninae). $R[GH&W99:52] autapomorphy

196. Backwardly pointed teeth on posteroventral edge of mandible: 0 = absent; 1 = few to many; 2 = mandibular appendage in GH&W99:52? (Sycoecinae to Agaoninae). $R[GH&W99:57]

197. Apex of outer (left) mandible: 0 = not overlapping base of opposing mandible when closed; 1 = overlapping base of opposing mandible. [JHun:27]

198. Socketed spine (peg) on inner surface of mandible, near the ventral margin: 0 = absent; 1 = present [Coccophaginae, Calesinae, Encyrtidae (Anthemini and Habrolepidini)]. $R[MJ98:4]

199. Posteroventral fringe of setae on mandibles: 0 = absent; 1 = present, well developed. [MJ98:5]

200. Mandibular setae [which mandible?]: 0 = few setae, <6, along outer margin; 1 = numerous setae, >10, along outer margin. [JHun:28]

201. Mandibular base: 0 = concealed by genal margin (and oblique?); 1 = exposed (and straight?). [MG00:15, GW97:8, GH&W99:71]
This character was used by Wijesekara (1997) as a synapomorphy supporting the monophyly of Chalcididae and is included here for the same purpose. No other taxa in the analyses presented here possess an exposed mandibular base. Perilampids possess a similar character but can be differentiated in that they possess a concave genal margin as opposed to chalcidids whose genal margin is straight.

202. Possession of two mandibular glands: [actual number] 0 = no; 1 = yes (Sycoecinae, Sycophaginae and most Agaoninae). [GH&W99:59] will be very difficult to code if all mandibles have to be cleared.

Maxillae and labium

203. Maxillary palp segments: actual number. Ordered 0123? $R[JWK03:12, JHun:29, GH&W99:136] Reorder by actual number

203. Labial palp segments: actual number. Ordered 0123? $R[JWK03:13, JHun:30, GH&W99:136]204. Reorder by actual number

205. Concealed nectar extraction apparatus [CNEA]: 0 = absent; 1 = both the glossa and galeae are slightly to moderately elongated and the glossa is concealed for most of its length by the galeae in dried specimens. The glossa is shallowly bilobed/forked at its tip and is rolled at its lateral edges, being either semi-tubular with a broad saliva-conducting ventral groove or tubular with a narrow ventral groove; 2 = resembles state 0, but the glossa is both greatly elongated relative to the galeae and thus exposed for much of its length in dried specimens, and it is very deeply forked. The two 'prongs' of the fork are flattened internally; 3 = resembles state 0, but the maxillary palps are elongated and capable of being closely aligned; 4 = elongated glossa, galeae and labial palps; the glossa is exposed for much of its length in dried specimens; it has certain features in common with the apparatus of 'long-tongued' bees, namely: the glossa is longer than the prementum, its surface is covered with numerous hairs, and it is rolled at its edges to form a tube with a narrow, ventral saliva-conducting groove; 5 = greatly elongated maxillary palps; 6 = elongated, slender glossa and closely aligned, elongated labial palps; maxillary palps 'normal' in appearance; inner surfaces of the labial palps are concave and bear a dense covering of long, slender hairs; the tip of the glossa reaches well short of the tips of the labial palps; 7 = elongated labial palps and even more elongated maxillary palps, the latter enclosing the former; the inner surfaces of the maxillary palps are concave and bear a dense covering of long, slender hairs. Ordered 0 -> 1, 5, 6 or 7; 1 -> 2, 3 or 4; 1 -> 0. Other transformations considered unlikely. [MJ98:6]

Mesosoma

206. Mesosomal nota other than pronotum: 0 = separate; 1 = more or less fused (male Agaonidae). *R[G&H93:96]

207. Mesosomal sculpture: 0 = coarse, umbilicate punctation (Figs. 39, 43); 1 = fine, umbilicate punctation (Fig. 36); 2 = reticulate (Fig. 37, prepectus & mesepisternum); 3 = fine, transverse reticulation (Fig. 34, 38); 4 = imbricate-reticulate (Fig. 52; imbricate); 5 = rugose-reticulate (Fig. 75, ventral mesepisternum) (0.79, 1.00). *R[MG00:21] could be modified to umbilicate versus (reticulate or rugose)?
Coarse umbilicate punctation has been hypothesized as the plesiomorphic condition within Chalcidoidea (Boucek 1988). The majority of Eurytomidae, Chalcididae and Leucospidae have states 0 or 1. In this analysis, only taxa of Rileyinae (most *Rileya, Austrophotismus*) possess state 2, while two plesiomorphic eurytomids (*Archirileya, Macrorileya*) are autapomorphic (states 4 and 5 respectively).

208. Body sculpture: 0 = distinct sculpture present (Akapalinae, Perilampidae, Eurytomidae); 1 = reticulate or with other fine sculpture: 2 = smooth and shiny, at most with scattered micropunctures or other very obscure sculpture (some Agaonidae). *R[G&H93:46]

209. Placement of mesosomal setation: 0 = setae, if present, scattered over surface; 1 = one seta each in broad circular depressions (umbilicate sculpture). *R[JHun:53]

210. Length of pubescence of body: 0 = with erect scattered setae (some Agaonidae); 1 = with short setae. *R[G&H93:89]

211. Thickness of setae of pronotum, mesoscutum and scutellum: 0 = not thickened; 1 = some or all setae of these parts thickened, distinctly stouter than setae of propodeal callus. *R[MG87:30]

212. Relation of mesopleuron, metapleuron and propodeum ventral to the propodeal spiracle: 0 = separate sclerites: 1 = fused (Mymarommatidae). $R[GH&W99:32] autapomorphy

Pronotum

213. Pronotal shape: 0 = long dorsally, hence saddle-like in lateral view, loosely attached to mesopleuron and highly mobile relative to mesothorax; 1 = intermediate in shape and degree of mobility between 0 and 2; 2 = reduced dorsally, hence triangular in lateral view, and rigidly united with mesopleuron. Ordered 012. $R[GG86:8] may need modification
[Maybe not independent of R99: 28; Vilhelmsen 2000b: 1 and/or Basibuyuk et al character 31]

214. Relative structure of pronotum and mesoscutum: 0 = pronotum campanulate in dorsal view, either wide relative to mesoscutum with mesoscutal lateral lobes obliquely angled to pronotum as small or inconspicuous "shoulders" (0a), or narrow relative to mesoscutum with mesoscutal lateral lobes right-angled as distinct "shoulders" (0b); 1 = pronotum more-or-less conical in dorsal view, posteriorly as wide as mesoscutum sp as to lack "shoulders"; 2 = pronotum transverse (2a) to linear (2b) in dorsal view, posteriorly as wide as mesonotum so as to lack "shoulders". [GG89:12]

215. Shape of pronotum in lateral view: 0 = campanuliform; 1 = triangular; 2 = lunate; 3 = subrectangular. [MG87:23 with modified wording] same as above

216. Length of pronotum: 0 = short, transverse; 1 = medium; 2 = long, longer dorsally than the mesoscutum (Spalagiinae, Cerocephalinae, male Agaonidae). [RBun:4, G&H93:66, MG87:22] same as two above

217. Width of pronotum relative to mesoscutum: 0 = narrower how much??? (Cleonyminae, *Amotura*); 1 = as wide as; 2 = broader. *R[RBun:9]

218. Mesosoma in lateral view: 0 = with mesoscutum not abruptly convex above pronotum, pronotum usually visible medially in dorsal view (even if only a margin); 1 = with mesoscutum abruptly convex above pronotum, with pronotum vertical and in dorsal view not visible medially (Eucharitidae, Philomidinae). $R[G&H93:55, GH&W99:100, JWK03:18, JHun:32]
The vertical orientation of the pronotum is very differently derived in Philomidinae and Eucharitinae, but they are here coded as state 1.

219. Pronotum dorsal articulation: 0 = rides over mesoscutum; 1 = plate-like and vertical; 2 = reduced and abutting mesoscutum. $R[JHun:33]
The pronotum of Philomidinae forms a clear, plate-like flange that extends vertically over the anterior face of the mesoscutum. In Chrysolampinae and Perilampinae, the pronotum extends loosely over the anterior margin of the mesoscutum (plesiomorphic). In Eucharitidae, especially Eucharitinae, and *Akapala*, the pronotum more directly abuts the mesoscutum (non-sliding articulation). The articulation is slightly overlapping in Oraseminae, although possibly not as freely articulating as in the other taxa.

220. Shape of pronotal collar: 0 = no differentiated collar; 1 = small, transverse - bell-shaped; 2 = large, at least half length of mesoscutum, rectangular to subconical (Eurytomidae). $R[G&H93:65] 1 and 2 the same? move up to 'shape' above

221. Pronotal lobe: 0 = absent; 1 = present. what is this? [GG85:3]

222. Pronotal median line: 0 = pronotum uniformly sculptured without median longitudinal line; 1 =

pronotum with median suture or line of weakness, the cuticle sometimes folded into apparent median carina; 2 = pronotum with smooth and shiny median band extending for variable distance from anterior margin of neck. $R[GG03:18]

223. Pronotum medially: 0 = continuous; 1 = divided. $R[JWK03:17] does this need to be merged with the preceeding character?

224. Transverse carina of pronotal collar: 0 = absent; 1 = collar delimited anteriorly by a transverse carina. *R[MG87:25]

225. Pronotal carina: 0 = absent; 1 = raised transverse carina medially on the pronotum (Fig.); 2 = carinate margin surrounding concave smooth surface of pronotum (Fig.) (unordered). $R[JHun:31]
The very different pronotal structure of Chrysolampinae (often with state 1) and Perilampinae and Akapalinae (both with state 2) would suggest that the carinae are not homologous and should at least be treated as unrelated or unordered states. State 2 corresponds to the unique development of the pronotum in these groups and possibly we should be treating the pronotal invagination as a separate character - is this 29?.

226. Pronotal relationship to tegula: 0 = extended posterodorsally to tegula; 1 = separated from tegula by interposed prepectus. [GG86:10] chalcidoid character

227. Projection of pronotal spiracles: 0 = visible externally, but not projecting; 1 = projecting slightly, spiracles visible in dorsal view; 2 = spiracle hidden externally. [MG87:24]

228. Posterolaterally differentiated area of pronotum (huh?): 0 = absent; 1 = present, elongate along most of height of pronotum behind spiracle; 2 = present, area below spiracle; 3 = present, small area surrounding spiracle. [GG99:14]

229. Relationship of pronotum and mesepisternum: 0 = moveable; 1 = rigidly associated without interlocking mechanism; 2 = rigidly associated by tongue-and-groove interlocking mechanism over most of height. [GG99:15] this occurs as a character somewhere else in this list.

230. Pronotal cuticle posteroventrally: 0 = not continuous; 1 = continuous (pronotum annular). [GG99:16]

Propectus (propleuron, cervix and prosternum, profurca)

231. Prosternal spine: 0 = absent (Fig.); 1 = present (Fig.).
The spine is a distinct raised ridge medially on the proepisternum and projects as a blunt spine between the procoxal bases of Perilampinae. [JHun:51]

232. Propleuron: 0 = propleuron triangular, narrowly appressed; 1 = propleuron entirely appressed medially (Fig.); 2 = propleuron fused medially (Mymarommatidae). [JHun:52] needs to be more broadly defined.
The complex of proepisternum and sternum of Philomidinae is very different from the other taxa. The two lateral lobes (propleura) meet at the midline along their entire length. The median lobe (prosternum) is small, quadrate and is located posterior to the lateral lobes. In other taxa, the propleura are subtriangular and either meet just at the inner corners (as in *Chrysomalla*) or may be broadly joined medially (as in *Chrysolampus*), but never completely along the midline. The sternum is usually diamond shaped or trapezoidal and extends between the propleura and the fore coxae.

233. Relation of propleura and prosternum: 0 = separate sclerites: 1 = fused into a carapace below the pronotum (Mymarommatidae). $R[GH&W99:33]

234. Prosternum shape: 0 = truncate posteriorly; 1 = acute posteriorly.

235. Single, large bristle on posterolateral corner of pronotum: 0 = absent; 1 = present.

Prepectus

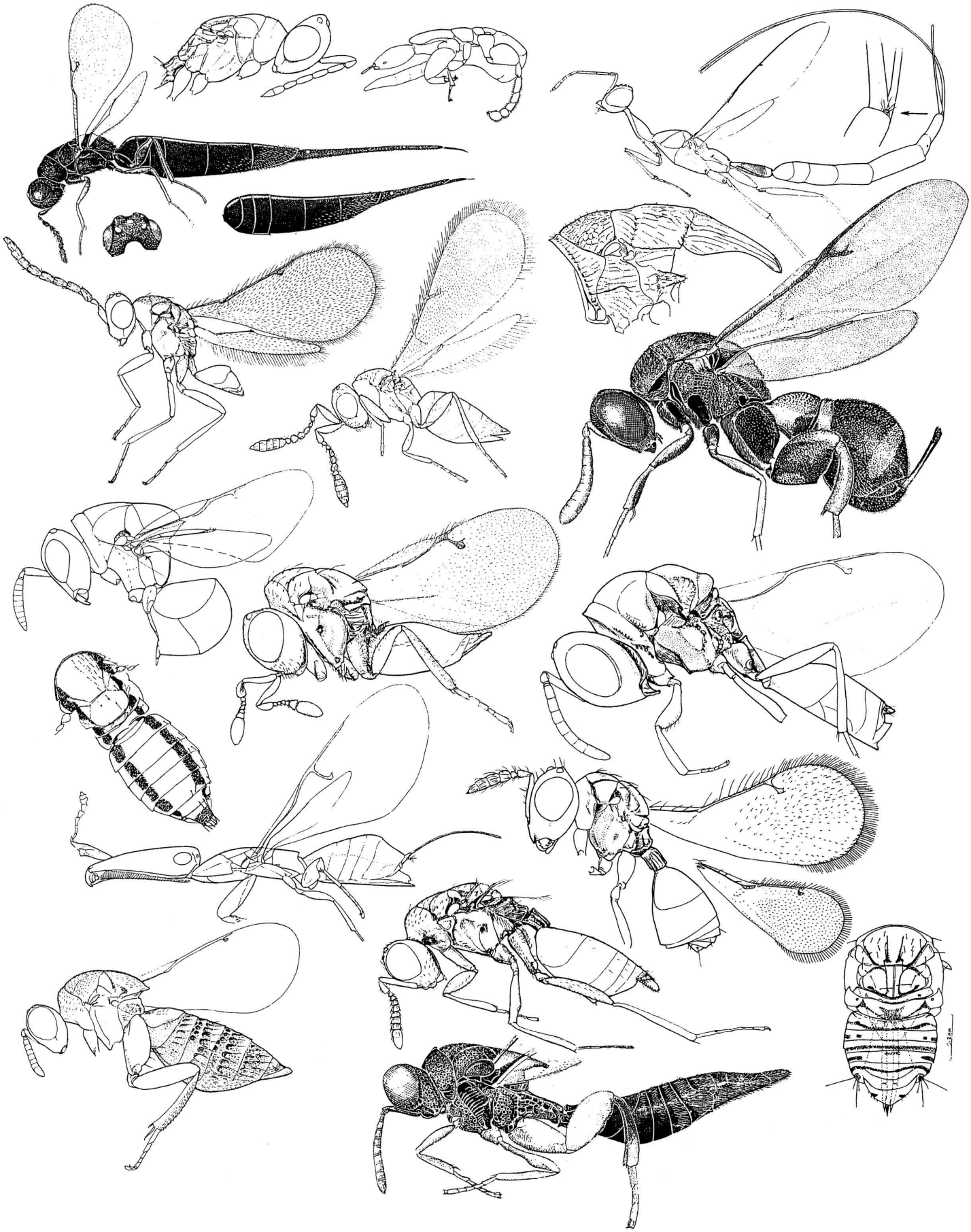
236. Prepectus: 0 = absent, no indication of fusion with any other sclerite; 1 = present, but sometimes concealed or fused with pronotum.

237. Position of free prepectus relative to pronotum: 0 = concealed under posterolateral margin dorsally; 1 = exposed between pronotum and mesepisternum, at least dorsally. $R[GG99:11]

238. Structure of prepectus: 0 = prepectus relatively flat and evenly sclerotized, exterior to pronotum except for anterodorsal angle, which articulates with first phragma anterior to insertion of pl_2-t_2c muscle; 1 = prepectus flat and evely sclerotized, exterior to pronotum, articulated with lateral edge of mesoscutum posterolateral to insertion pl_2-t_2c muscle; 2 = prepectus enveloping mesoscutal process for pl_2-t_2c mescle exterior to pronotum, with thickened medial edge that articulates in angle formed between first phragma and mesoscutal process for pl_2-t_2c muscle, and with frontal surface either relatively flat (2a) or conspicuously protuberant anterior to mesothoracic spiracle (2b); 3 = prepectus enveloping mesoscutal process for pl_2-t_2c muscle underneath pronotum, with concealed cuticle more-or-less membranous except for thickened medial edge that articulates in angle formed between first phragma and mesoscutal process for pl_2-t_2c muscle, and with concealed frontal surface either relatively flat (3a) or conspicuously protuberant anterior to mesothoracic spiracle (3b); 4 = prepectus divided into lateral prepectal surface exterior to pronotum and interior strut-like medial edge that articulates with first phragma as described for states 2 and 3. [GG89:10]

239. Relation between prepectus and pronotum: 0 = separate sclerites; 1 = prepectus fused to pronotum along entire anterior margin (e.g. Macromesinae). $R[JHun:49, GG99:10, G&H93:13, GW97:12, GH&W99:4]
In *Steffanolampus* the prepectus is closely associated with the pronotum and separated only by a very fine suture; however, the sclerite is easily disassociated. In some species of *Perilampus*, the anterior suture can be distinct, but the sclerite is completely fused. Chalcidoidea is the only taxon possessing a prepectus, an externally visible independent sclerite between the posterolateral pronotum and anterodorsal margin of the mesepisternum (Goulet & Huber 1993; Gibson et al. 1999) (Fig. 7) (some Rotoitidae have the prepectus hidden Gibson & Huber (in press), or fused to the pronotum as in Eucharitidae (Heraty 1994». The visible portion of the prepectus is typically as large as or larger than the tegula, and this condition has been hypothesized to be the plesiomorphic condition (Zerova 1988). In contrast, a highly reduced prepectus is considered apomorphic. However, numerous taxa possess a greatly reduced subtriangular to subcircular (Eurytomidae: Rileyinae, Heimbrinae) or strip-like prepectus (Chalcididae, Leucospidae). I have treated the prepectus as a binary character for purposes of this analysis, although Wijesekara subdivided my "small prepectus" into three states (Leucospidae = intermediate, elongate, ventromedially narrow; Chalcididae = small, not elongate, ventromedially narrow, or reduced to a thin sclerite and difficult to see) that pertained to Chalcididae + Leucospidae. Gibson et al. (1999) felt the state seen in Leucospidae was an intermediate state between the plesiomorphic condition and the reduced states seen in Chalcididae; thus the difference between the two is obscure.

240. Pronotum ventrolaterally: 0 = not overlapping prepectus; 1 = overlapping prepectus, obscuring ven-



trolateral region of prepectus. $R[JWK03:21]

241. Size and shape of the prepectus: 0 = large and triangular sclerite, ventromedially broad, exposed portion greater than twice the length of tegula; 1 = intermediate size sclerite, more than 2X as long as broad, ventromedially narrow; 2 = small, less than 2X as long as broad, ventromedially narrow; 3 = reduced to a thin sclerite, difficult to see externally. $R[GW97:13, MG00:19]

242. Size and position of free prepectus relative to pronotum: 0 = small, within ventral half; 1 = extending almost entire height of pronotum; 2 = small, within dorsal half. $R[GG99:12 with modified wording]

243. Prepectus orientation and shape of surface: 0 = angled, associated with mesepisternum (Fig.); 1 = shoulder-like (Philomidinae); 2 = closely associated with pronotum and in the same plane (Fig.). $R[JHun:48]

244. Association between prepectus and ventral half of pronotum: 0 = loosely associated; 1 = closely associated; 2 = fused. Ordered 012.

245. Prepectus: 0 = flat or fused with pronotum (Encyrtidae, most Eupelminae, Eucharitidae); 1 = bulbous and protruding lateral to pronotum (Tanaostigmatidae). $R[G&H93:32] Need to recode to prepectal strut character?

246. Position of prepectus: 0 = removed from mesoscutum; 1 = at least dorsally adjacent to the mesoscutum (Chalcidoidea). [Prepectus concealed in Rotoitidae]. $R[GH&W99:5]

247. Length of ventral prepectus: 0 = as long as lateral prepectus; 1 = at least 1/2 shorter. $R[JWK03:19] ??????context??

248. Ventroposterior margin of prepectus: 0 = distinctly separated medially and laterally from mesepisternum; 1 = ventral margin partially or completely fused medially with episternum; 2 = fused ventrolaterally but not medially to mesepisternum. $R[JWK03:20]

249. Prepectus ventrally: 0 = externally connected; 1 = no external connection visible (Fig.). $R[JHun:47 with modified wording]
Akapala is the only taxon within this group in which the prepectus does not reach the ventral margin of the mesosoma laterally. It is connected internally along the ventral margin; in all other taxa, there is at least a very narrow band of cuticle visible externally. Chrysolampinae have the prepectus closely associated with the mesepimeron and broadly separated from the pronotum by a wedge-shaped gap along most of its anterior length. Also, the lateral plane of the prepectus aligns with the mesepimeron and not with the pronotum. This form of the prepectus is typical for Pteromalinae (Fig.) and Torymidae (Fig.) and is presumed to be plesiomorphic.249.

250. Prospiracular apodeme: 0 = absent; 1 = present (Fig.). [JHun:50]
A sclerotized rod extends internally from the anterodorsal margin of the prepectus, behind the trachea of the prospiracle, and into the mesosoma, where it connects to the first phragma laterally. This is a unique feature known only in Perilampinae.

251. Setation of lateral lobe of prepectus: 0 = bare; 1 = setose.

252. Structure of lateral lobe of prepectus: 0 = flat; 1 = medially foveate, with posterior and/or dorsal

flange (most pteromalid groups and eulophids).

Mesoscutum

253. Shape of lateral lobes of mesoscutum in dorsal view: 0 = broadly triangular; 1 = narrowly triangular; 2 = sublinear. *R[MG87:29]

254. Shape of lateral lobes of mesoscutum in dorsal view: 0 = broadly triangular or quadrate; 1 = sublinear medially, extending posteriorly as scapular flange (aphelinid-tetrastichine type). Not same as above. Correlation with anterior projection of the axilla, but not necessarily vice versa.

255. Setation of lateral lobe of mesoscutum: 0 = bare or evenly setose, without stout bristles; 1 = with (one to three) stout bristles.

256. Number of setae on side lobe of mesoscutum: 0 = three or four setae, rarely with more; 1 = two setae; 2 = one seta. Ordered 012? *R[JWK03:23]

257. Parascutal carina: 0 = present; 1 = absent. Or other definition?

258. Dorsal extension of preaxilla: 0 = absent, preaxilla broadly separated from dorsum; 1 = present, extending medially.

259. Shape of mesoscutum: 0 = 'normal'; 1 = shoulder-like on either side of the pronotum (Calosotinae). [GH&W99:145]

260. Completeness of notauli: 0 = complete (Euderinae); 1 = incomplete or absent. *R[modified from GH&W99:126, GW97:11, GG85:2, EG95:16, MG00:26]
The presence of notauli appears to be a symplesiomorphy within Chalcidoidea (Schauff 1984; Gibson 1985, 1989; LaSalle 1987; Grissell 1995). The notaulus was coded as present when distinct grooves were visible. Faint grooves were typically only visible at certain angles and/or under indirect illumination or were indicated by a linear arrangement of dorsal sculpturing of the mesosoma.

261. Definition of notauli: 0 = foveate; 1 = sulcate; 2 = not defined, notauli absent.

262. Notauli orientation: 0 = oblique and converging posteriorly; 1 = parallel to midline and complete.
If not apparent externally, then the orientation can be traced by the internal phragmata. *R[JHun:36]

263. Shape of notauli: 0 = straight; 1 = sinuous. *R[GH&W99:124]

264. Distinctness of notauli: 0 = deep; 1 = shallow; 2 = erased. *R[GH&W99:125]

265. Separation of notauli at transscutal articulation: 0 = widely separated; 1 = V-shaped and meeting at or anterior to transscutal articulation (most Eupelmidae, Tanaostigmatidae). *R[G&H93:35, EG95:17]

266. Position of parapsidal lines: 0 = mid to posteriorly; 1 = anteriorly (Calosotinae). *R[GH&W99:146]

267. Parapsidal lines: 0 = absent, or present as line or ridge directed anteriorly from transscutal articulation, but not continuous to anterior egde of mesoscutum; 1 = as continuous line or ridge between transscutal articulation and anterior edge of mesoscutum; 2 = as line near anterior edge of mesoscu-

tum lateral to each notaulus. [GG89:14]

268. Median line of mesoscutal mid lobe: 0 = absent; 1 = present, with at least some trace of a median longitudinal line. *R[MG87:26, JWK03:37]

269. Mesoscutal ridge: 0 = absent; 1 = present.
Associated with the absence of a first phragma, the mesoscutal ridge is a pronounced internal carina along the anterior margin of the mesoscutum (Heraty 1990). *R[JHun:35] Move to internal section.

270. Transscutal articulation (TSA): 0 = present; 1 = absent. *R[JHun:37]
This is a unique feature in Eucharitidae of two orasemines (*Timioderus* and *Indosema*) and one undescribed genus of Eucharitini.

271. Scutoscutellar sulcus (SSS): 0 = oblique and converging to TSA medially (Fig.); 1 = transverse (Fig.). *R[JHun:38]
In *Akapala* and some Eucharitinae (i.e. *Kapala*), the transverse SSS is also correlated with an internal vertical phragma that divides the upper region of the mesosoma, whereas in other Eucharitini with a transverse SSS the phragmata form ridges but are not so well developed (Heraty 1990). Where the SSS is oblique, internally there is an invagination but no distinct phragma. Move to scutellar section

272. Large piliferous punctures of mesoscutum: 0 = absent; 1 = present. *R[MG87:27]

273. Setae on mesoscutal mid lobe: 0 = with setae scattered irregularly over the surface; 1 = setae reduced to a few rows on each side; 2 = reduced to one row on each side; 3 = reduced to a single seta on each side; 4 = with two types of setae (2). *R[MG87:28, GH&W99:118, JWK03:22]

274. Stout setae (bristles) on mesoscutal mid lobe: 0 = absent; 1 = present.

275. Mesoscutum and scutellar-axillar complex: 0 = abutting; 1 = connected by membrane medially (Tanaostigmatidae, Encyrtidae). [GH&W99:182]

276. Mesonotal ariticulatory structure: 0 = mesoscutum and scutellar-axillar complex articulated along transscutal articulation, with edges of sclerites contiguous when mesonotum flexed; 1 = mesoscutum and scutellar-axillar complex articulated only laterally, with edges of sclerites separated when mesonotum flexed. [GG89:8]

277. Length of mesoscutum relative to scutellum: 0 = mesoscutum longer; 1 = mesoscutum distinctly shorter (Cerocephalinae). [RBun:8]

Scutellar-axillar complex

278. Parascutal and axillar carinae: 0 = separated at transscutal articulation; 1 = meeting at transscutal articulation (Chalcididae); 2 = meeting before transscutal articulation. [GH&W99:72, GW97:18, MG00:30]

279. Scutellum: 0 = undivided; 1 = subdivided into anterior scutellum and large posterior scutellum (Mymaridae). [GH&W99:39]

280. Shape of scutellum plus axillae: 0 = at least as long as wide and axilla usually distinctly delineated

from scutellum; 1 = narrowly transverse-rectangular (belt-like), and axilla at most obscurely delineated (Signiphoridae). [G&H93:26]

281. Shape of scutellum: 0 = shield-like or teardrop-shaped; 1 = distinctly quadrate - widely truncate along transscutal articulation and with subparallel or incurved axillular grooves and transverse frenal groove (some Sycophaginae). [G&H93:71]

282. Scutellum shape: 0 = ovate and broader than long: 1 = ovate and longer than broad; 2 = pentagonal or hexagonal; 3 = heptagonal. Ordering? *R[JWK03:34]

283. Projection of scutellum extending over metasoma: 0 = absent; 1 = present, but only as posteriorly narrowed lobe (Perilampidae); 2 = present, as a long, wide bilobed projection (Akapalinae). *R[G&H93:62]

284. Posterior margin of the scutellum: 0 = not distinctly carinate posteriorly (Fig. 181); 1 = distinctly carinate posteriorly (Figs. 37, 39); 2 = spiniform projection posteriorly (Fig. 43) (0.59, 0.46). [MG00:20; R: apical rim important?]
A scutellum lacking an apical production is variously rounded, with a vague blunt edge or otherwise acarinate. A carinate scutellum might be blunt, where the carina is slightly thickened and/or lacking a sharp edge apically, or fine in which a sharp apex is present. A produced scutellum has either a carina or spiniform process apically. The spiniform process is found in *Heimbra bicolor* Subba Rao and *H. opaea* (Ashmead). It is not unique to Heimbrinae, however. It is also seen in *Conoaxima* (Eurytominae) in this analysis, although the different processes might not be homologous. This character is homoplasious across Eurytomidae and Chalcididae in this analysis. All outgroup taxa possess state 1.

285. Marginal rim of scutellum: 0 = not foveolate; 1 = with foveolate sulcus. Same as above?

286. Size of scutellum: 0 = 'normal'; 1 = enlarged (Promuscidea, Eunotiscus, Eunotinae). *R[GH&W99:67]

287. Submedian lines of scutellum (not axillular grooves): 0 = present; 1 = obsolescent or absent. [MG87:31]

288. Shape of submedian lines of scutellum: 0 = narrow and relatively shallow, not or only weakly transcostate; 1 = broad, deep, and transversely costate. *R[MG87:32]

289. Submedian grooves of the scutellum: 0 = present ; 1 = absent (Euderinae). *R[GH&W99:123]

290. Scutellar setation: 0 = none; 1 = 1 pair; 2 = 2 pairs, or occasionally 3 setae on one or both sides in aberrations; 3 = 4 or more pairs of setae; 4 = supplementary small setae in addition to the usual ones; 5 = irregularly distributed setae. Ordered? *R[MG87:33, GH&W99:115, JWK03:25]

291. Medial bristles on scutellar disc: 0 = absent, at most with fine cetacean; 1 = one pair; 2 = two pairs; 3 = more than two pairs.

292. Posterior scutellar bristles: 0 = absent; 1 = present, at posterior margin of scutellum; 2 = present, at posterior margin of scutellar disc, in frenal line. Homology uncertain.

293. Relative position of anterior and posterior scutellar setae: 0 = anterior pair farther apart than posteri-

or pair; 1 = anterior pair parallel to posterior pair; 2 = posterior pair lateral to anterior pair. Ordered 012? *R[JWK03:38]

294. Large piliferous punctures of scutellum: 0 = absent; 1 = present. *R[MG87:34]

295. Scutellar base: 0 = scutellum with anterior margin variably broadly truncate along posterior margin of mesoscutum between axillulae; 1 = scutellum anteriorly convergent to angle between axillae. [GG03:24]

296. Scutoscutellar sulcus: 0 = broadly separated at transscutal articulation (TSA); 1 = meeting at TSA; 2 = connecting posterior to TSA (transverse).

297. Dorsellar keel of scutellum: 0 = absent; 1 = present (Elasminae, *Euryischia*). *R[GH&W99:88]

298. Marginal rim of scutellum: 0 = posterior margin of scutellum not differentiated by evident band of aligned crenulae; 1 = posterior or posterolateral margin of scutellum with a flat or down-curved marginal rim differentiated by a relatively obscure band of aligned crenulae; 2 = posterior margin of scutellum with distinct band of aligned crenulae differentiating a reflexed or extensive marginal rim; 3 = scutellum with carina delineating posterior smooth region on scutellum, but furrow differentiated by posterior continuation of axillular carina. [GG03:23]

299. Scutellum without lateral glabrate area (-); scutellum with lateral glabrate area (+). [LS87:12]

300. Placoid sensilla of the scutellar disc: 0 = absent; 1 = present as a pair.

Axillae

301. Axillae: 0 = differentiated by axillar grooves; 1 = distinct but not differentiated by axillar grooves; 2 = externally absent (Signiphoridae). Ordered 012. [GH&W99:168] Does it matter if the grooves are foveolate or a linear sulcus?

302. Transscutal articulation between axillae and scapular flange: 0 = present; 1 = obliterated.

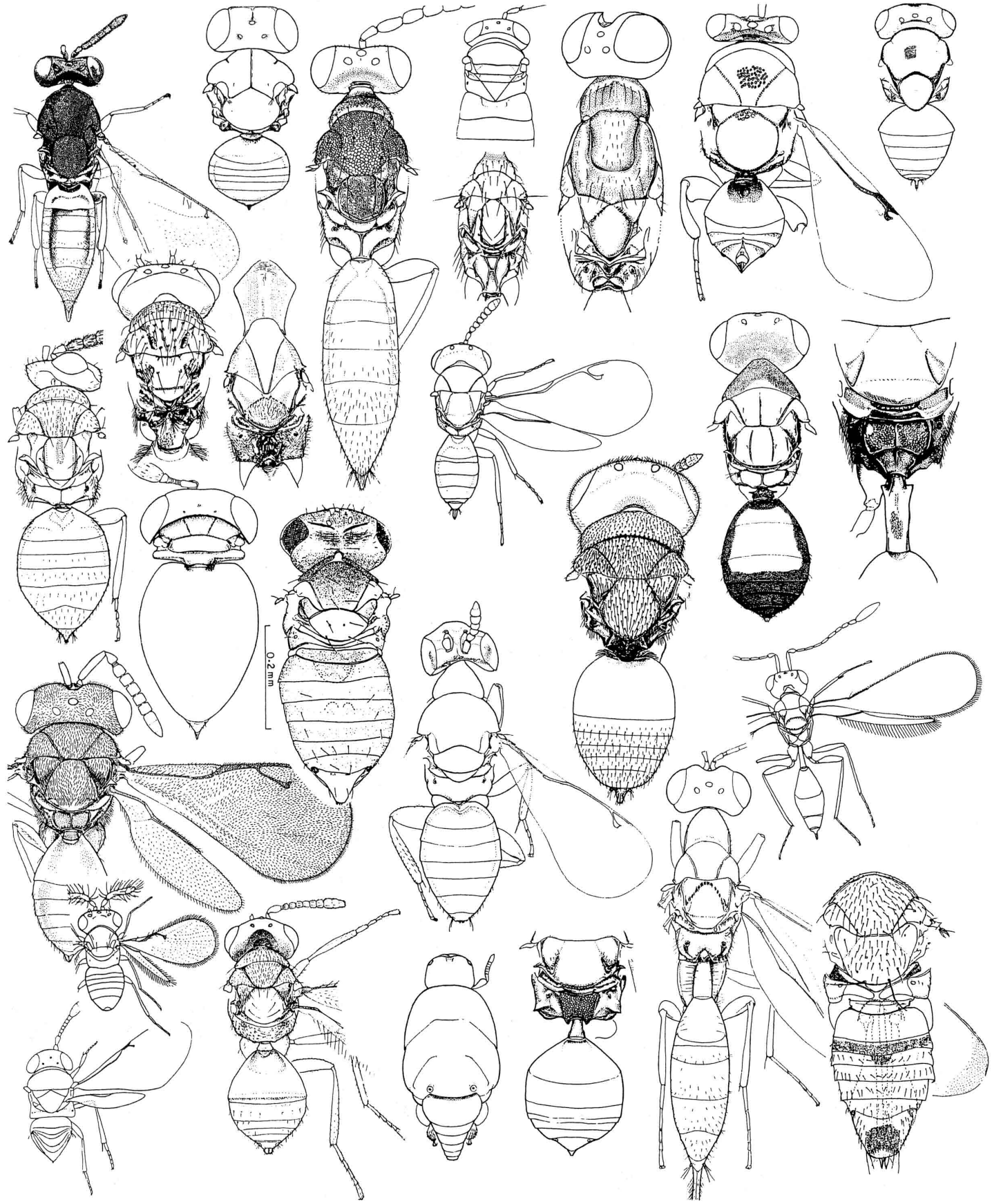
303. Axillae: 0 = dorsal surface of axillae conspicuously declined relative to plane of scutellum, with anteromedial angles contiguous to widely separated; 1 = dorsal surfaces of axillae primarily in same realtively horizontal plane as scutellum, with anteromedial edges contiguous and each axilla either elongate-subtriangular (1a), or tansverse-subtriangular (1b); 2 = dorsal surface of axillae primarily in same relatively horizontal plane as scutellum, with anteromedial angles distinctly separated and each scutoscutellar suture straight to slightly outcurved relative to scutellum (2a), or incurved relative to scutellum (2b). [GG89:11]

304. Differentiated dorsal axillar surfaces: 0 = present; 1 = absent (Mymarommatidae). [GH&W99:36]

305. Shape of axillae: 0 = equilateral to triangular; 1 = subquadrangular to transverse-rectangular (Encyrtidae, Rotoitidae, some Mymaridae). [GH&W99:171]

306. Axillar width to length: 0 = axilla width 1.0X-1.8X as wide as long; 1 = 0.50-0.95X. *R[JWK03:33]

307. Axillar width relative to inter-axillar distance: 0 = 0.7X shorter than the inter-axillar distance; 1 = 0.45-0.5X; 2 = 0.3-0.4X. Ordered 012? [JWK03:31]


0·2 mm

308. Axillae: 0 = separated or with anteromedial angles just touching; 1 = distinctly joined medially (Eucharitidae, Philomidinae). $R[G&H93:56]

309. Position of axilla: 0 = not advanced; 1 = slightly, but distinctly advanced; 2 = anterior margin advanced by more than one third length of side lobe of mesoscutum. Ordered 012? [JWK03:32, RBun:2, GH&W99:130]

310. Number of bristles on axilla: 0 = absent, but may have fine setation; 1 = one; 2 = two; 3 = more than two. *R[modified wording JWK03:24] Can we break this into positionally homologous bristles?

Axillulae

311. Axillula: 0 = dorsal limit indistinct, not delimited by carina or distinct sulcus; 1 = dorsal limit defined by a longitudinal carina, which may or may not be evident as the ventral or outer margin of a crenulate sulcus; 2 = dorsal limit defined by definite sulcus, but with neither side of furrow carinately margined. ?*R[GG03:25, JHun:39, GW97:19] Should this be changed to simply dorsally bordered or not?

312. Longitudinal or slightly concave axillular grooves: 0 = absent; 1 = present (Sycophaginae, Agaoninae, Colotrechninae). [GH&W99:58]

313. Size of axillulae: 0 = 'normal'; 1 = enlarged, axillular grooves visible dorsally. [RBun:27]

314. Axillula sculpture: 0 = broadly rounded and sculpture not differentiated from dorsum; 1 = flat, smooth and distinct from dorsal sculpture (Fig.). *R[JHun:40]
If the axillular sulcus is absent and the sculpture is similar to the dorsum, state 0 is assumed.

Frenum

315. Frenal area of the scutellum: 0 = not marked by a carina; 1 = marked by a faint carina or margins foveolate; 2 = distinctly marked by a carina. $R*[GW97:20, JHun:41, G&H93:68, EG95:15, GH&W99:74]
The derived state is peculiar to Perilampinae and is coupled with one or two transverse crenulate grooves posterior to the carina on the frenum. In Eucharitinae, only *Gollumiella* has a transverse carina dorsally along the frenal margin, but the structure is unique (Heraty 1993), and not included in this analysis.

316. Frenal area of scutellum as defined by the position of the frenal arm: 0 = absent, ?merged with marginal rim of scutellum; 1 = present, indicated by frenal arm but not dorsally differentiated; 2 = present, anteriorly delineated by some change of sculpture. Need to assess mymarids for presence/absence of a frenal arm/frenum.

317. Scutellar frenum: 0 = scutellum with about posterior quarter to third differentiated as frenum by variably distinct line of punctures dorsally between frenal arms (????); 1 = scutellum without frenal line connecting frenal arms, but with about posterior quarter to third differentiated as bare frenal area by posterolateral seta at level of each frenal arm; 2 = scutellum without distinct frenal line or frenal area, the shiny frenal arm or posteriormost seta(e) very near posterior margin of scutellum; 3 = scutellum without evident frenal line or frenum, but with posterodorsally faced bandlike region apically, the region bare and smooth or finely sculptured; 4 = scutellum without evident frenum or frenal area and setose apparently to posterior margin, but with vertical or ventrally angled, variably sculptured bare region below posterior margin (Eurytomidae). $R[GG03:22]

318. Frenum orientation: 0 = posterior to frenal line and visible in dorsal view (Fig.) or absent; 1 = reflexed (Fig.). *R[JHun:43]
In Perilampinae, the frenum is reflexed under the carinate frenal line.

319. Frenal bristles in frenal groove: 0 = none; 1 = one pair (Coelocybinae); 2 = 2 pairs. $R[RBun:26]

Mesopectus

320. Shape of mesopleuron: 0 = evenly convex and cushion-like for entire, or almost entire, region between prepectus and propodeum (mesopleuron longer than high); 1 = not evenly convex, usually more or less subdivided by oblique depression or groove, except often for a small differentiated area ventral to tegula (mesopleuron usually higher than long), (Encyrtidae, some Aphelinidae, most Eupelminae and Tanaostigmatidae). $R[G&H93:28, JWK03:30] Check Gibson -97.

321. Acropleuron shape/size: 0 = small, located below tegula; 1 = large, expanded at least half-way across mesopleuron.

322. Division of mesopleuron (posterior margin of femoral depression = pleural sulcus): 0 = not divided by any particular sculpture or change in elevation; 1 = defined by broad depression/change in sculpture (foveate groove, broad depression, change in elevation at upper mesepimeron); 2 = divided by a narrow, longitudinal sulcus without change in elevation. $R[RBun:1]

323. Mesopleural suture: 0 = acropleuron as small subalar region (at most as large as mesepimeron) with upper mesepisternum + mesepimeron conspicuously the largest part of mesopleuron in lateral view; 1 = acropleuron conspicuously the largest part of mesopleuron in lateral view, but not extended to metapleuron or mesocoxa; 2 = acropleuron extended to metapleuron dorsally, but with mesepimeron between acropleuron and mesocoxa, either as flat region ventral to and below convex plane of acropleuron (2a), or as convex region at posteroventral apex of and in same plane as acropleuron (2b); 3 = acropleuron extended to metapleuron and mesocoxa, without visible mesepimeron. [GG89:3]

324. Femoral depression of mesopleuron: 0 = absent; 1 = present. *R[G&H93:94]
Same as previous character??

325. Sculpture of femoral depression on mesopleuron: 0 = distinctly reticulate or punctate (some Pteromalidae); 1 = coriaceous or minutely reticulate (Eupelminae). *R[G&H93:93]

326. Orientation of the area between anterior margin of the femoral depression and epicnemial carina in relation to sagittal plane: 0 = parallel; 1 = perpendicular. [GW97:17] Angle of mesepisternum anterior to femoral depression, level with mesopleuron or at angle with rest of mesopleuron.

327. Conspicuous pits on mesopleuron: 0 = absent; 1 = one; 2 = more. $R[RBun:19]

Mesepimeron

328. Setal pattern of upper mesepimeron: 0 = entirely bare; 1 = partly to entirely setose, at least with some setae in subalar pit. [GG03:29]

329. Setal pattern of lower mesepimeron: 0 = entirely bare; 1 = with setae along posterior margin; 2 = with few scattered setae; 3 = entirely setose. [GG03:30]

330. Posterior margin of upper mesepimeron: 0 = straight; 1 = with distinct notch in margin (=spiracle?).

[JHun:96]

331. Mesepimeral-metapleural junction (MMJ): 0 = absent (Fig. 40); 1 = present (Fig. 42)(1.00, 1.00). $R[MG00:22]
This character only occurs in Rileyinae as a synapomorphy of *Rileya+Platyrileya*. The mesepimeron is grooved posteroventrally to receive the anteroventrally-produced process of the metapleuron, which fit together in a "tongue-in-groove" manner (Fig. 42). Typically, striae radiate dorsally from this junction. Taxa lacking a MMJ usually have only the mesepimeron and metapleuron appressed against one another without any type of intervening production or gap (Fig. 40).

Mesothoracic spiracles

332. Mesothoracic spiracle: 0 = concealed; 1 = exposed (Leucospidae). $R[GH&W99:155]

333. Position of mesothoracic spiracle relative to mesoscutum: 0 = below and separate from exposed lateral edge of mesoscutum; 1 = at exposed lateral edge of mesoscutum. $R[GG86:11, GH&W99:3, GG99:9]

334. Spiracle relative to pronotal cuticle in taxa without a free prepectus: 0 = with pronotal lobe below spiracle; 1 = surrounded by pronotal cuticle (Eucharitini); 2 = between pronotum and mesepisternum, without pronotal cuticle below or surrounding spiracle. $R[GG99:13, GH&W99:112, GW97:14]

Tegula, wing process and subalar area (acropleuron)

335. Mesopleural wing process: 0 = partly exposed (see Wijesekara 1997; Fig. 25); 1 = covered by tegula (Fig. 43) (0.0, 0.5).
The mesopleural wing process is a dorsal production of the mesopleuron that functions as a support for the fore wing. Usually, the process is at least partly exposed. [MG00:23, GW97:15]

336. Size of tegula: 0 = not conspicuously large, only about as long as distance between pronotum and base of tegula; 1 = conspicuously large, often at least twice as long as distance between pronotum and base of tegula (most Chalcididae). $R[G&H93:11]

337. Relative size and shape of the tegula: 0 = not expanded, second axilla of the wing joint completely exposed; 1 = both ventrally and posteriorly expanded, oval, second axilla completely covered; 2 = ventrally expanded, second axilla of the wing exposed; 3 = reduced, second axilla exposed and enlarged. $R?[GW97:16]
Same as previous character

338. Basalare: 0 = large; 1 = small (Chalcidoidea). [GG99:8]

339. Acropleural border: 0 = not ventroposteriorly defined by a sulcus; 1 = ventroposteriorly completely circumscribed by a sulcus.

340. Number of setae on tegula: Note number as well as size and position.

Mesepisternum/mesosternum

341. Shape of mesepisternum: 0 = less rounded; 1 = broadly rounded (Oraseminae). [GH&W99:102]

342. Mesosternum, just in front of trochantinal lobes: 0 = convex; 1 = flat or nearly so. *R[MG87:43]

343. Mesosternum, just in front of trochantinal lobes: 0 = flat or rounded; 1 = sett of by a strong transverse carina.

344. Mesosternum, mesosulcus/discrimen (median longitudinal groove): 0 = distinct; 1 = obsolescent. *R[MG87:44]

345. Mesepisternum precoxal suture: 0 = absent; 1 = more or less indicated. [MG87:45] Needs definition.

346. Membranous region anterior to each mesocoxa: 0 = absent; 1 = present (Eupelmidae). $R[GH&W99:139]

347. Orientation of the mesepisternal area between the epicnemial carina and the femoral depression: 0 = horizontal?; 1 = perpendicular to the sagittal plane (Leucospidae, Eurytomidae). [GH&W99:158] Included above.

348. Anterior mesofurcal pit: 0 = absent; 1 = present (Calesinae).

349. Transepisternal sulcus (TSS): 0 = present; 1 = absent.

350. Epicoxal pad (papillate intercoxal membrane): 0 = absent, concealed; 1 = present, single continuous area; 2 = present, divided into two pads. [JWK03:29]

Metanotum

351. Metanotum: 0 = entire; 1 = divided medially by a suture.

352. Dorsellum: 0 = present; 1 = absent.

353. Dorsellum: 0 = undivided; 1 = divided medially by a longitudinal groove or ridge. *R[MG87:35] Needs better definition?

354. Relative length of metanotum to propodeum: 0 = propodeum less than 0.8X as long as metanotum; 1 = 1.0X-1.3X; 2 = 1.5X-2.9X; 3 = 3.1X-4.8X; 4 = more than 5X; 5 = metanotum absent. Ordered 012345? [JWK03:26]

355. Protrusion of metanotum: 0 = not protruding as horizontal triangular plate posterior to scutellum; 1 = protruding posterior to scutellum as flat, horizontal, often translucent or light-colored triangular plate (Elasminae, some Eriaporinae). *R[G&H93:41]

356. Metanotum with a hyaline, triangular, dorsellar lamella that extends over the propodeum and that has a partial or complete medioventral keel: 0 = absent; 1 = present (Elasminae). *R[GH&W99:79]

357. Posterior margin of metanotum: 0 = transverse or broadly rounded; 1 = with acute median projection. [JWK03:27]

358. Metapostnotum: 0 = present as a transverse rectangular plate; 1 = present as a narrow transverse strip; 2 = present as an extremely narrow strip; 3 = extremely reduced, sclerotically fused with the anterior margin of the propodeum; 4 = absent, no remnants fused with propodeum. [MS86:1]

359. Metanotal (posterolateral) flange: 0 = present; 1 = absent. Need to consider whether or not the flange is overlapping or not?

Metapectal-propodeal complex

360. Shape of metapleuron: 0 = quadrate to rectangular, dorsal margin transverse below base of hind wing

(Apocryptini, some Otitesellinae, Agaonidae); 1 = subtriangular, angulate below base of hind wing (some Torymidae and most Pteromalidae). $R[G&H93:75, G&H93:87, GH&W99:47]

361. Metapleural margin: 0 = front margin of metapleuron straight; 1 = front margin of metapleuron produced into mesepimeron; 2 = anterior margin of metapleuron essentially straight, posterior margin of mesepimeron sinuate and raised above the anterior margin of the metapleuron which lies partially hidden underneath. Ordered 0 - 2, 1. [EG95:21]

362. Metepimeral supracoxal flange: 0 = absent; 1 = extending over hind coxa (Fig.). A complete flange along the entire ventral margin is similar to the propodeal flange (character 40) and covers the base of the hind coxa laterally. R[JHun:46]

363. Carina between metacoxae: 0 = absent; 1 = single median carina present; 2 = two submedian carinae present; 3 = two carinae connecting the anterior edge of the metacoxal insertion with nucha, two transverse carinae connect longitudinal carinae (0.62, 0.57). $R?[MG00:24]
Most taxa in this study possessed states 0 or 1, but the Aximini (*Axima. Conoaxima, Aximopsis*) and *Bephratelloides* (all Eurytominae) have state 2. Acanthochalcis is autapomorphic for state 3. This character is homoplastic but might have potential as more taxa of Eurytominae are sampled.

364. Position of metafurcal pits: 0 = posteriorly on the mesosternum; 1 = medially into the metasternum (Aphelinidae (excluding Eriaporinae) and Signiphoridae). $R[GH&W99:66]

365. Number of metafurcal pits: 1 = one; 2 = two.

366. Mesotrochantinal plate and metasternum: 0 = abutting; 1 = widely separated by intercoxal membrane (Calosotinae, Eupelminae, Neanastatinae, Tanaostigmatidae, Encyrtidae); 2 = intercoxal membrane secondarily sclerotized (Aphelinidae). [GH&W99:143]

367. Metasternum: 0 = anterior edge of propodeal foramen placed either midway between anterior and posterior margins of hind-coxal foramen or slightly closer to posterior margin, laterally separated from each other by a narrow area, metasternal area a square or transverse strip from half as long (anterior to posterior) as diameter of propodeal foramen to nearly as long, no metasternal shelf present; 1 = anterior edge of propodeal foramen placed far posteriad of hind-coxal foramina, laterally separated from each other by a wide area, propodeum projecting posteriorly as a curved neck extendign well beyond the bases of the hind coxae, metasternal area much longer than diameter of propodeal foramen, short metasternal shelf above midcoxae; 2 = anterior edge of propodeal foramen placed about midway between anterior and posterior margins of hind-coxal foramina, laterally separated from each other by a narrow area, metasternal area shorter than diameter of propodeal foramen, a carina connects propodeal and hind-coxal foramina, metapleuron and metasternum not distinctly separated along anterior margin of latter, long metasternal shelf above midcoxae; 3 = anterior edge of propodeal foramen placed closer to posterio edge of hind-coxal foramina than anterior, laterally separated from each other by a relatively wide distance, metasternal area (not including narrow translucent area surrounding each hind-coxal foramen) nearly square and slightly longer than diameter of propodeal foramen, a short carina connects propodeal and hind-coxal foramina, no metasternal shelf present; 4 = forward edge of propodeal foramen placed closer to posterior edge of hind-coxal foramina than anterior (essentially touching an imaginary line drawn across the posterior edge of hind-coxal foramina), laterally separated from each other by a wide area, metasternal area between hind-coxal foramina transverse, wider than diameter of hind-coxal foramen, a short carina connects propodeal and hind-coxal foramina, metasternal shelf above midcoxae; 5 = propodeal foramen placed posteriad with respect to hind-coxal foramina (not touching an imaginarly line drawn

across the posterior edge of hind-coxal foramina), laterally separated by a wide area, metasternal area well developed and sclerotized and much longer than diameter of propodeal foramen, a lateral carina connects propodeal and hind-coxal foramina, metasternal shelf above midcoxae; 6 = forward edge of propodeal foramen placed closer to posterior edge of hind-coxal foramina than anterior, laterally scarcely separated, metasternal area narrowly longitudinal, subequal in length (anterior to posterior) to diameter of propodeal foramen, no metasternal shelf present. Ordered 0 - 6, [1 - 2], [3 - 5 - 4]. $R?[EG95:20]367.

368. Metapleural sulcus: 0 = present; 1 = absent.

369. Anterior metapleural pit: 0 = absent; 1 = present.

370. Posterior metapleural pit: 0 = absent; 1 = present.

371. Sculpture and setal pattern of metapleuron: 0 = uniformly sculptured and setose; 1 = setose and sculptured ventrally, but oviously smoother and bare dorsally; 2 = entirely bare or with only a few scattered setae, but more or less conspicuously reticulate-coriaceous; 3 = entirely bare, but with distinct meshlike pattern defined by impressed lines; 4 = entirely bare, smooth and shiny; 5 = transversely strigose ventrally and rugulose dorsally, densely setose dorsally and anterodorsally, but very sparsely setose to bare posteriorly and ventrally. [GG03:31]

Propodeum

372. Propodeum: 0 = with strong, complete median carina attached to developed nucha and dorsal margin of propodeum, carina projects from surface fo propodeum, spiracular sulcus evident and reaching (or curved towards) nucha, callus convex and setose OR as in state 2; 1 = with two distinct, parallel submedian carinae present, spiracular sulcus evident and reaching (or curved towards) nucha, callus convex and setose; 2 = with no median carina, or, if present, a weakly developed, ephemeral line not much raised above the surface of the propodeum, or several incomplete, ephemeral carinae present (the propodeal surface may be smooth or heavily reticulately sculptured), spiracular sulcus evident and reaching (or curved towards) nucha, callus convex and setose; 3 = this is essentially state 0 with some modifications such as foveae or many strong carinae paralleling the median carina; 4 = with multiple carinae irregularly placed over surface of propodeum, spiracular sulcus evident and reaching (or curved towards) nucha, callus convex and setose; 5 = with or without carinae, if present, oriented somewhat transversely across propodeum, which is somewhat elongate in the axis of the body, spiracular suclus absent or, if present, oriented to lateral corner of propodeum, callus absent (a flattened, asetose area rarely may be present); 6 = without carinae, propodeum elongated in the axis of the body and projecting posteriorly as narrowed neck, spiracular sulcus absent or, if present, oriented to lateral corner of propodeum, callus absent; 7 = propodeum structurally modified, with carinae that define faceted sections, scallops, and depressions (spiracular sulcus and callus condition unknown; 8 = without carina, propodeum elongated in axis of body, spiracular sulcus reaching to hind margin of propodeum about mid-way between nucha and lateral corner, callus evident, flattened, with setae; 9 = without carina, propodeum slightly elongated in axis of body, spiracular sulcus absent, callus absent; 10 = state 2 with posterolateral corners sharply angled. Ordered 2 - 0, 8, 3, 7, 5, 1, 4, 6, 9, 10. *R[EG95:18]

373. Propodeum: 0 = angulate in relation to scutellum, forming an angle of -90-135°; 1 = straight in relation to scutellum, forming an angle of -135-180°; 2 = anteriorly straight and steeply sloping posteriorly; 3 = medially depressed and vertical with lateral projections. *R[GW97:21, MG00:37]
The slightly larger and/or more elongate taxa (chalcidids, leucospids, Macrorileya, Archirileya) possess a roughly coplanar scutellum and propodeum. This may, in part, be due to a spatial constraint

acting on taxa with the apomorphic state (Eurytominae, Rileyinae), which attack gall formers, seed feeders, etc. (Bugbee, 1936) versus the phytophagous stem-feeding (or entomophagous species attacking elongate eggs embedded within stems) species with the plesiomorphic state.

374. Delineation of propodeal area: 0 = absent; 1 = by carinae; 2 = by fine grooves (Signiphoridae). Not ordered. *R[G&H93:25]

375. Propodeum laterally: 0 = not fused to metapleuron; 1 = partially fused to metapleuron, with posterior invagination that leads to a hole or pit along the border between these two sclerites; a second pit is present at the anterior end of the attachment of the propodeum and metapleuron. [L&al97:14]

376. Propodeum: 0 = without a medial sclerite; 1 = with a medial sclerite that lacks a posterior process; 2 = with a medial sclerite that bears a posterior process. [JW88:9]

377. Postspiracular furrow: 0 = present; 1 = absent.

378. Median logitudinal carina: 0 = present; 1 = absent.

379. Sublateral carinae: 0 = absent; 1 = present.

380. Propodeum with triangular median region delineated by lateral sulci: 0 = no; 1 = yes (Signiphoridae). *R[GH&W99:173]

381. Propodeum surface: 0 = realtively flat or evenly convex; 1 = widely depressed medially or with median longitudinal channel (Eurytomidae). *R[G&H93:67]

382. Propodeum: 0 = median area weakly sculptured to smooth; 1 = strongly reticulate; 2 = with irregular wrinkles, more or less areolate. *R[MG87:42]

383. Propodeal sculpture: 0 = completely reticulate; 1 = one or two distinct transverse costulae; 2 = carinaceous; median channel present; 3 = median, distinct complete carina present; 4 = two submedian, distinct complete carinae present; 5 = entirely carinaceous, median channel absent. *R[MG00:36]
This character is difficult to code accurately into discrete states and taxa sharing identical states in the coding might not reflect a valid homology statement implied in the data matrix. This character was excluded from the analysis pending reevaluation at a later time. It might be more useful at a lower taxonomic level.

384. Pubescence of propodeal disc: 0 = bare; 1 = setose, with setae on each side directed toward midline (some Tetracampidae and Pteromalidae). [G&H93:78]

385. Shape of propodeal spiracle : 0 = elongate (Leucospidae, Chalcididae); 1 = elliptical or kidney-shaped (Fig.); 2 = round (Fig.); 3 = round and notched dorsally to metanotal margin (Fig.); 4 = round and notched ventrally (Fig.); 5 = reduced; 6 = sunken into propodeum; 7 = lateral margin modified to a lamina which characteristically extends posteriad. *R[modified from JHun:44, GH&W99:156, GW97:22, MG00:35]
State 4 is found only in derived members of the Eucharitinae. Only the Australian rileyine *Austrophotismus* and *Rileya orchideara* (and other related species) possess a circular propodeal spiracle. In Chalcididae (Delvare 1992, Wijesekara 1997), this character has been used to assess tribal and sub familial relationships, respectively. Delvare (1992) considered elongate, transversely or obliquely oriented spiracles to be the ground plan state. State 1 only occurs in the outgroup taxa *Conura* and *Melanosmicra* in this analysis

386. Orientation of propodeal spiracle: 0 = ‘normal’, longitudinal; 1 = transverse or oblique (Leucospidae, Chalcididae). [GH&W99:157]

387. Position of propodeal spiracle: 0 = spiracle either close to hind margin of metanotum or separated from it by at most about its own diameter; 1 = separated from metanotum by 1.5-2.0 times its diameter (Ceinae). *R[MG87:37, RBun:6]

388. Propodeal spiracle: 0 = with whole rim exposed; 1 = with outer part of rim more or less covered by a raised flap of the callus. *R[MG87:36]

389. Small bump or tubercle behind spiracle on propodeum: 0 = absent; 1 = present (most larger Entedoninae). *R[GH&W99:121]

390. Seta adjacent to propodeum spiracle: 0 = unmodified; 1 = short and thick; 2 = bifurcated; 3 = leaf-like. Unordered? *R[JWK03:35]

391. Number of setae on lateral propodeum: 0 = bare; 1 = one; 2 = two; 3 = 3-4; 4 = many (pilose). *R[modified from JWK03:36]

392. Propodeal plicae: 0 = absent; 1 = with plicae indicated in hinder part; 2 = with complete plicae. *R[MG87:38]

393. Propodeal ???pliraspiracular carinae: 0 = absent; 1 = with weak paraspiracular carinae; 2 = with sharp carinae. *R[MG87:39]

394. Propodeal callus: 0 = without longitudinal crest or carinae; 1 = with longitudinal ridge or carina. *R[MG87:40]

395. Raised, longitudinal protuberance on propodeal callus: 0 = absent; 1 = present (*Promuscidea, Eunotiscus*, Eunotinae). *R[GH&W99:69]

396. Setation of propodeal callus: 0 = with 3 or more setae; 1 = with 2 setae. *R[MG87:41]

397. Propodeal supracoxal flange: 0 = absent; 1 = extending over hind coxa (Fig.). *R[JHun:45]
The flange is a distinct smooth lamina projecting from the ventral margin of the propodeum and covering the base of the hind coxa.

398. Incision in posterior margin between metapleural and propodeal flange: 0 = absent; 1 = present.

399. Length of nucha: 0 = short (most Eunotinae); 1 = distinctly elongated (some Eunotinae). *R[RBun:16]

400. Posterior margin of propodeum: 0 = transverse; 1 = with acute process medially; 2 = with rounded, triangularly elevated process medially; 3 = bi-lobed or broadly rounded. Ordering? [JWK03:28]

401. Crenulae (on propodeum): 0 = absent; 1 = present. *R[JWK03:28-2]

402. Anterior rim of propodeal disc: 0 = not differentiated; 1 = with strong marginal rim.

Wings

403. Wingedness of female: 0 = fully winged; 1 = brachypterous; 2 = apterous. Ordered 012. *R[modified from MG87:51, G&H93:4]

Fore wings

404. Wing flexion lines (with corresponding alar fenestreae): 0 = absent; 1 = present. [D&M88:1]404.

405. Wing folding: 0 = absent; 1 = present. $R[D&M88:2]

406. Fore wing shape: 0 = 'normal', triangular; 1 = spoon-shaped, stalk-like basally (Mymarommatidae); 2 = rounded/broad; 3 = wedge-shaped (Elasminae); 4 = narrow (Ceinae). *R[G&H93:18, JHun:77, GH&W99:84, RBun:5]

407. Wing axillary sclerites: not complete! $R[GH&W99:138]

408. Number of setae on humeral plate: Note actual number in matrix. Map the setae!

Venation

409. Basal vein of fore wing: 0 = present, at least as a pigmented fold (Fig.); 1 = absent (Fig.). [modified from JHun:78]

410. Discal lines of fore wing disc: 0 = present as a distinct fold (Fig.); 1 = present only as a distinct line of fine setae (Fig.); 2 = absent (Fig.). [modified from JHun:88] Needs redefinition to encompass the whole of Chalcidoidea.

411. Cubital line of fore wing disc: 0 = present as a distinct fold (Fig.); 1 = present only as a distinct line of fine setae (Fig.); 2 = absent (Fig.). [JHun:89] Needs redefinition to encompass the whole of Chalcidoidea.

412. Distinctness of wing venation: 0 = distinct; 1 = partly obliterated (Eucharitidae). *R[GH&W99:98]

413. Angle of stigmal vein to marginal vein: 0 = oblique; 1 = virtually at right angle (Epichrysomallinae, some Sycophaginae). $R[G&H93:76]

414. Stigmal vein distinctly curved, at distinctly less than a right angle to postmarginal vein (-); stigmal vein straight or only slightly curved, perpendicular or nearly so to postmarginal vein (+). [LS87:15]

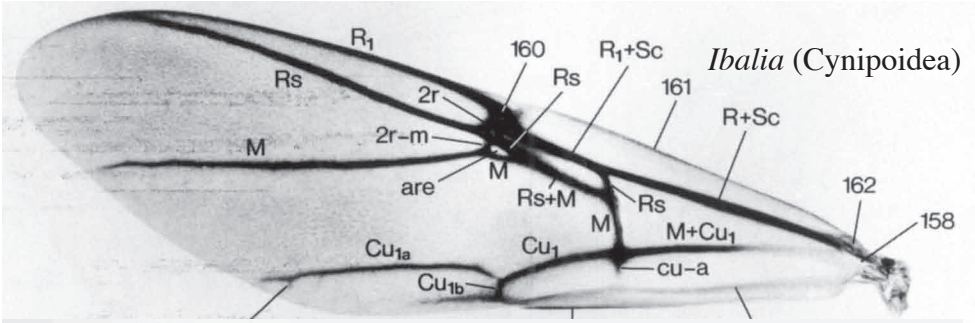
415. Thickness of marginal vein of fore wing : 0 = at most only slightly wider than submarginal vein (Fig.); 1 = more than twice width of submarginal vein (Fig.). [JHun:82]

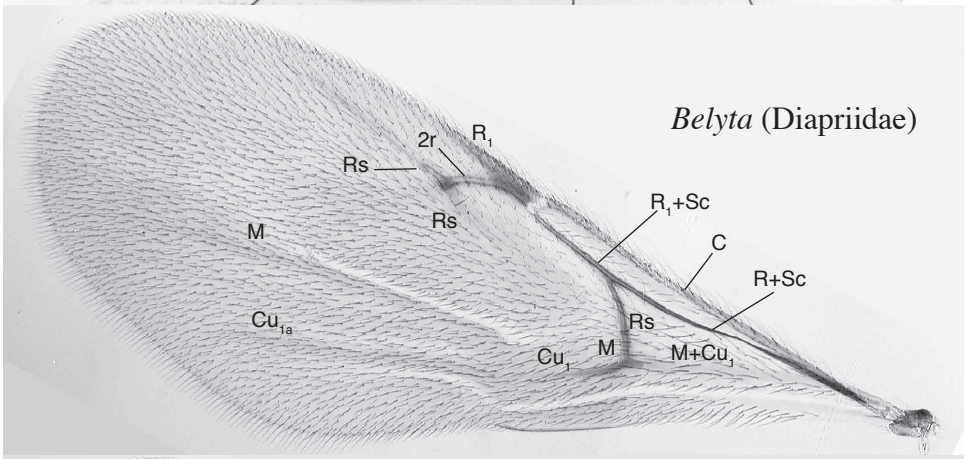
416. Marginal vein: 0 = reaching fore wing margin; 1 = narrowly separated along entire length from anterior margin. $R[JHun:93, GW97:31]

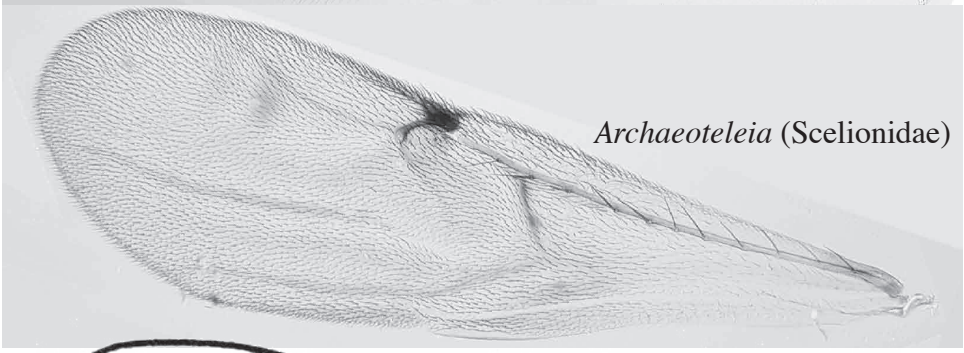
417. Parastigma with hyaline break: 0 = present; 1 = absent. [JHun:80, GH&W99:133, MG87:53]
The parastigmal area of *Chrysomalla* has a distinct light area medially.

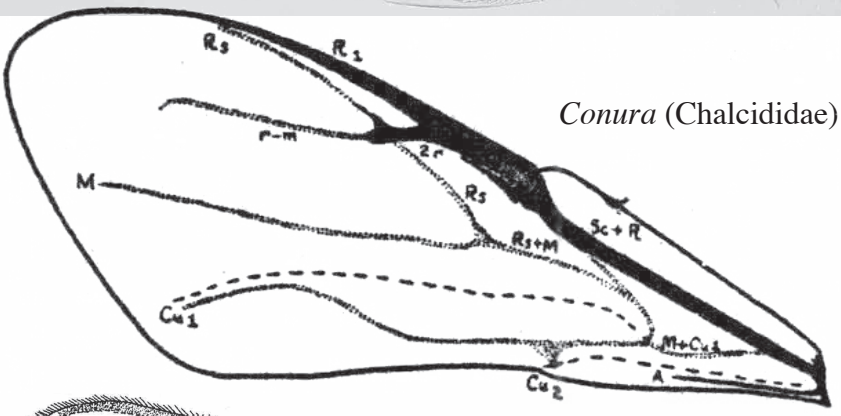
418. Joining of submarginal vein with parastigma: 0 = abrupt; 1 = smooth (Eulophinae). *R[GH&W99:131]

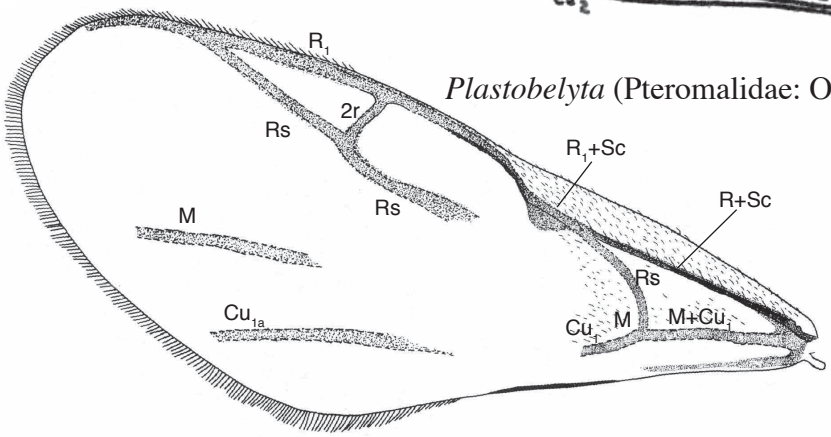
419. Alar fenestra on the last abscissa of Cu: 0 = present (Vespidae, Gasteruptiidae); 1 = absent (*Eulon-*


R1
160
R1+Sc
Ibalia (Cynipoidea)
Rs
Rs
161
2r
R+Sc
2r-m
M
M
are
Rs+M
Rs
162
M
M+Cu1
158
Cu1a
Cu1
cu-a
Cu1b


Belyta (Diapriidae)
2r
R1
Rs
Rs
R1+Sc
M
C
R+Sc
Cu1a
Rs
Cu1
M
M+Cu1


Archaeoteleia (Scelionidae)


Rs
R1
Conura (Chalcididae)
r-m
2r
M
Rs
Rs+M
Sc+R
Cu1
M+Cu1
Cu2
A


R1
Plastobelyta (Pteromalidae: Ormocerinae)
2r
Rs
R1+Sc
Rs
R+Sc
M
Rs
Cu1a
Cu1
M
M+Cu1

chopria). [D&M88:5]

The following four characters are only so vein lengths can be recorded and later used for the appropriate characters. Actual ratios are not used per se.

420. Length of costal cell (instead of submarginal vein) relative to wing length: note ratio in matrix cell or note absence/heavy reduction. [reference?]

421. Length of marginal vein relative to wing length: : note ratio in matrix cell or note absence/heavy reduction. [reference?]

422. Length of stigmal vein relative to wing length: : note ratio in matrix cell or note absence/heavy reduction. [reference?]

423. Length of postmarginal vein relative to wing length: : note ratio in matrix cell or note absence/heavy reduction. [reference?]

424. Length of fusion of Rs + M: 0 = short; 1 = considerable (Chalcididae). *R[GH&W99:77] Should be explicitly quantified.

Stigma, parastigma, pterostigma and uncus

425. Forewing pterostigma: 0 = present; 1 = absent (Chalcidoidea, Cynipoidea). [GH&W99:9]

426. Sensilla on parastigma of fore wing: 0 = 2-3 (3 rare); 1 = one sensillum; 2 = absent. [modified from JWK03:43, JHun:94]

427. Fore wing parastigma: 0 = without long, differentiated bristles; 1 = with 1-3 long bristles, with parastigma often extending spike-like behind submarginal vein (some Eriaporinae). [G&H93:80]

428. Radial process (?): 0 = not sclerotized; 1 = sclerotized (Eriaporinae).

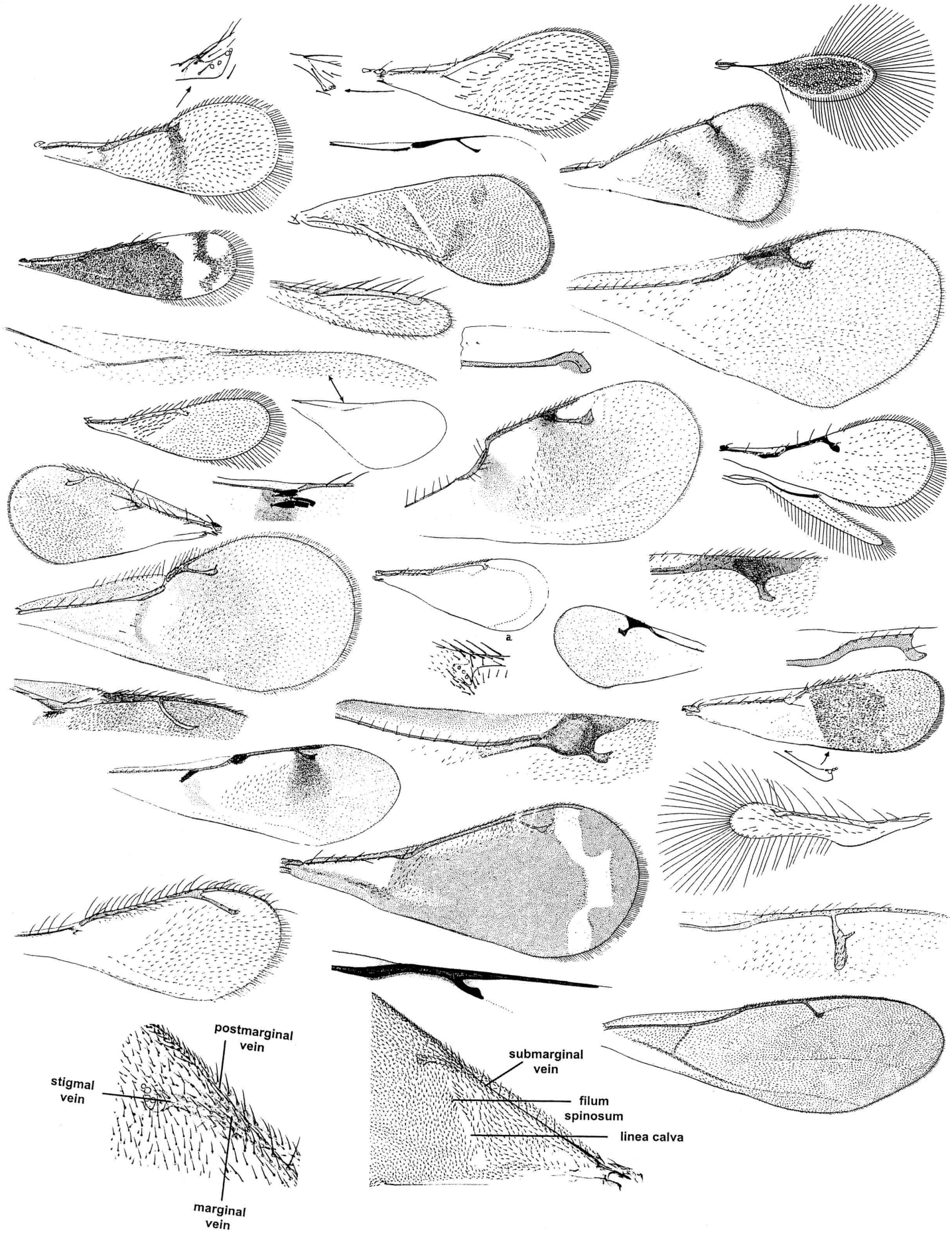
429. Stigmal sensilla: 0 = three; 1 = four; 2 = 5-6 (Fig.); 3 = numerous, more than 10 (Fig.). [modified from JHun:84, JWK03:45]
An autapomorphy of Philomidinae.

430. Distinct tuft of erect, black hairs on parastigma; 0 = absent; 1 = present (some Cerocephalinae). *R[RBun:23]

431. Tuft of black scales on parastigma: 0 = absent; 1 = present (Storeyinae). *R[RBun:43]

432. Stigma: 0 = absent; 1 = 'normally' sized, less than twice length of stigmal vein basad of stigma (Figs. 104-108, 186, 188,237); 2 = enlarged, greater than or equal to 2x length of stigmal vein basad of stigma (Megastigminae) (Figs. 163, 241, 245) (0.0, 1.00). $R[MG00:28, G&H93:63, GH&W99:186]
An enlarged stigma was hypothesized as apomorphic for Tanaostigmatidae (LaSalle, 1987) and Grissell (1995) determined this for Torymidae, based upon outgroup comparison with Pteromalidae. The enlarged stigma is autapomorphic for *Rileya megastigma* and *R. cearae*, but a slightly enlarged stigma (still within range of state 0) can be found in several species of *Rileya*. A similarly-sized stigma is also known from certain species of *Nikanoria* (Eurytominae; Zerova, 1988)

433. Arrangement of stigmal sensilla: 0 = three or four sensilla grouped in a cluster; 1 = four sensilla


a
postmarginal vein
stigmal vein
marginal vein
submarginal vein
filum spinosum
linea calva

grouped in two clusters of two and two; 2 = three or four sensilla in a line; 3 = three sensilla grouped with one distant sensillum. Ordered? [JWK03:44]

434. Stigmal line of fore wing disc: 0 = present as a distinct fold (Fig.); 1 = present only as a disinct line of fine setae (Fig.); 2 = absent (Fig.). [JHun:87] Needs redefinition to encompass the whole of Chalcidoidea.

435. Uncus line of fore wing disc: 0 = present as a distinct fold (Fig.); 1 = present only as a disinct line of fine setae (Fig.); 2 = absent (Fig.). [JHun:86] Needs redefinition to encompass the whole of Chalcidoidea.

436. Distance between apex of uncus and postmarginal vein: 0 = more than width of stigma; 1 = at most equal to width of stigma. [G&H93:82] What groupings is this referring to?

437. Uncus: 0 = present and projecting as a linear process (Fig.); 1 = absent. [JHun:85]

438. Campaniform sensilla along margin of submarginal vein: 0 = present; 1 = absent. Or maybe some feature of the sensilla if omnipresent.

Membrane, setation and pigmentation

439. Microtrichiae on forewing: 0 = present; 1 = absent. [JW88:19]

440. Basal cell without a reduced number of setae (-); basal cell with a recuced number of setae (less than 5) (+). [LS87:17]

441. Speculum open to posterior margin of wing, or separated from it by only the single line of setae representing subcubital vein (-); speculum separated from posterior margin of wing by more than the single line of setae representing subcubital vein (+). [LS87:18]

442. Membrane of fore wing: 0 = 'normal'; 1 = reticulate and cell-like pattern (Mymarommatidae, Trichogrammatidae). $R[GG86:14, GH&W99:31, G&H93:20, GH&W99:172]

443. Forewing membrane pubescence: 0 = virtually bare (Signiphoridae); 1 = sparse; 2 = dense (Elasminae). *R[GH&W99:83, G&H93:27]

444. Fore wing hypochaeta on ventral surface: 0 = absent; 1 = present (Mymaridae, and others?). [GG86:13]

445. Direction of hypochaeta of ventral surface of fore wing: 0 = other; 1 = posteriorly from near the anterior margin of the wing just in front of the marginal vein (Mymaridae). [GH&W99:160]

446. Posteriorly directed tuft of setae, on front ventral margin of the forewing, near the distal end of the costal cell: 0 = absent; 1 = present. [GW97:29]

447. Distinct setal lines on fore wing: 0 = absent; 1 = present, 4 or more longitudinal or radiating lines (Trichogrammatidae). *R[G&H93:16]

448. Fore wing with distinct lines of setae radiating from the stigma: 0 = absent; 1 = present (Euderinae). *R[GH&W99:127]

449. Marginal setae (fringe) of fore wing: 0 = absent; 1 = only apical margin ciliate; 2 = present, 'normal'

length; 3 = present, very long (Trichogrammatidae). *R[G&H93:19, JHun:79, MG87:57]

450. Number of setae on submarginal vein: 0 = none; 1 = one; 2 = two; 3 = three; 4 = six (presence among Entedoninae). *R[GH&W99:117, GH&W99:132, MG87:52] Potentially excluded due to homoplasy.

451. Seta M6 on forewing marginal vein: 0 = absent; 1 = present. [JW88:22]

452. Setae on delta area of fore wing: 0 = setose and ill-defined delta; 1 = setose and well defined; 2 = setose and somewhat bare (>30% setae); 3 = mostly bare delta (<10-20% setae). Ordered 0123? *R[JWK03:47]

453. Fore wing with a distinct row of often long admarginal setae on the lower wing surface or marginal vein: 0 = absent; 1 = present. $R[modified from GH&W99:129]

454. Linea calva: 0 = absent; 1 = present, incomplete or complete (Encyrtidae). $R[JWK03:46, N&H94:67]

455. Presence of hairless streak: 0 = fore wing without hairless streak, at most with broad glabrous band below parastigma; 1 = fore wing with hariless streak. [GG89:16]

456. Filum spinosum (a row of differentiated, thickened or peg-like setae along the apical margin of the linea calva): 0 = absent; 1 = present. $R[GH&W99:96, GH&W99:95]

457. Extensive bare discal area of fore wing: 0 = absent; 1 = present (Cerocephalinae). *R[RBun:22]

458. Fore wing with a bare area behind the marginal vein extending from the parastigma to the stigmal vein: 0 = absent; 1 = present (Euderinae). *R[GH&W99:128]

459. Pigmentation of basal vein: 0 = strong (Rotoitidae); 1 = weak. [GH&W99:170]
This is worth discussion, especially in light of the numerous times that a basal vein appears in amber chalcids.

Hind wings

460. Shape of hindwing: 0 = broad and slightly rounded; 1 = parallel-sided. [JW88:23]

461. Hind wing structure [dependent on R99: 97; V01: 184]: 0 = wing membrane extended to base of wing; 1 = wing membrane origin distally from stalk-like vein (Mymaridae); 2 = with only stalk-like vein, no membrane, apically bifurcate and haltere-like (Mymarommatidae). $R*[GG86:15, GH&W99:30, G&H93:24]

462. Number of hamuli of hind wing: Note actual number in matrix. [RBun:44]

463. Location of distal hamuli: 0 = on regular wing surface; 1 = on a well-pronounced projection (Cynipoidea, Ceraphronoidea, Platygastroidea, many Chalcidoidea and Proctotrupoidea). $R[B&Q97:p. 1569, GH&W99:23]

464. Additional erect setae opposite to distal hamuli: 0 = absent; 1 = present (Ceraphronoidea, Diapriidae, Chalcidoidea, Maamingidae). [B&Q97:E]

465. Spur vein (1r-m?) of hind wing: 0 = present (Fig.); 1 = absent (Fig.). The medial portion of the

submarginal vein [NEED TO FIND OUT NAME OF VEIN AND COMPARE TO PLACMENT IN PERILAMPINAE]. [JHun:90, GW97:32] Potentially correlated with angulate submarginal vein.

466. Hind wing vein: 0 = complete (Fig.); 1 = interrupted medially (Fig.). [JHun:91]
The vein is indistinct medially in *Akapala*. The vein is also lost in several derived genera of Eucharitinae (list genera), but this was considered as apomorphic within Eucharitinae, and thus absence is autapomorphic for Akapalinae.

467. Hind wing vein: 0 = straight; 1 = broadly curved (Calesinae).

468. Length of hind wing vein: 0 = short, not extending beyond half of wing; 1 = long, extending beyond half of wing.

469. Costal cell of hind wing: 0 = 'narrow', vein path curved toward and paralleling leading margin of wing so as to result in very slender costal cell over much of length; 1 = 'broad', vein path concave or if straight then angled to margin of wing, but resulting in borad costal cell over much of its length. [GG03:38]

470. Row of modified erect setae opposing the distal hamuli: 0 = absent; 1 = present (Ceraphronoidea, Diapriidae, Chalcidoidea, Maamingidae). $R[GH&W99:22]

471. Number of modified erect setae opposing the distal hamuli: Note actual number in matrix.

Male wing specific

472. Male fore wing marginal vein: 0 = at most only slightly longer than submarginal vein; 1 = with enlarged marginal vein, as elongate, thickened, black area that is conspicuously larger than submarginal vein (some Tetracampidae). $R[G&H93:79]472.

Legs

473. Coxal cavities: 0 = quite large and closely approximated medially (Symphyta, Evaniomorpha sensu Rasnitsyn and many aculeates); 1 = strongly constricted and displaced laterally (Ichneumonoidea, Chalcidoidea, Cynipoidea, Proctotrupoidea and several aculeates). [NJ88:6]

474. Mesal lobes: 0 = not elongate, articulation away from the rim but not far; 1 = elongate and articulate on the surface of the coxa far from the rim (Ceraphronidae, Megaspilidae, Evaniidae, Aulacidae, Trigonalidae and Gasteruptiidae). [NJ88:7]

475. Number of fore leg tarsomeres: Note actual number in matrix. $R[modified from G&H93:2, GH&W99:41]

476. Number of tarsal segments of mid tarsus compared to fore tarsus: 0 = same; 1 = one less.

477. First segment (basitarsus) of meso- and metatarsi: 0 = much shorter than second; 1 = slightly shorter than second; 2 = about equal in length to second segment; 3 = first segment of mesotarsus only about 1.5 times as long as second; 4 = much longer than second. Ordered 01234. *R[modified from MG87:50, G&H93:3] Potentially reduce to much longer vs. subequal.

478. Pro- and mesotarsal claws: 0 = simple (Fig.); 1 = pectinate (Fig.). $R[JHun:76, GH&W99:152]
The tarsal claws of Philomidinae are pectinate with at least two subapical spines, whereas they are simple or at most with a single subapical tooth in other taxa. The only exception observed among the ingroup taxa with a simple claw was *Perilampus subcarinatus* Crawford, which has two subapi-

cal spines similar to the pectinate claws of Philomidinae. Within Chalcidoidea, we know of similar strong pectinate tarsal claws only in Leucospidae.

479. Relative size of pro- and metatibia to respective femur: 0 = subequal in length; 1 = conspicuously smaller (usually half or less length of femur and subtriangular), (Agaoninae, Sycoecinae, rare Sycophaginae, Otitesellinae). *R[G&H93:44]

480. Stout spines or teeth apically on pro- and metatibia: 0 = absent; 1 = present (some Agaonidae). *R[G&H93:45]

481. Tibial[all?] spines: 0 = tibia without spines or denticles; 1 = tibia partly covered with robust spines or denticles and/or with apical comb of denticles. *R[G&H93:97]

482. Setae forming the basitarsal comb: 0 = cylindrical; 1 = distinctly flattened (Chalcidoidea). $R[GH&W99:20]

483. Corbiculae: 0 = absent (most Agaonidae); 1 = present (some Agaonidae). [GH&W99:45]

Relevance of characters 484-491 needs to be looked in to.

484 Surface texture of orbicula: 0 = sculptured primarily with scales but at least some scales usually at basal area with cuticular projections; 1 = scultpured entirely with scales; 2 = almost entirely smooth. [BQR&F00:1]

485. Conspicuously socketed sensilla trichodea A (STA) on orbicula: 0 = none; 1 = one; 2 = two; 3 = three or more. [BQR&F00:2]

486. Sensilla trichodea B (STB); 0 = none; 1 = one; 2 = two; 3 = three or more. [BQR&F00:3]

487. Sensilla trichodea B (two or more): 0 = scattered; 1 = symmetrical or forms a single row. [BQR&F004]

488. Sensilla trichodea B: 0 = simple; 1 = basally enlarged. [BQR&F00:5]

489. Sensilla trichodea B: 0 = without a basal cuticular projection; 1 = a basal cuticular projection. [BQR&F00:6]

490. Sensilla campaniformia A (with encircling ridge): 0 = none; 1 = one; 2 = two; 3 = three or more. [BQR&F00:7]

491. Position of sensilla campaniformia to sensilla trichodea A: 0 = anterior; 1 = level with or posterior. [BQR&F00:8]

Fore legs

492. Protibial spur: 0 = present; 1 = absent (some Agaoninae) *R[GH&W99:56].

493. Posterior apical spur: 0 = present and well developed; 1 = present but reduced; 2 = absent. [B&Q95: A]

494. Profemoral, preapical bristle: 0 = absent; 1 = present (i.e. *Coccobius*).

495. Length of protibial spur: 0 = relatively long; 1 = short and inconspicuous (some Tetracampidae, most Eulophidae). $R[G&H93:51]

496. Shape of anterior spur: 0 = modified; 1 = unmodified, straight and without velum or fine comb. [B&Q95:B]

497. Tip of spurs: 0 = pointed and sclerotized; 1 = blunt and with a smooth (membranous) area. [B&Q95: C]

498. Shape of protibial spur (calcar): 0 = curved (some Aphelinidae); 1 = straight (some Tetracampidae, most Eulophidae). $R[G&H93:52, B&Q95:E]

499. Stoutness of protibial spur: 0 = distinct ; 1 = needle-like (some Tetracampidae, most Eulophidae). $R[G&H93:53]

500. Apex of protibial spur: 0 = cleft; 1 = single tip. $R[G&H93:54, B&Q95:D]

501. Secondary fine comb consisting of an oblique row of socked and modified setae at the distal end of the fore tibia anteriorly: 0 = absent; 1 = present, only a few setae; 2 = present, several setae. Ordered 012. $R[B&Q95:p. 170, GH&W99:21]

502. Apical margin of the protibia: 0 = without horizontally directed stout spur or elongation; 1 = with horizontally directed stout spur; 2 = without horizontally directed spur but distinctly expanded giving the appearance of a spur. [GW97:23]

503. Dorsoapical edge of protibia: 0 = without spicules; 1 = with one or more short, stout, curved spicules; 2 = with cuticular denticle. [GG89:18]

504. Size of male protibia relative to profemur: 0 = more than half as long as profemur; 1 = less than one-half as long as conspicuously larger profemur (male Agaoninae). *R[G&H93:101, GH&W99:61]

505. Short, stout spicules along dorsoapical margin of protibia: 0 = absent; 1 = one or more present (Eupelmidae). [GH&W99:141, GG03:40, GG03:41]

506. Protibial structure: 0 = ventrally not carinate; 1 = with sinuate, ventral carinate margin over about basal half to three-quarters; 2 = with carinate margin along entire ventral length. [GG03:42]

507. Ventral denticles/spines along profemur:

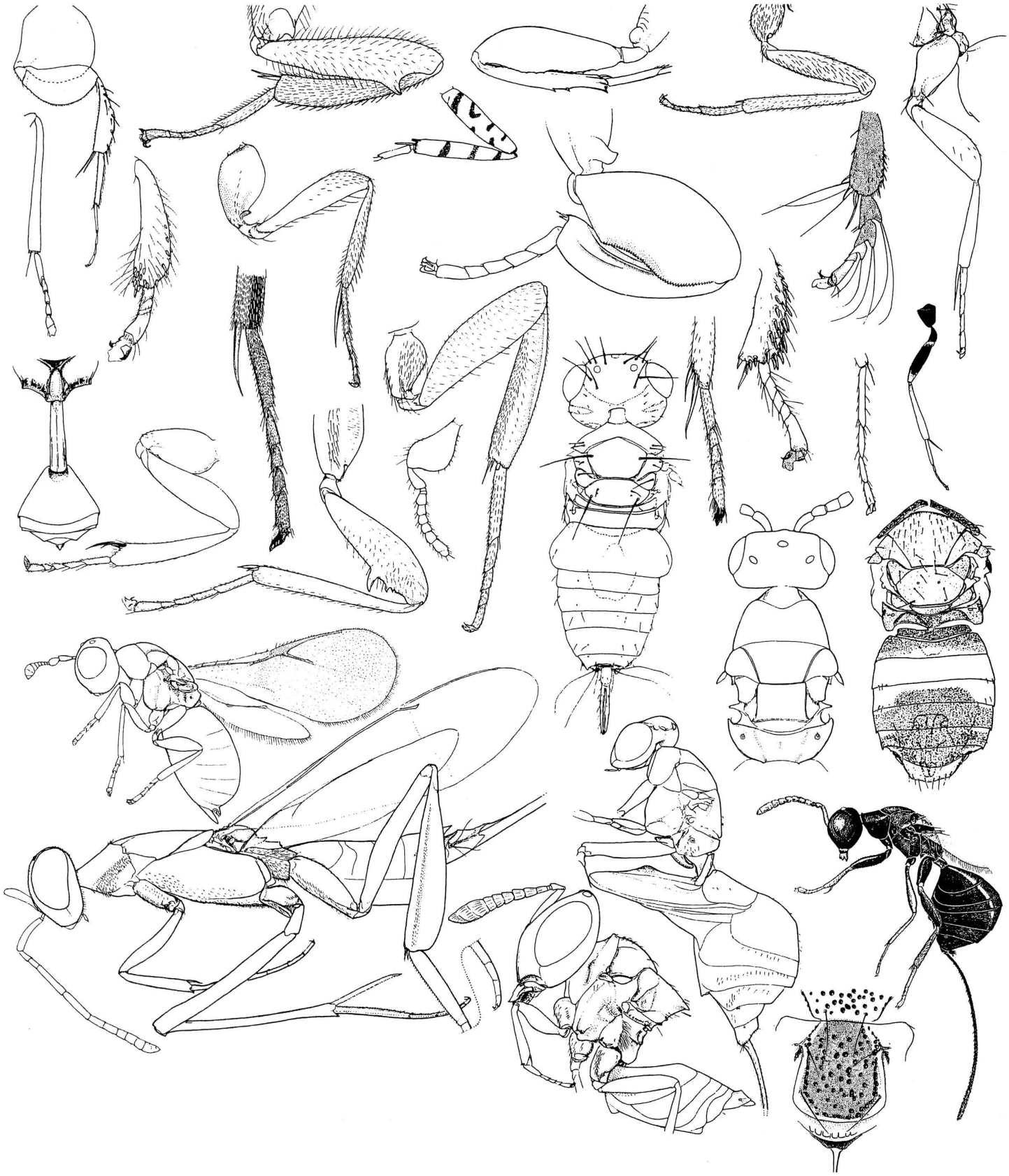
508. Procoxal dorsoapical flange: 0 = absent or indistinct; 1 = present and distinct. Needs assessment.

509. Calcar: 0 = with velum; 1 = without velum (e.g. *Elasmus, Sympiesis*). [B&Q95:F]

510. Velum (if present): 0 = smooth and with smooth rim; 1 = smooth but with serrated rim; 2 = smooth buth with a fine comb of socketed setae along edge; 3 = with a spinose or ribbed surface. [B&Q95: G]

511. Calcar: 0 = without apex; 1 = with apex. [B&Q95:H]

512. Basitarsal notch: 0 = absent; 1 = weak but distinct; 2 = well developed. [B&Q95:I]



513. Basitarsal comb: 0 = without any comb (Pseudochalcura, Orasema, Pediobius, Entedon, some trichos); 1 = with 'protocomb' of erect but well-spaced setae; 2 = with comb of closely set, fine setae; 3 = with row of plate-like structures. [B&Q95:J]

514. Basitarsus anteriorly: 0 = with one row of paddle-shaped setae; 1 = with more than one row of paddle-shaped setae; 2 = with ordinary setae; 3 = without paddle-shaped setae though sometimes with blunt or filiform setae; 4 = without setae. [B&Q95:K]

515. Shape of setae comprising the fine basitarsal comb: 0 = cylindrical; 1 = distinctly flattened. [B&Q95: p. 169]

516. Orientation of basitarsal comb: 0 = longitudinal; 1 = oblique (Signiphoridae, Encyrtidae, Aphelilnidae, Elasmini, Tetracampidae, some Eulophidae (Eulophinae), *Pteromalus luzonensis, Semiotellus, Macroneura*); 2 = nearly transverse. [B&Q95:p. 170]

Mid legs

517. Setation of trochanter and femur of male mid leg: 0 = without long outstanding setae; 1 = with a row of long outstanding setae beneath. [MG87:47]

518. Lateral articulation and subdivision of mesocoxa: 0 = two points of articulation nearly on the same level and the coxa divided transversely (most others); 1 = coxa subdivided by a broad sulcus into a basicoxite and disticoxite, sulcus runs more or less parallel to the axis of rotation, coxa seems subdivided in an oblique plane (Orusside, Stephanidae, Megaspilidae, Trigonalidae, Gasteruptiidae, Evaniidae, Aulacidae and many aculeates). [NJ88:5]

519. Insertion of mesocoxa: 0 = distinctly posterior to midline of mesopleuron (mesosternum relatively long); 1 = at or anterior to midline of mesopleuron (mesosternum very short), (Encyrtidae). $R[G&H93:31, GH&W99:92, N&H94:68]

520. Mesocoxal articulation: 0 = mesotrochantinal plate inflected internally, extended dorsally to or almost to anterior edge of metasternum, with mesepisternum abutted against bases of mesocoxae; 1 = mesotrochantinal plate inflected internally but with conspicuous membranous region separating dorsal edge of plate from anterior edge of metasternum, with mesepisternum abutted against bases of mesocoxae (1a), or with small cavity (1b) or membranous region (1c) anterior to each coxa; 2 = mesotrochantinal plate inflected internally, with metasternum extended anteriorly and ventrally between meocoxal fossae to dorsal edge of plate, with mesepisternum abutted against bases of mesocoxae (3a) or with membranous region anterior to each coxa (3b); 3 = mesotrochantinal plate external, extended posteriorly, with coxal fossae entirely membranous and mesepisternum with membranous region anterior to each coxa. [GG89:6]

521. Spines on middle femur: Note actual number of long spines in matrix. [JW88:25]

522. Row or patch of pegs along anterior apical margin of mesotibia: 0 = absent; 1 = present (many Encyrtidae, some Aphelinidae, many Eupelminae and many Tanaostigmatidae). $R[G&H93:30]

523. Mesotibial apical pegs: 0 = mesotibia at most with robust spines along anteroapical edge; 1 = mesotibia with row or patch of pegs along anteroapical edge. [GG89:13]

524. Subapical bristle on both anterior and posterior surfaces of mesofemur: 0 = absent; 1 = present, ventrally directed (some Eriaporinae). [G&H93:81]

525. Mesofemur anteroventrally: 0 = without spines; 1 = with at least one long spine (Signiphoridae). *R[GH&W99:174]

526. Shape of mesotibia: 0 = 'normal', outline of sides subparallel; 1 = obconic (Signiphoridae). *R[GH&W99:175]

527. Long dorsal spines of mesotibia: 0 = absent; 1 = present (Signiphoridae). *R[GH&W99:176]

528. Length of mesotibial spur: 0 = relatively short, about one-quarter length or less of mesotarsus and usually distinctly shorter than tarsomere 1 (most Pteromalidae, very few Torymidae and Agaonidae); 1 = distinctively long, about one-third length of mesotarsus and subequal in length to tarsomere 1 (Eupelminae, some Pteromalidae). [G&H93:90]

529. Mesotibial spur: 0 = short and slender; 1 = long and slender; 2 = robust (of varied lengths but thickened). [GG89:4]

530. Position of mesotrochantinal plate: 0 = extending to metasternum; 1 = separated from metasternum by distinct membranous area (Eupelminae). [G&H93:92]

531. Mesotarsus: 0 = more or less same width throughout; 1 = basally thickened (Eupelmidae). [GH&W99:140]

532. Rows of pegs or dense pad-like cushions of setae on ventral surface of at least tarsomere 1 of mesotarsus: 0 = absent; 1 = present (Encyrtidae, some Aphelinidae, most Eupelminae and Tanaostigmatidae). $R[G&H93:29] Should we keep track of number of rows?

533. Mesotarsal peg pattern: 0 = mesotarsus with row of setae along both antero- and posteroventral edges; 1 = mesotarsus with row of pegs along posteroventral edge and row of setae along anteroventral edge; 2 = mesotarsus with row of pegs along anteroventral edge, including one or more pegs along anterodistal edge of each tarsomere, and row or setae along posteroventral edge; 3 = mesotarsus with row of pegs along anteroventral edge and mixed row of setae and pegs along posteroventral edge; 4 = mesotarsus with row of pegs along both antero- and posterovental edges. [GG89:5]

Hind legs

534. Metacoxa: 0 = not enlarged (Figs. 7,41); 1 = compressed, plate-like (Elasminae; 2 = enlarged with flat inner surface (Fig. 49); 3 = enlarged with convex inner surface (Fig. 45) (0.92, 1.00). *R[MG00:32, GW97:24, G&H93:38, GH&W99:81]
Wijesekara (1997) hypothesized that an enlarged metacoxa with a flat inner surface is correlated with a sessile, transverse petiole and rigid propodeal gastral junction, which is seen in Leucospidae and Cleonyminae. This is contrasted with the enlarged, mesally convex coxa seen in Chalcididae. However, the state seen in Chalcididae is also found in *Platyrileya*, and thus is globally homoplastic. An unenlarged metacoxa is typical of most Pteromalidae and Eurytomidae.

535. Length of metacoxa: 0 = 'normal'; 1 = long (Diparinae). *R[RBun:11]

536. Transverse dorsal ridges on metacoxa: 0 = absent; 1 = present (most Diparinae). *R[RBun:12]

537. Metacoxal structure for female: 0 = dorsally rounded or acutely angled, but not carinately margined; 1 = with carinate, often externally crenulate ridge along dorsal length for variable length. *R[GG03:44, MG87:46]

538. Metacoxal structure for male: [see GG03:44; GG03:45] Does it need to be repeated, compare with female character.

539. Metacoxa: 0 = not laminate, carinate or grooved (Figs. 41, 242); 1 = posterior, transverse or oblique lamina present, groove absent (Fig. 50); 2 = longitudinal carina present, groove absent; 3 = grooved to receive femur (0.40,0.50). *R[MG00:25]
The majority of included taxa possess the plesiomorphic condition of a simple, unmodified metacoxa (state 0). A few taxa have state 1 across Chalcididae and Eurytomidae while only the outgroup taxa possess state 2. *Aximopsis* and *Axima* are synapomorphic for state 3.

540. Setal pattern of exterior surface of metacoxa: 0 = exterior surface (the usually flat to slightly concave surface relative to the convex ventral or dorsal surfaces) bare mediolongitudinally; 1 = exterior surface extensively setose at least apically or basally. [GG03:43]

541. Metacoxal setae: 0 = hind coxa with no setae dorsally; 1 = hind coxa dorsally with a few, widely spaced, long setae; 2 = hind coxa dorsally more or less densely covered with short setae. Ordered 2 - 0, 1. [EG95:19]

542. Metafemur: 0 = not enlarged (less than or equal to 3x as long as broad) or dentate ventrally; 1 = enlarged (greater than or equal to 3x as long as broad), dentate ventrally (Figs. 45, 49, 50) (1.00, 0.94). $R[MG00:27, G&H93:1, GW97:25]
A metafemur that is neither enlarged nor modified with ventral dentition is the hypothesized groundplan state within Chalcidoidea (Grissell 1995; Gibson et al. 1999). The enlarged metafemur appears to have originated multiple times within Chalcidoidea (Pteromalidae (Boucek, 1988b), Chalcididae (Wijesekara 1997), Leucospidae, Agaonidae (Boucek, 1988b), Eulophidae (Boucek, 1988b) and Torymidae (Grissell 1995». Within Eurytomidae, males of *Macrorileya oecanthi* (Ashmead) (Gates, pers. obs.; Smith 1930), *Archirileya inopinata* Silvestri (Zerova 1976; Boucek 1951; Erdos 1957) and females of *Masneroma angulifera* Boucek (Boucek 1983) have an enlarged, non-dentate metafemur. Unlike Chalcididae, the enlarged femur in some eurytomids is flattened ventrally and does not have the corresponding curved tibia.

543. Structure of metafemur: 0 = without denticles or teeth ventrally; 1 = with single, rounded preapical lobe; 2 = with acutely angled lobes or spinelike teeth of irregular size, shape and spacing, mostly or entirely within apical half; 3 = with small, uniform teeth similar to blade of saw over most of length; 4 = with large, regular, lobelike teeth; 5 = with irregular tiny denticles. [GG03:46]

544. Structure of metatibia: 0 = tubelike, sometimes abruptly widened apically but not paddle-shaped; 1 = moderately compressed with carinate margin over about dorsal half; 2 = strongly compressed and paddle-shaped apically. *R[GG03:50]

545. Shape of metatibia: 0 = essentially straight from base to apex; 1 = slightly bent basally, but apical half straight; 2 = curved from base to apex. Ordered 0 - 2, 1. *R[EG95:10, MG00:31]
The plesiomorphic condition for the metatibia is hypothesized as straight (Grissell 1995). State 1 is correlated with an enlarged metafemur and appears to have originated several times within Chalcidoidea in conjunction with the enlarged metafemur.

546. Apex of metatibia: 0 = truncate at right angle (Figs. 52); 1 = diagonally truncate, ventroposterior corner acute (Fig. 51); 2 = diagonally truncate, ventroposterior corner elongated into spine (Figs. 47-48); 3 = diagonally truncate, outer tibial spur incorporated into a spine (see Wijesekara 1997: Fig. 51) (0.86, 0.82). [MG00:34, GW97:26, GG03:47, GH&W99:75, EG95:11]

Right angle truncation is common in Chalcidoidea and diagonal truncation has been hypothesized as an apomorphy derived independently in Chalcididae and Leucospidae (Wijesekara 1997). Wijesekara indicates that two metatibial spurs with a diagonally truncated ventral apex as seen in *Epistenia* (Cleonyminae) is evidence for the derivation of state 3 without incorporating a spur. However, after examining additional taxa of Cleonyminae available to me but not included in the analysis, I cannot find state 1 in *Cleonymus* sp., *Epistenia coeruleata* Westwood, *Epistenia* sp. or *Agamerion cleptideum* Girault which all have state 0; only *Amotura hyalinipennis* (Ashmead) and *Amotura caelata* Grissell have state 1 while *Dryadochalcis* sp. from Venezuela has state 2 with only a single weak spur present. All Eurytomidae assessed have state O.

547. Number of metatibial spurs: Note actual number in matrix. *R[GG03:48, GH&W99:76, GH&W99:164, MG00:33, GW97:27] reorder to number
Two metatibial spurs is considered plesiomorphic within Hymenoptera (Boucek 1988ab, Boucek & Heydon 1997).

548. Stoutness of metatibial spurs: 0 = outer spur similar in diameter and shape to inner spur (Fig.); 1 = outer spur noticeably stouter than inner spur (Fig.). [JHun:75]

549. Length of metatibial spurs: 0 = 'short', both spurs only about as long as apical width of tibia; 1 = 'long', at least inner spur conspicuously longer than apical width of tibia. [GG03:49]

550. Length of male metatibial spur: 0 = apical spur much shorter than basitarsus; 1 = apical spur of male virtually or quite as long as basitarsus; 2 = apical spur of male longer than basitarsus. *R[MG87:49]

551. Metatibial spur insertion: 0 = spurs arise at the apex; 1 = spurs arise some distance from the apex. [EG95:12]

552. Metatibia with elongate or diamond-shaped patterns of flattened, spine-like setae arranged in one continuous line that loops back on itself: 0 = absent; 1 = present (Elasminae, some Eriaporinae). *R[GH&W99:80, G&H93:40, G&H93:39] Needs to be reworded.

553. Length of basitarsus of hind leg: 0 = 'normal'; 1 = long, over half the length of the metatibia (Elasminae, Euryischia). *R[GH&W99:89]

554. Elongated tooth-like process on metatibial claws: 0 = absent; 1 = present. [GW97:28]

Mesosomal internal skeletal structures and musculature

555. Mesofurcal bridge: 0 = anterior furcal arms absent; 1 = elongate anterior arms present; 2 = reduced and well-separated arms; 3 = narrow and elongate and only extreme apices joined; 4 = arms elongate and fused along most of their length; 5 = arms completely fused, forming a transverse mesofurcal bridge; 6 = complete fusion of anterior arms into a smooth and bowed mesofurcal bridge; 7 = mesofurcal bridge absent. Ordered 01234567? $R[HW&D94:1, JWK03:39, HW&D97:1, GH&W99:18]

556. Lateral furcal arms: 0 = anteriorly directed and straight; 1 = laterally directed and straight; 2 = laterally directed and curved; 3 = posteriorly directed and strongly curved; 4 = posteriorly directed and lyre-shaped. Ordered 01234? [modified from HW&D97:5, JWK03:40]

557. Unique conformation of mesofurcal arms: 0 = absent; 1 = present (Coccophaginae). [GH&W99:63]

558. Shape of anterior arms (anterior interfurcal processes/apodemes) of the mesofurca (subdivision of character HW&D97:1 state 1(2)): 0 = cylindrical and without any medial or lateral ridge; 1 = with a medial or lateral ridge with a thin, broad, horizontal flange; 2 = thin and cylindrical with a poorly defined apex. Unordered. [HW&D97:2]

559. Posterior interfurcal extension (process of the mesofurca): 0 = absent; 1 = present. [HW&D97:6, JWK03:41]

560. Insertion of furcal-laterophragmal muscle: 0 = on apex of apodeme; 1 = double attachment on apodeme; 2 = continuous attachment along apodeme; 3 = tubular muscle (fu_2-pn_{2a}, 150) attached to reduced apodeme (Coccophaginae). [HW&D97:3, GH&W99:64]

561. Origin of furcal-laterophragmal muscle: 0 = on lateral arms; 1 = at midline. [HW&D97:4]

562. Furcal-laterophragmal muscle: 0 = single muscle (150, fu_2-pn_2) acting between the mesofurca and laterophragma of the mesopostnotum; 1 = two distinct muscles (150a and 150b) operating antagonistically on the enlarged laterophragma; 2 = muscle 150b absent; 3 = muscle 150a absent. [HW&D94:3]

563. Unique structure of furcal-laterophragmal muscle (fu_2-2ph, fu_2-pn_{2a}, or muscle 150a): 0 = attaches only apically to the axillary lever; 1 = a median conical muscle attaching to the apex of the apodeme and a broad, flat muscle attaching along the apodeme, the two muscles being separated by a gap (Mymaridae); 2 = attaches along the entire length of the deflected apodeme of the laterophragma (axillary lever) (most Chalcidoidea). Ordered 012? $R[GH&W99:19]

564. Laterophragma of mesopostnotum (pn_2): 0 = forming a lobe that extends obliquely into the mesothorax from the lateral corners of the mesopostnotum, mediad of the lateral attachment to the upper mesepimeron and lateral to the second phragma; 1 = excised between the elongate apodeme and the posterior lobe (pn_2); 2 = reduced to a narrow triangular process that forms an attachment for the tendon of muscle 150; 3 = axillary lever inflected ventrally; 4 = lever reduced, forming a short, broad process attaching to a broad tendon of the shortened muscle; 5 = axillary lever robust and strongly appressed to the inner surface of the second phragma; 6 = axillary lever separated as an independent sclerite. Unordered. [HW&D94:2]

565. Second dorsal diagonal (= phragmal flexor) muscle: 0 = muscle 116 (t_2-pn_2) attaching between the mesopostnotum and the anterior face of the laterophragmal lobe; 1 = muscle 116 and the associated posterior lobe of the laterophragma absent. Irreversible. [HW&D94:4]

566. Mesopostnotum and scutellar-metanotal muscle: 0 = mesopostnotum broadly exposed medially, 114 internal and attached to the anterior medial margin of the mesopostnotum; 1 = broadly exposed and 114 passes under the mesopostnotum through a small emargination of its posterior margin; 2 = exposed dorsally, 114 passes externally over the mesopostnotum as a tendon enclosed by a sheath of connective tissue; 3 = 1; 4 = muscle 114 and the mesopostnotum are completely internal an 114 passes medially over the second phragma. [HW&D94:5]

567. Formation of pseudophragma: 0 = anterior margin of the mesopostnotum broadly attached to the posterior margin of the mesonotum (scutellum) by a narrow conjunctiva; 1 = anterior margin of the mesopostnotum developed into a broad bilobed internal plate (pseudophragma) that extends anteriorly and dorsally beyond the dorsal attachment of the mesopostnotum to the mesonotum. [HW&D94:6]

568. Furcal-spina muscle 127: 0 = present; 1 = absent. [HW&D94:7]

569. Furcal-spina muscle 180: 0 = present; 1 = absent. [HW&D94:8]

570. Furcal-basalare muscle (fb1, fu_2-ba_3): 0 = absent; 1 = present. [HW&D94:9]

571. Lateral articulation of mesopostnotum: 0 = mesopostnotum broadly and evenly joined to the upper mesepimeron; 1 = juncture invaginated and connected by weak cuticle within the invagination, but maintains a strong cuticular connection at the anteriormost point of attachment; 2 = mesopostnotum completely internal and the lateral connection of the mesopostnotum to the upper mesepimeron is reduced to the anteriormost point of attachment. [HW&D94:10]

572. Fusion of lateral arms of mesofurca and metafurca: 0 = closely appressed, but broadly separated and joined by the interfurcal muscle 181; 1 = fused at the junction with the mesofurcal bridge, interfurcal muscle absent. [HW&D94:11]

573. Furcal process for trochanteral muscle 174: 0 = furcal depressor of the trochanter (muscle 174, fu_2-tr_2) attaching to the lateral arms of the mesofurca; 1 = attaching to anterior extensions of the lateral furcal arms; 2 = attaching to similar extensions that arise from the furcal bridge. [HW&D94:12]

574. Muscle ba_2-cx_2: 0 = absent (Apocrita, Tenthredinoidea, Orussidae, Xyela); 1 = present (other Symphyta). [NJ88:1]

575. Muscle t_2-cx_2: 0 = present (*Xyela* and other Symphyta); 1 = absent (Apocrita, Tenthredinoidea, Orussidae, *Pamphilus* and *Xiphydria*). [NJ88:2]

576. Attachment of sa_2-cx_2: 0 = coxal rim; 1 = metepisternum (Chalcidoidea). [NJ88:3]

577. Origin of fu_2-cx_{2a} and fu_2-cx_{2p}: 0 = mesal face and lateral arms of mesofurca posterior to the costa defining the anterior margin of the mesal lobes; 1 = anterior to the costa on the mesal face of endosternum (Apocrita and Orussidae). [NJ88:4]

578. t_2-tr_2 with portion anterior to transscutal articulation: 0 = yes; 1 = no. [GG99:1]

579. origin of anterior portion of t_2-tr_2: 0 = mesoscutum; 1 = axillar phragma. [GG99:2]

580. ad: Origin of t_2-tr_2: 0 = posterior of mesoscutum; 1 = both mesoscutum and axilla; 2 = axilla. Ordered 012. [GG85:8]

581. Mesotergal-mesotrochanteral (t_2-tr_2) muscle in females: 0 = 'normal'; 1 = reduced to a slender, ligament-like muscle that extends from the anteroventral angle of the lateral axillar surface (Eupelminae). GH&W99:144]

582. fu_2-tr_2 with portion posterior to transscutal articulation: 0 = no; 1 = yes. [GG99:3]

582. fu_2-tr_2: 0 = present; 1 = absent. [GG99:4]583.

584. fu_2-tr_2 site of origin: 0 = from mesofurcal plate medial to t_2-tr_2; 1 = from mesofurcal lateral arm posterior to t_2-tr_2. [GG99:5]

585. ab: Origin of fu_2-tr_2: 0 = vertical plate of the mesofurca; 1 = lateral arm of the mesofurca; 2 = extended onto the mesopleuron as pl_2-tr_2; 3 = only from mesopleuron as pl_2-tr_2, fu_2-tr_2 lost. Ordered

0123. [GG85:6]

586. Mesotergal-mesotrochanteral (t_2-tr_2) muscle: 0 = large tubular muscle, origin partly from dorsal axillar surface (t_2-tr_{2a}), and partly from large axillar phragma (t_2-tr_{2b}), both parts inserted into golf tee-like pedicel ventrally in body cavity, with tendon-lilke ligament from near center of pedicel; 1 = relatively small muscle, origin partly from between lateral axillar surface and axillar plate (t_2-tr_{2a}), and partlyl from anteroventral apex of axillar plate (t_2-tr_{2b}), both parts inserted into small pedicel otherwise similar to that described for state 0; 2 = relatively small muscle, origin partly from dorsal axillar surface (t_2-tr_{2a}), and partly from small axillar phragma (t_2-tr_{2b}), both inserted into elongate-narrow pedicel that articulates posteriorly with ventral edge of scutellar-axillar complex, with tendon-like ligament either extended from anterior end (2a) or near center (2b) of pedicel; 3 = small, short, band-like muscle, origin from ventral edge of lateral axillar surface near anterior angle, inserted into strongly sclerotized rod-like pedicel that articulates posteriorly with ventral edte of scutellar-axillar complex, with tendon-like ligament extended from anterior end of pedicel; 4 = small, short, band-like muscle within scutellar-axillar complex, origin partly from dorsal axillar surface (t_2-tr_{2a}) and partly from small axillar phragma (t_2-tr_{2b}), both parts convergent ventrally to tendon-like ligament; 5 = tendon-llike muscle extended from anteroventral angle of lateral axillar surface. [GG89:17]

587. Posterior portion of the mesotergal-mesotrochanteral depressor muscle: 0 = present; 1 = absent (Mymarommatidae). [GH&W99:37]

588. a: Mesotrochanteral depressor: aa: 0 = both t_2-tr_2 and fu_2-tr_2 present; 1 = only fu_2-tr_2 present; 2 = only t_2-tr_2 present. Unordered. $R[GG85:5]

589. Mesotrochanteral depressor: 0 = with fu_2-tr_2, and origin of t_2-tr_2 from mesoscutum and axilla; 1 = with fu_2-tr_2, and origin of t_2-tr_2 from axilla only; 2 = with t_2-tr_2 only, origin from mesoscutum and axilla; 3 = with fu_2-tr_2 only; 3a = with fu_2-tr_2 and pl2-tr2; 3b = with pl_2-tr_2 only; 4 = with t_2-tr_2 only, origin from axilla (this state not known for any extant terebrant); 4a = with t_2-tr_2 only, origin from axilla and axillar phragma; 4b = with t_2-tr_2 only, origin from axillar phragma. Transformation series: 0 (2; 0 (1 (3 (3a (3b, or 0 (1 and 0 (3 (3a (3b; 0, 1 or 2 (4 (4a (4b. $R[GG86:16]

590. Unique loss of two of the three plesiomorphic sites of origin of the mesotrochanteral depressor muscle (fu_2-tr_2 and mesoscutal portion of t_2-tr_2). $R[GH&W99:6]

591. Unique origin of a horizontal phragma that extends anteriorly under the mesoscutum from each axilla as the site of origin for all or part of the remaining mesotergal-mesotrochanteral (t_2-tr_2) muscle. $R[GH&W99:7]

592. pl_2-tr_2: 0 = absent; 1 = present. [GG99:6]

593. Insertion of pl_2-t_{2c} muscle: 0 = muscle inserted ventrally into lateral edge of mesoscutum at or posterior to level of mesothoracic spiracle; 1 = muscle inserted into anteriorly projecting process of lateral mesoscutal edge, with process either short (not, or only slightly extended anterior to mesothoracic spiracle) (1a), or long (conspicuously extended anterior to mesothoracic spiracle) (1b). [GG89:9]

594. Mesoscutal process for attchment of muscle pl_2-t_{2c}: 0 = 'normal'; 1 = elongated conspicuously anterior to the mesothoracic spiracle (Tanaostigmatidae, Encyrtidae). [GH&W99:181]

595. ac: Axillar phragma projecting anteriorly: 0 = absent; 1 = present. [GG85:7, GG99:7]

596. Attachment of Ph_1-Ph_2: 0 = to first phragma; 1 = primarily to midlobe of mesoscutum. [JHun:34]

The longitudinal flight muscle shifts to the mesoscutal midlobe as the first phragma is reduced in size and the mesosoma becomes more vaulted.

597. b: Second-phragmal flexor, t_2-2ph: 0 = present; 1 = absent. [GG85:9]

598. Ligament to which muscle "2" attaches: 0 = present; 1 = absent (Sycophaginae, Epichrysomallinae, Agaoninae). [GH&W99:50]

Metasoma

Petiole and 3st

599. Attachment of metasoma: 0 = petiolate; 1 = subsessile (Elasminae, Alaptinae); 2 = sessile (Trichogrammatidae, Signiphoridae, Aphelinidae). [modified from GH&W99:86, G&H93:15, GH&W99:161] Correlated with extension of second phragma into gaster.

600. Relation between petiole and propodeum: 0 = fully separated; 1 = anterior condyle separated from the body only dorsally so that the anterior ventral margin of the petiole body abuts the propodeal foramen (Eurytomidae). [GH&W99:147]

601. Petiole: 0 = absent; 1 = one-segmented (Chalcidoidea); 2 = two-segmented (Mymarommatidae). Ordered 012. $R[GH&W99:34, GG86:17, G&H93:17]

602. Second metasomal segment: 0 = normal; 1 = petiolate.

603. Shape of petiole: 0 = short and of even width; 1 = elongate and basally tapered (Eucharitinae). [GH&W99:107, G&H93:58]

604. Petiole structure: 0 = anterior condyle distinct and petiole ventrally membranous (Fig. 57); 1 = petiole completely sclerotized and anterior ventral margin extended into propodeum, anterior articulation not separate from body (see Wijesekara 1997; Fig. 56); 2 = anterior condyle separate from petiole body, anterior ventral margin of petiole expanded outside propodeum (Fig. 56); 3 = anterior condyle separated from petiole body by a lamella, petiole body variously elongated (Fig. 54); 4 = anterior condyle united with extended anterior ventral surface of petiole body, lamella absent (see Wijesekara 1997; Fig. 59); 5 = anterior condyle separate from petiole body which is distinct dorsally and ventrally, posterior ventral margins not distinctly separated from sternum of metasoma (see Wijesekara 1997; Fig. 60); 6 = anterior condyle distinctly separated from petiole body dorsally only, anterior ventral margin of petiole body abuts propodeal foramen (Fig. 58) (0.71, 0.86). $R[MG00:38, GW97:33]
This character was used by Wijesekara (1997) in his analysis of Chalcididae and is based, in part, upon work by Steffan (1957) and Delvare (1992). It was included initially to support the monophyly of Eurytomidae (state 6), but was subsequently found to be homoplastic as Heimbrinae possesses state 2.

605. Structure of male petiole: 0 = in dorsal view transverse to about twice as long as wide and tubelike, but in ventral view broadly membranous (∩-like in cross section) or at least divided along midline by suture and with posterior margin not angled under Gt1; 1 = in dorsal view similar to state 0, but entirely sclerotized so as to form a tube; 2 = in dorsal view transverse, but consisting of a heavily sclerotized tubelike structure (i.e. with suture along ventral midline) that is angled posteroventrally so as to be somewhat collarlike in lateral view, with posterior ventral margin distinctly posterior to anterior margin of Gt1; 3 = similar in structure to state 2 except entirely sclerotized so as to form a tube; 4 = in dorsal view transverse, dorsoventrally flattened, and in ventral view heavily sclerotized,

sculptured, and soomewhat W-like with emarginate anterior and posterior margins, with anterolateral margin projecting into denticle, and with contiguous ventromedial margins; 5 = in dorsal view a conspicuous, dorsally convex sclerite with angular or outcurved, flangelike lateral margins, but in ventral view membranous along median; 6 = in dorsal view similar to state 4, but in ventral view entirely sclerotized; 7 = in dorsal view a large, elongate sclerite similar in appearance to subsequent terga, but in ventral view broadly membranous, ∩-like in cross section; 8 = a slender subcylindrical tube at least four times as long as wide. $R[GG03:51]

606. Gastral petiole: 0 = small, subconical, smooth or virtually so; 1 = small but reticulate or otherwise sculptured; 2 = at least slightly longer than broad, not carinate; 3 = longer than broad, with 3 longitudinal carinae. [MG87:58]

607. Petiole shape of female: 0 = subtriangular and less than 1.2X as long as broad; 1 = cylindrical and more than 1.5X as long as broad. $R[JHun:54]
Orasema texana is the only species within Oraseminae that has a cylindrical petiole that is about as long as broad, but we consider this a derived state within *Orasema*. Some of the more derived Eucharitini also have a short, nearly transverse but cylindrical petiole, which again is considered as independently derived.

608. Base of petiole (both sexes): 0 = tapered or rounded; 1 = laterally carinate and dorsally rounded; 2 = laterally toothed and medially depressed; 3 = carinate; 4 = flanged. (general figure?) $R[JHun:55]

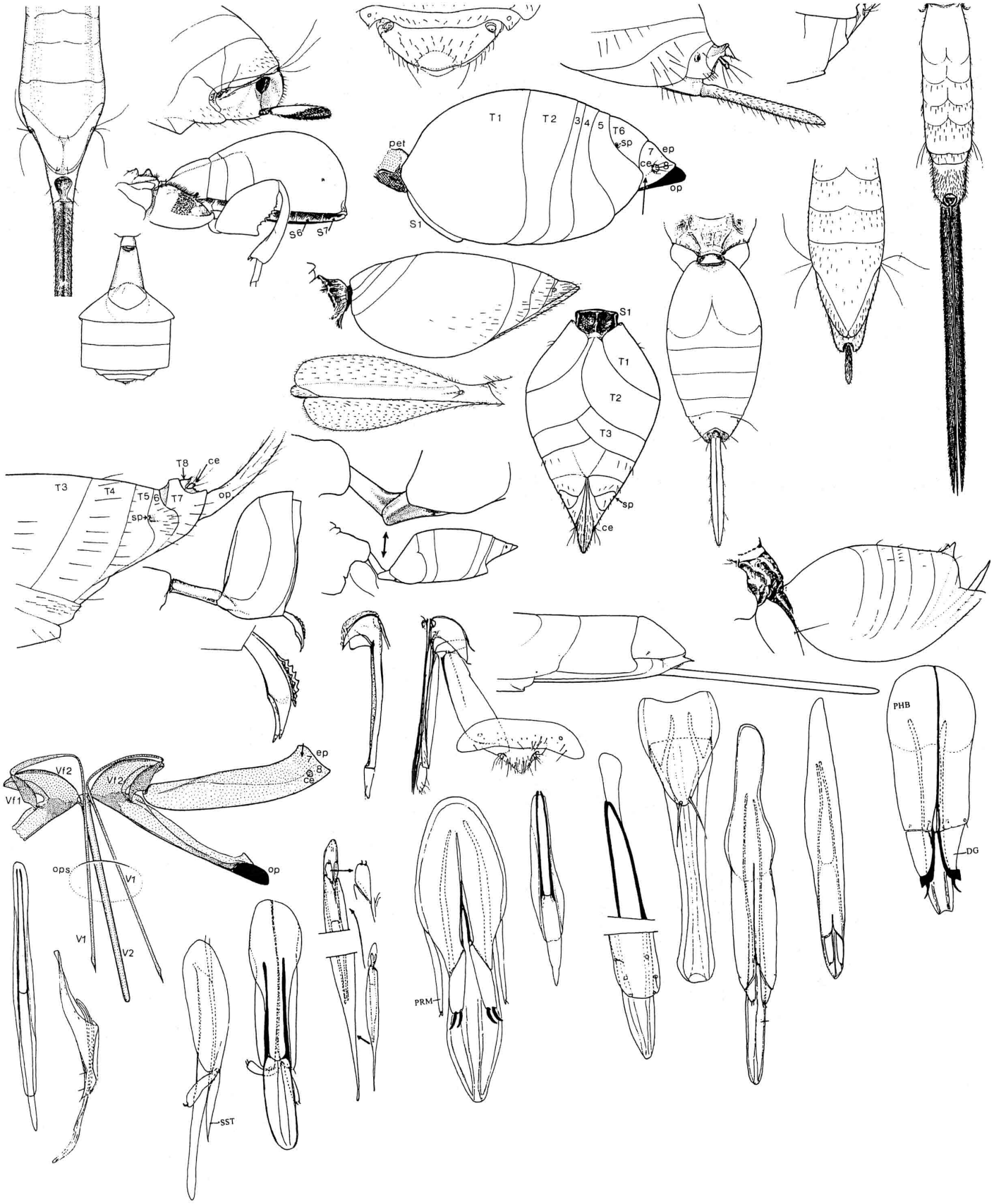
609. Ventral and lateral flanges of petiole: 0 = absent (Miscogastrinae); 1 = present (Sphegigastrini only). [Heydon dissertation] Needs to be assessed.

610. Dorsal longitudinal ribs on petiole: 0 = absent; 1 = present (Asaphinae). *R[RBun:18]

611. Petiole, ventral channel: 0 = without groove (or membranous); 1 = with single median groove paralleled by fine carinae (Fig.). This is a feature known only in *Chrysolampus* (?).$R[JHun:58] Check with Gibson's character.

612. Petiole, ventral surface: 0 = membranous with tergal margins separated or at most fused by a narrow bar across the apical margin; 1 = completely fused ventrally (ordered). $R[JHun:57] Check with Gibson's character.
In groups with a subtriangular transverse petiole, the ventral surface is mostly membranous, except for a transverse sclerotized bar across the apical margin. This bar may be absent in *Timioderus*, but the petiole was not digested for verification. In Eucharitidae, an unsclerotized ventral surface (state 0) is a feature only of females, with males having a fused cylindrical petiole (state 1). *(Do we need separate coding for males and females??)*

613. Petiolar lamina: 0 = without process; 1 = lamina present (Figs.). $R[JHun:59]
In Chrysolampinae, Philomidinae and Perilampinae, the apical margin of the petiole gives rise to a pair of thin transverse laminae that slide over the surface of the anterior region of Gs1 (anterior to the antecostal sulcus). As far as we know, this is a unique structure in Chalcidoidea. In Philomidinae (Fig.) and Chrysolampinae (Fig.), the laminae are distinctly cuticular, whereas in Perilampinae, the laminae are very delicate and it is debatable if they are truly cuticular or just an outfolding of membrane. The laminae found in Philomidinae, Chrysolampinae, *Steffanolampus*, and *Monacon* are large and cover almost the entire anterior region of the first sternite. In *Perilampus* (some species??) (Fig.), the laminae are minute and barely extend around the margin of the sternite. *(Need to resolve* Chrysolampus *and also other genera of Perilampinae)*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614. Petiolar scale: 0 = scale absent; 1 = medial transverse scale present (Fig.). $R[JHun:56]

615. Setation of female petiole: 0 = bare; 1 = setose laterally. $R[GG03:52]

Gaster, female

616. Shape of metasoma: 0 = depressed, ovate to lanceolate in dorsal view (some Torymidae and most Pteromalidae); 1 = compressed, tapered posteriorly (some Otitesellinae). *R[G&H93:85]

617. Gaster shape: 0 = rounded or relatively flat dorsally; 1 = basal tergites medially depressed (concave) (Fig.). [JHun:64]

618. Shape of gaster in cross section: 0 = oval; 1 = triangular (Elasminae). *R[GH&W99:87]

619. Shape of gaster: 0 = 'normal'; 1 = high and triangular in profile (Perilampidae). *R[GH&W99:166]

620. Number of visible gastral tergites: 0 = more than two; 1 = one or two (Eucharitidae and Perilampidae). *R[GH&W99:114]

621. Relative length of gastral tergites: 0 = roughly equal segmentation; 1 = first longest; 2 = second longest, first shortest; 3 = third longest, first and second shortened; 4 = fourth longest, first through third shortened; 5 = fourth longest, first through third not shortened; 6 = fifth longest, no terga reduced. *R[MG00:39]
The anterior gastral terga are modified in Rileyinae into small, anterodorsal 'flaps'. Roughly equal gastral segmentation has been hypothesized as the plesiomorphic condition (Bugbee, 1936; Zerova, 1988) and is coded here as O. States 1-4 apply to Rileyinae, whose anterior gastral terga are modified and typically much reduced. States 5-6 are seen primarily in Eurytominae and some Chalcididae. However, this character was homoplastic and was excluded from current analyses as I am not comfortable with statements of homology implied by the present coding.

622. First gastral tergite (Gt_1) size: 0 = median length of Gt1 equal to or less than Gt_2; 1 = median length of Gt_1 much longer than Gt_2. [JHun:63]

623. Size of gastral tergite 1 (abdominal 3tg): 0 = small, subequal to following tergites; 1 = large, covering at least 1/3 of , and usually almost all of, gaster (Diparinae, Eunotinae). *R[RBun:10]

624. Gastral tergum 1: 0 = not foreshortened (Fig. 54-55); 1 = foreshortened (Figs. 59, 60, 62) (1.00, 1.00). *R[MG00:40]
Only the Rileyinae have gastral tergum one distinctly foreshortened (Figs. 5, 58-60). I hypothesize this foreshortening to be apomorphic based upon outgroup comparison and previous work (Bugbee 1936; Zerova 1988) indicating that shortening or reduction of body regions is apomorphic.

625. Posterior margin of Gt_1: 0 = transverse; 1 = bilobed. [JW88:11]

626. Sclerotization of metasoma: 0 = relatively weakly sclerotized, collapsing dorsally after death; 1 = convex and relatively rigid dorsally. **R[MG87:59]

627. General type of gastral sculpture: 0 = fine (transversely coriaceous to aciculate-strigose); 1 = coarse (meshlike-reticulate to punctate-reticulate). *R[modified from GG03:55, G&H93:7, G&H93:83]

628. Pattern formed by gastral sculpture: 0 = no apparent pattern; 1 = transverse bands or rows on one or

more terga (Ormyridae). $R[G&H93:83]

629. Sculpture of Gt_1 for female: 0 = either smooth or shiny or at most very obscurely coriaceous under some angles of light when subsequent terga obviously more coarslely sculptured, or coriaceous to strigose if subsequent terga sculptured similar to Gt_1; 1 = distinctly and extensively coriaceous under any angle of light when subsequent terga obviously more coarsely sculptured; 2 = punctate to reticulate, the sculpture defined by raised ridges. *R[GG03:56]

630. Longitudinal striae anteriorly on 3tg: 0 = absent; 1 = present (Erotolepsiinae). $R[RBun:30]

631. Female metasomal terga: 0 = not grooved; 1 = one or more longitudinally grooved (Leucospidae). *R[G&H93:5]

632. Gastral terga of female: 0 = rounded laterally, not margined dorsolaterally; 1 = abruptly or linearly margined dorsolaterally. [GG03:53]

633. Anterior projections on S3 to S6 in females: 0 = apodemes absent; 1 = apodemes present. [JW88:12]

634. Tergal emarginations: 0 = terga without emarginations on posterior margin, Mt_2 especially rigid and "shell-like", never laterally compressed or folded medially; 1 = 1 tergum, Mt_2 distinctly emarginate on posterior margin; 2 = 2 terga, Mt_{2-3}, deeply emarginate on posterior margins; 2A = Mt_{2-3} greatly elongate and distinctly emarginate on posterior margins; 3 = 3 terga, Mt_{2-4}, distinctly emarginate on posterior margins; 3A = 3 terga, Mt_{2-4}, distinctly emarginate on posterior and lateral margins; 4= 4 terga, Mt_{2-5}, with emarginations either shallow or deep; 5 = 4 terga, Mt_{2-5} with emarginations and laterally flattened; 6 = in terminal taxon, 1 or 2 terga (Mt_2 or Mt_{2-3}) slightly to distinctly emarginate on posterior margins (this combines and redefines elements of 1 and 2 above); 7 = in terminal taxon, 1, 2, 3, or 4 terga (Mt_{2-5}) distinctly emarginate on posterior margins (this combines elements of 1, 3, and 4 above). Ordered 0 - [6 - 2A, 7, 4], 3A, 5. *R[EG95:22]

635. Metasomal spiracles: 0 = segments 1-7; 1 = segment 7 only; 2 = none. Ordered 012. [GG86:18a]

636. Tergal scar: 0 = absent; 1 = present (Fig.). [JHun:62]
A linear scar, delimited by a slight roughening of the cuticle is present dorsolaterally and subapically on Gt_1. The scar marks an internal sclerotized connection between Gt_1 and Gt_2. In *Monacon*, the scar is partially surrounded by a very fine groove. A linear or circular scar, without the groove, is found in a lineage of Eucharitini parasitic on large ponerine ants (e.g. *Kapala, Chalcura, Schizaspidia*), and may be linear or circular. Its distribution in only these very divergent taxa would suggest this is a convergent feature across the taxa of interest here.

637. Gaster, basal tergite connection: 0 = gastral tergite 1 (Gt_1) and Gt_2 freely articulating and overlapping; 1 = Gt_1 & Gt_2 connate (fused and abutting) medially (Fig.). [JHun:60]

638. Gaster, basal tergite dorsolateral connection: 0 = gastral tergites ($Gt_{1\&2}$) freely articulating and overlapping; 1 = $Gt_{1\&2}$ connected by small hinge-point (Fig.). *R[JHun:61, G&H93:61, RBun:17]
The hinge is recognized externally by a light-colored spot on the extreme dorsolateral edge of Gt_1, which is associated with a weak crease in the cuticle. The tergites are closely appressed at the hinge-point, whereas in dry specimens the surrounding margins of Gt_1 are usually raised from the surface of Gt_2.The hinge is not alway associated with a fused $Gt_{1\&2}$, but occurs in all taxa where the tergites are fused.

639. Size of metasomal terga 2 and 3: 0 = more or less similar in size as other metasomal terga; 1 = equal in size and covering the remaining tergites (Perilampidae). *R[GH&W99:167]

640. Gt_2 versus Gt_3: 0 = approximately equal in length (Fig. 58); 1 = Gt_3 about twice the length of Gt_2 (Fig. 64); 2 = Gt_3 greater than 2x length of Gt_2, Gt_3 not extending beyond basal half of gaster (Fig. 61); 3 = Gt_3 much greater than 2x length of Gt_2, Gt_3 extending to midline of gaster (Figs. 199-200); 4 = Gt_3 much greater than 2x length of Gt_2; Gt_3 extending beyond basal third of gaster (Fig. 110); 5 = Gt_1 less than Gt_2; 6 = Ot] much less than Gt_2 (Fig. 63); 7, Gt_1 + Gt_2 (fused) much greater than Gt_3 (Heimbra spp.) (0.52, 0.67). *R[MG00:41]
The initial purpose of this character was to attempt to provide differentiation within Rileyinae. However, it has proven to be homoplastic and of limited utility with respect to phylogenetic signal.

641. Middle gastral tergites: 0 = without pits or crenulae; 1 = with crenulae having setae projecting apically from the crenulations; 2 = with pits (usually in one or more rows) (Ormyridae). $R[GH&W99:163]

642. Gaster, spiracles of tergite 6, Mt_7: 0 = not visible; 1 = visible, dorsal in position. [MG87:64]

643. Metasomal tergum 8, Mt_7: 0 = dorsally oblique; 1 = dorsally transverse (parallel-sided), (Torymidae). [GH&W99:183]

644. Metasomal tergum 8, Mt_7: 0 = not posteriorly emarginate; 1 = broadly posteriorly emarginate (Torymidae). [GH&W99:184]

syntergum = when Mt_8+Mt_9 fused as last metasomal tergum (Mt_7+Mt_8?)
epipygium = last tergite of the metasoma (=syntergum) OR torymid flap-like segment following Mt_7
epiproct = a sclerite posterior to Mt_7 (in Signiphoridae and Azotinae)

644. Articulated metasomal tergum 9, Mt_9: 0 = no, Mt_9 absent (actually fused with Mt_8 and not visible = syntergum) or if visible as a separate sclerite then broad basally and sesparated from posterior of Mt_8 only by a narrow suture; 1 = yes, Mt_9 a free sclerite narrowed basally and separated from posterior of Mt_8 by a membranous region. $R[EG95:24]645.

646. Syntergum: 0 = fusion line between eighth and ninth metasomal tergites, Mt_8+Mt_9, completely covered by the posterior margin of the seventh tergite, Mt_7; 1 = roof-like, posterior dorsal edge of eighth tergite not fused to ninth tergite; 2 = not roof-like, postero-dorsal edge of eighth tergite fused to ninth tergite and line of fusion exposed. $R[GW97:34]

647. Structure of Mt_8 and Mt_9 of females: 0 = Mt_8 and Mt_9 fused as syntergum, at most with dorsal suture between cerci indicating line of fusion; 1 = Mt_8 and Mt_9 separate, with Mt_8 very short dorsally, possibly concealed by Mt_7. [GG89:15]

648. Epipygium at apex of metasoma: 0 = absent (most Pteromalidae); 1 = present (some Torymidae). (Number of metasomal terga: 0 = nine; 1 = eight (eighth and ninth fused anterior to the cercus).) $R[G&H93:88, GH&W99:122]

649. Epiproct: 0 = absent; 1 = present (Signiphoridae, Azotinae). $R[GH&W99:178]

650. Shape of apical tergum of metasoma: 0 = about as long as preceding tergum, posterior margin not emarginate; 1 = transverse dorsally and with posterior margin Ω-like (some Torymidae). $R[G&H93:73]

651. Constriction of first gastral sternite (abdominal sternum 3, 3st): 0 = present; 1 = absent (Eucharitinae). [GH&W99:106]

652. Antecostal sulcus of gastral sternite 1: 0 = present; 1 = absent or only very weakly impressed (no distinct sulcus). [JHun:65]

653. Antecostal sulcus of gastral sternite 1 sculpture: 0 = smooth; 1 = crenulate. [JHun:66]
Rather than code this as an inapplicable character state for Eucharitinae that lack a sulcus, a smooth or evenly sculptured sternite is scored as state 0.

654. Anterior projections of sternites 3-6: 0 = absent; 1 = present (Signiphoridae, Azotinae). $R[GH&W99:177]

655. Similar structure of terminal metasomal segments: 0 = no; 1 = yes (Sycophaginae, Agaoninae). [GH&W99:60]

656. Apex of metasoma: 0 = directed more or less posteriorly; 1 = curved down, with dorsum distinctly convex (some Otitesellinae). [G&H93:86]

hypopygium = (subgenital plate, hypogynium) last female sternite

657. Hypopygium structure: 0 = hypopygium not reaching apex of gaster; 1 = hypopygium prominent reaching cercal plate; 2 = prominent reaching apex of gaster beyond cercal plate. Ordered 012? *R[JWK03:48, MG87:61]

658. Anterior margin of female hypopygium: 0 = with anterior margin trilobed; 1 = truncate or nearly so. [MG87:62]

659. Posterior (caudal) margin of female hypopygium: 0 = with posterior (caudal) margin not produced in middle; 1 = produced in middle. [MG87:63]

660. Relative structure of metasoma and ovipositor: 0 = ovipositor rotates about basal line of axis, protruded ventrally from metasoma anterior to metasomal apex during oviposition, and if covered by sterna then latter widely displaced from terga during oviposition; 1 = modified from above, "apomorphic". [possible grouping of different (non-homologous) apomorphic states into one]. [GG86:19]

661. Relation of outer plate of the ovipositor and the dorsal part of the ninth abdominal tergite: 0 = continuous with; 1 = separated from (Encyrtidae). [GH&W99:90]

662. Paratergites (elongate membranous or sclerotized filaments that occur between the ninth abdominal tergite and outer plate of the ovipositor posterior to each cercus): 0 = absent (Encyrtinae); 1 = present (Tetracneminae). [GH&W99:93]

663. Female metasoma with a modified structure that enables protrusion of the base of the ovipositor (within a membranous sac) between the first and second gastral tergites during oviposition (Leucospidae). [GH&W99:150]

Cerci

664. Exserted cerci (pygostyles) on metasomal tergum 8: 0 = no, cercus arises on sclerotized posrtion of apparent metasomal tergum 8 (Mt8) or Mt8+9 (if fused = syntergum) (rarely, in some Eupelmidae,

cercus situated on membranous area between nearly fused Mt8 and 9); cercus nearly always bump-like, not exserted; 1 = yes, cercus arising on membranous area at lateral margin of Mt8, always projecting from surface as a narrow cylinder. $R[EG95:23]

665. Cerci [included as R99: 123]: 0 = digitiform/peglike; 1 = reduced (tuberculate, flattened button-like structures or as setiferous, sensory plates); 2 = absent. Ordered 012. $R[GG86:18b, GH&W99:162, JHun:74, G&H93:84]665.

666. Insertion of cercus: 0 = originating from the sclerotized surface of the tergum; 1 = on a translucent, inwardly deflexed posterolateral subdivision of the tergum (Torymidae). $R[GH&W99:185]666.

667. Position of cercus: 0 = not conspicuously advanced, terga more or less transverse: 1 = conspicuously advanced anteriorly, with som terga V-like between, or M-like between and around, the cerci (Encyrtidae). $R[G&H93:34, GH&W99:91, N&H94:69]

668. Cercal setae: 0 = 'normal'; 1 = at least one seta kinked (Tanaostigmatidae except *Cynipencertus*). *R[GH&W99:179]

669. Gastral cercal setae: 0 = absent; 1 = present, relatively short, subequal in length; 2 = present, one seta of each cercus distinctly longer than the others (Diparinae). ?R[MG87:60, RBun:13] Needs assessment.

670. Cercal bristles: 0 = three long setae and one short seta; 1 = two long setae and one short seta; 2 = two long setae and two short setae; 3 = three long setae; 4 = two long setae. Ordering? *R[JWK03:49]

671. Group of short black setae anterior to cercus (cercal brush): 0 = absent; 1 = present (Diparinae, some Spalanginae). $R[RBun:28]

Ovipositor

672. Ovipositor shape: 0 = needlelike; 1 = expanded (Fig.) (cf. Heraty, 1994). [JHun:71, GH&W99:103]

673. Type of ovipositor structure: 0 = one; 1 = two; 2 = three (different eulophines). [GH&W99:134]

674. Ovipositor: 0 = 'normal'; 1 = upturned (almost all Leucospidae). *R[GH&W99:153]

675. Bulbous articulation for protracting the ovipositor shaft: 0 = present; 1 = absent (Mymaridae). $R[GH&W99:16]

676. Tail-like structure of metasoma: 0 = composed only of long ovipositor sheaths; 1 = composed of ovipositor sheaths and posterior one or two terga (Sycoryctini). $R[G&H93:70]

677. First valvifer (bulbous articulation of 2nd valvula by C&K): 0 = small quadrate structure (Fig.); 1 = enlarged Y-shaped sclerite (Fig.). [JHun:70]

678. Gonostylus: 0 = separated from third valvifer by distinct suture or membranous line (Fig.); 1 = fused and indistinct from third valvifer. [JHun:67]

679. First (dorsal) valvula: 0 = apically smooth or with weak ridges; 1 = with strong diagonal ridges or lateral teeth (cf. Heraty, 1994). [JHun:72]

680. Second (ventral) valvula: 0 = smooth or with weak ridges; 1 = strong diagonal ridges; 2 = with transverse ridges (cf. Heraty, 1994). [JHun:73]

681. Transverse laminated bridge of 2nd valvula: 0 = present; 1 = absent. [JHun:95]

682. Ovipositor valves (valvulae): 0 = smooth; 1 = hairy (Fig.). [JHun:69]

683. Median interlocking mechanism between the upper and lower valves of the ovipositor: 0 = absent; 1 = present. [Quicke et al., 1994] [GH&W99:78]

684. Third and second valvulae of ovipositor: 0 = separate; 1 = fused (Tetracneminae). [GH&W99:94]

685. Ovipositor sheaths (third valvulae) and second valvifers: 0 = separate; 1 = continuous (Chalcidoidea, Cynipoidea). $R[GH&W99:11]

686. Gonostylus of the second valvifer: 0 = free; 1 = fused (Eucharitini). [GH&W99:113]

687. Shape of extruded ovipositor sheaths: 0 = straight (directed posteriorly), robust; 1 = curved or coiled ventrally, thread-like (Apocryptini, some Otitesellinae). [G&H93:74]

688. Ovipositor sheath (third valvifer of C&K), internal connection: 0 = sclerotized bridge between valvifers absent; 1 = with thin sclerotized bridge or bar in basal third of sheaths holding valvifers together (Fig.). [JHun:68]

689. Extension of ovipositor sheaths: 0 = at most slightly beyond apex of last metasomal tergum (Eurytomidae, Ormyridae); 1 = extending conspicuously beyond apex of last tergum; 2 = extending more than length of metasoma (excluding sheaths or tail), (Sycoryctini, some Sycophaginae, some Torymidae, Apocryptini, some Otitesellinae, some Pteromalidae). *R[G&H93:69]

690. 'Spur' between right and left components of ovipositor sheath: 0 = absent; 1 = present (Mymaridae). $R[GH&W99:15]

691. Fusion of ovipositor stylets: 0 = fused, with a single central lumen (Mymaridae, Mymarommatoidea); 1 = uniformly convex basally, but apically differentiated into right and left; 2 = overlapping halves joined by notal membrane (other Chalcidoidea). $R[GH&W99:13]

692. Joining of ovipositor stylets : 0 = absent; 1 = present, upper valvulae uniformily thin-walled and fused, with a single central lumen (Mymaridae and Mymarommatidae); 2 = present as a laminated bridge, a transversely striated band of notal membrane that joins the upper valvulae basally (Chalcidoidea except Mymaridae). $R[GH&W99:14] Same as above?

693. Relation of the outer plates of the ovipositor and the ninth abdominal tergite (T9): 0 = not separated; 1 = separated (Encyrtidae). [N&H94:70]

694. Upper valve: 0 = divided at apex; 1 = not divided at apex. [Q&al94:A]

695. Upper valve: 0 = with two lumina; 1 = with one lumen. [Q&al94:A]

696. Olistheters: 0 = diverging ventrally; 1 = approximately vertical; 2 = converging ventrally. [Q&al94:A]

697. Olistheter mechanism: 0 = densely covered with large scales; 1 = with only sparse, weak scaling. [Q&al94:A]
Preliminary SEM investigation shows lack of obvious scaling in sections can result either from a reduction in the size and prominence of scales (as in some siricoids) or in their density (as in Orussidae and Apocrita).

698. Ventral wall of upper valve: 0 = evenly thickened; 1 = more strongly thickened medially, making the upper valve lumen reniform in section. [Q&al94:A]

699. Lower valves ventrally: 0 = abutting (Cynipoidea, Roproniidae, Heloridae, Pelecinidae); 1 = overlapping (Chalcidoidea, Mymarommatoidea, some Proctotrupoidea, Platygastroidea and Ceraphronoidea). $R[Q&al94:A, GH&W99:17]

700. Upper valve dorsally: 0 = without asymmetric cleft; 1 = with asymmetric cleft. [Q&al94:A]

701. Ovipositor: 0 = strongly laterally compressed; 1 = more-or-less oval/round; 2 = strongly dorso-ventrally compressed. [Q&al94:A]

702. Lower valves medio ventrally: 0 = without seal; 1 = with seal. [Q&al94:A]

703. Upper valve halves: 0 = symmetric and not overlapping; 1 = uniformly convex basally but cleft apically beginning near the middle of the ovipositor; 2 = asymmetric and overlapping (Chalcidoidea excl. Mymaridae). [modified Q&al94:p. 667]

704. Thickenings of upper and lower valves: 0 = absent; 1 = present (Chalcidoidea excl. Mymaridae). $R[Q&al94:p. 667, GH&W99:12]

705. Distinctive transversely striate band of notal membrane near the ovipositor base, the laminated bridge: 0 = absent; 1 = present. [Q&al94:p. 667]

706. Colleterial glands: 0 = double (Torymidae, Pteromalidae, Eurytomidae); 1 = single (Agaonidae, Eulophidae, Encyrtidae, Chalcididae, Mymaridae). [GH&W99:48]

707. Ramus and semicircular sheet: 0 = semicircular sheet enlarged; 1 = extension only of the ramus (Sycophaginae, Epichrysomallinae, Agaoninae). [GH&W99:49]

Metasoma, male

708. Shape of male metasoma: 0 = relatively short; 1 = long with subparallel or diverging sides and subtruncate posterior margin; 2 = with posterior 4 or 5 segments tubularly elongated and tapered, recurved under mesosoma (male Agaoninae). *R[G&H93:98, [GH&W99:55]

709. Posterolateral extension of male metasoma: 0 = absent; 1 = present (most male Sycophaginae) [G&H93:100]

710. Gastral terga of male: ?? [see GG03:53; GG03:54]

711. Male metasoma: 0 = with separate tergites: 1 = fused into a carapace beyond the second gastral tergite (abdominal 4tg) (Leucospidae). $R[GH&W99:149, G&H93:6]

712. Size of male metasomal spiracles: 0 = ‘normally’ small; 1 = very large (most male Sycophaginae).

[G&H93:99]

713. Gaster of male: 0 = not thickly clothed with decumbent setae; 1 = thickly clothed, except at the base, with decumbent, backward-directed setae. *R[MG87:65]

714. Sculpture of Gt1 for male: ?? [see GG03:56; GG03:57]

715. Ventrolateral processes on the syntergum in males: 0 = processes absent; 1 = processes present but inconspicuous; 2 = processes present, conspicuous and bearing large spines. [JW88:15]

716. Male S7 with posteromedial emargination: 0 = emargination absent; 1 = emargination present. [JW88:16]

Phallus

717. Annular basal ring of the male genital capsule: 0 = present; 1 = absent. $R[GH&W99:8, GG86:20]

718. Volsellae of male genitalia: 0 = present; 1 = absent. $R[GH&W99:188]

719. Gaster of male: 0 = genitalia at most about 4 times as long as broad, except in one species where it is 7.5 times; 1 = 8-14 times as long as broad. *R[MG87:66]

720. Volsellar digiti of male genitalia: 0 = present; 1 = absent (Leucospidae). $R[GH&W99:151]

721. Gaster of male: 0 = digitus expanding slightly caudad; 1 = parallel-sided or tapering caudad. [MG87:67]

722. Gaster of male: 0 = digitus short, at most 3.7 times as long as broad; 1 = long, 4-6 times as long as broad. *R[MG87:68]

723. Gaster of male: 0 = digitus with 2 or 3 short teeth or spines on hind edge, directed obliquely; 1 = with 2 spines directed caudad; 2 = with 1 spine directed obliquely; 3 = with 1 spine the outer edge of which continues the line of the outer edge of the digitus itself. [MG87:69]

724. Medial denticles on male genitalia: 0 = medial denticles absent; 1 = present but not falcate; 2 = present, robust and falcate. [JW88:17]

725. Cuspides from the volsellae of the male genitalia: 0 = present; 1 = absent (Chalcidoidea, Cynipoidea). $R[GH&W99:10, GG86:21]

726. Aedeagal apodemes: 0 = present; 1 = absent.

727. Parameres: 0 = present; 1 = absent.

728. Distinct spine at terminus of paramere: 0 = present; 1 = absent. Attempt to map and homologize non-terminal spines of chalcids!

729. Volsella: 0 = present; 1 = absent.

730. Relation between digitus and volsella: 0 = distinctly separated (visible in slide preparations); 1= continuous

731. Number of digital spines: 0 = absent; 1 = one; 2 = two; 3 = three or more.

732. Intervolsellar process: 0 = present; 1 = absent.

733. Anterior volsellar spine: 0 = present; 1 = absent.

Immature stages

734. Ovarian egg composed of two bladders connected by an elongate-narrow tube; 0 = no; 1 = yes (Tanaostigmatidae, Encyrtidae). [GH&W99:180]

735. First-instar larva: 0 = larviform; 1 = planidiform (Eucharitidae). $R[GH&W99:99]

736. Tergites I and II of first-instar larva: 0 = separate; 1 = fused (Eucharitinae). [GH&W99:108]

737. Tergo-pleural line of first-instar larva: 0 = absent or indistinct; 1 = distinct (Eucharitinae). [GH&W99:109]

738. Cranial setae of first-instar larva: 0 = present; 1 = absent (Eucharitinae). [GH&W99:110]

739. Labial plate of first-instar larva: 0 = absent; 1 = present (Eucharitinae). [GH&W99:111]

740. Number of segments behind head of first-instar larva: 0 = 13 (Torymidae, Eupelmidae, Leucospidae, Eurytomidae); 1 = 12 (Perilampidae); 2 = 11 (some Eucharitidae); 3 = 10 (some Encyrtidae); 4 = 8 (some Eucharitidae). [P&T25:1K]

741. Endo- or ectoparasitic larva: 0 = ectoparasitic; 1 = endoparasitic. [P&T25:2K]

742. Kind of endoparasite: 0 = attached to host body wall; 1 = enclosed in an epithelial cyst; 2 = in an egg; 3 = free-living in host body cavity. [P&T25:3K]

743. Caudal appendage of first-instar larva: 0 = absent; 1 = present. [P&T25:4K]

744. Apex of caudal appendage: 0 = simple; 1 = bifurcate. [P&T25:5K]

745. Number of spiracle pairs of first-instar larva: 0 = 4; 1 = 1. [P&T25:6K]

746. Number of pairs of cephalic sensorial hairs: 0 = 8; 1 = 6; 2 = 2; 3 = 0. [P&T25:7K]

747. Conspicuous, elongate sensorial hairs on body: 0 = present; 1 = absent. [P&T25:8K]

748. Cuticular spines: 0 = present; 1 = absent. [P&T25:9K]

749. Arrangement of cuticular spines: 0 = arranged in definite dorsal and ventral areas on the body; 1 = definite dorsal and ventral areas not clear. [P&T25:10K]

Life-history and behavior

750. Larval feeding: 0 = arthropod parasitoid; 1 = phytophage.

751. Community association: 0 = decaying tree; 1 = gall community: 2 = ...

752. Life-history: 0 = parasitoid; 1 = non-gall-making phytophage; 2 = gall-maker (most Agaonidae); 3 = inquiline in gall (some non-Agaoninae). *R[modified from GH&W99:43]

753. Host plant association: 0 = other; 1 = Ficus (Moraceae), (Agaonidae). *R[GH&W99:42]

754. Hosts: 0 = groups other than Psylloidea; 1 = Hemiptera: Psylloidea. *R[MG87:70]

755. Insect host group: 0 = Exopterygote; 1 = Endopterygote.

756. Host stage parasitized: 0 = egg; 1 larva; 2 = pupa; 3 = adult. [modified from GH&W99:1]

757. Pollinator: 0 = no (non-Agaoninae); 1 = yes (Agaoninae). *R[GH&W99:44]

758. Grooming behavior, single antenna scraped by forleg of same side: 0 = present; 1 = lacking (Chalcidoidea, some Cynipoidea). [GH&W99:24]

759. Simultaneous grooming of one antenna with cleaners of both ipsi- and contralateral fore legs. One antenna at a time is scraped simultaneously by the antenna cleaner of both fore legs: 0 = absent; 1 = present (Megaspilidae, Chalcidoidea, Cynipoidea, Proctotrupidae and some Platygastroidea). [B&Q99b:4, GH&W99:26]

760. Double antenna scraping. The anenna cleaner of both fore legs are passed distad along their respective ipsilateral antenna: 0 = present; 1 = absent (Chalcidoidea, Megaspilidae, Pelecinidae and Proctotrupidae, and some Cynipoidea and Ichneumonoidea). [B&Q99b:5, GH&W99:25]

761. 'Chalcid type' wing grooming: a pair of raised wings of one side are groomed simultaneously between both hind legs on both surfaces of the wings, with costal margins either oriented upwards or downward. This is an extremely specialized action for cleaning the wings and is charateristic of the Chalcidoidea. In this, only one pair of wings is cleaned at a time by being sandwiched between both hind legs which then scrape both surfaces distally: 0 = absent; 1 = present (Chalcidoidea and some Cynipoidea, and indication of some Evaniidae, Gasteruptiidae, Proctotrupidae and Pompilidae). [B&Q99b:15, GH&W99:27]

762. Middle leg-hind leg-hind leg rubbing. The tarsus of each leg passes beneath the tibial spurs and/or along the tarsus of another leg: 0 = present; 1 = absent (Gasteruptiidae, Stephanidae, Pelecinidae, Diapriidae, Chalcidoidea and Bethylidae). [B&Q99b:29, GH&W99:28]

763. Maturation of oocytes: 0 = after emergence; 1 = in pupal stage of before emergence (Sycophaginae, Epichrysomallinae, Agaoninae). [GH&W99:51]

764. Heteronomy: 0 = absent; 1 = present (Coccophaginae). $R[GH&W99:65]

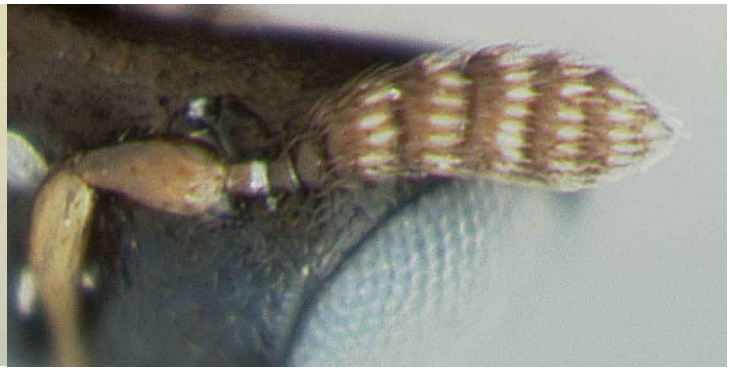
765. Sexual 'ditrophicity': 0 = no; 1 = yes, males are secondary parasites of females of their own species or of other chalcids. [VY76:2]

Plates of special taxa

mesosoma: dorsal

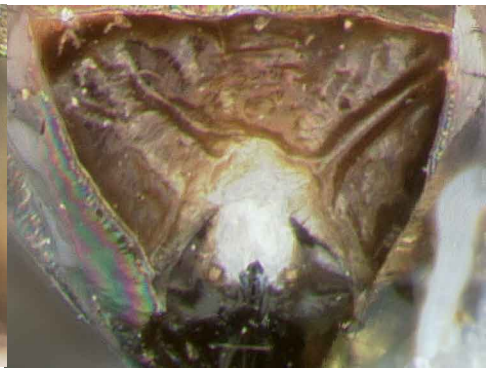
mesosoma: dorsolateral

right fore wing: dorsal



left antenna: mesal

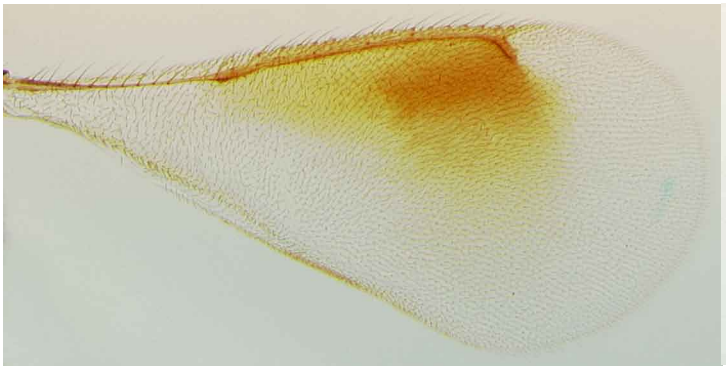
head: anterior



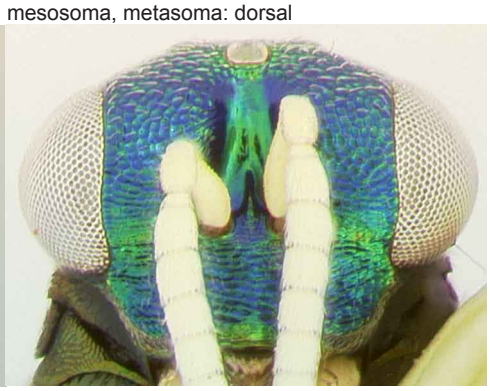
female metasoma: posterior

male habitus: lateral

mesosoma, metasoma: dorsal



forewing: dorsal



head: anterior

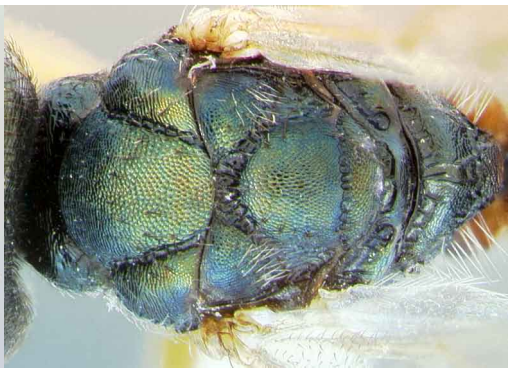
Eunotopsia sp. Chalcidoidea: Pteromalidae: Erotolepsiinae

male head, mesosoma: dorsal

head: anterior

Callimomoides sp. Chalcidoidea: Pteromalidae: Louriciinae

female habitus: lateral



mesosoma: dorsal

head: anterior

metasoma: base: ventral

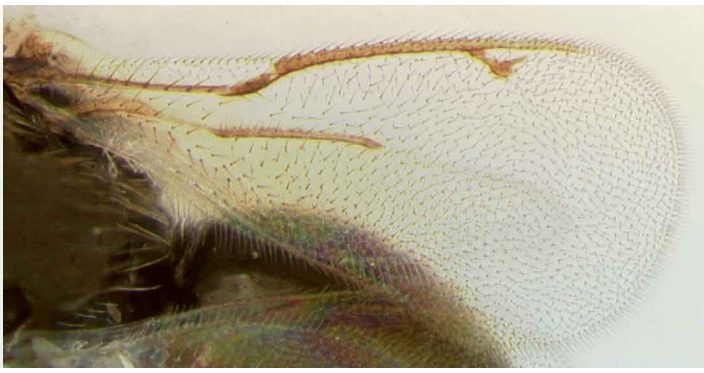
Diconocara sp. Chalcidoidea: Pteromalidae: Pteromalinae

mouthparts: labium

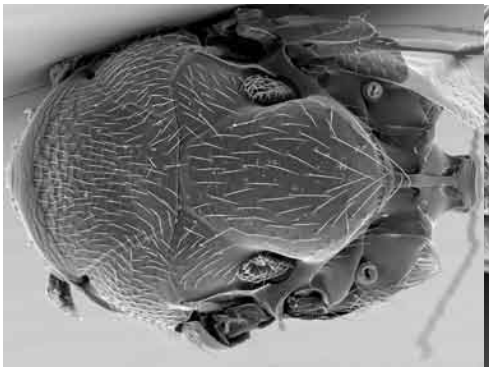
mouthparts: maxilla

mesosoma: dorsal

male habitus: lateral



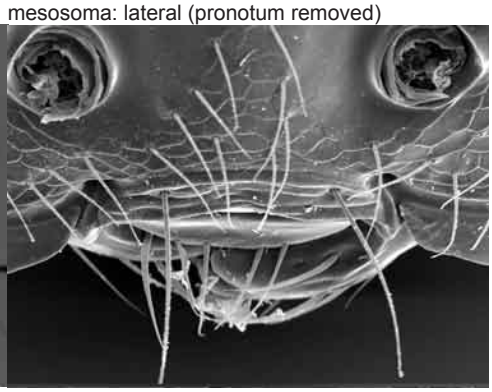
forewing: dorsal



mesosoma: dorsal (pronotum removed)

mesosoma: lateral (pronotum removed)

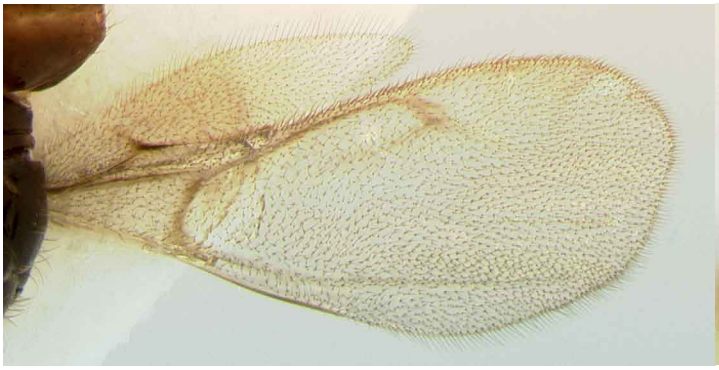
head: anterior



head: clypeus: anterior

female habitus: lateral

mesosoma: dorsal



wings: dorsal

antenna: mesal

head: anterior

metasoma: posterior

male habitus: lateral

female mesosoma: lateral

female mesosoma: dorsal

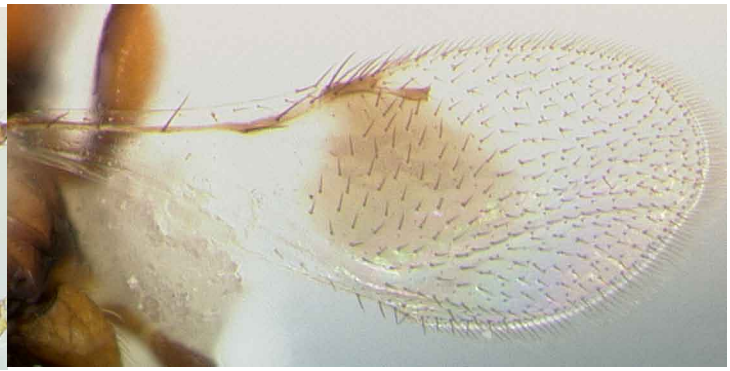
male forewing: dorsal

female head: anterior

male antenna: mesal

female habitus: dorsal

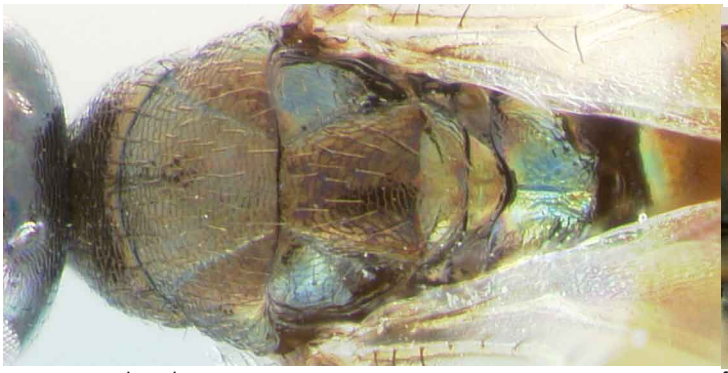
head: anterior



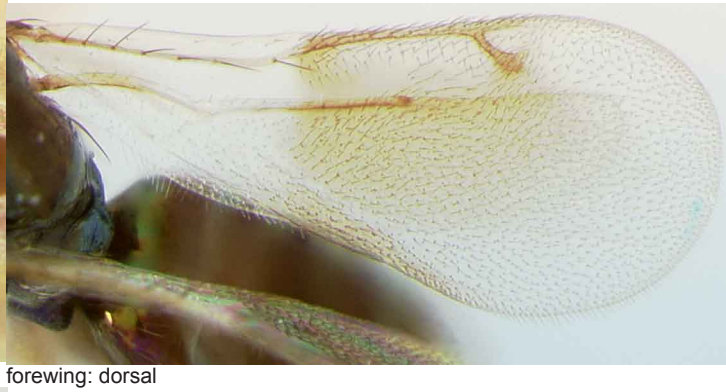
forewing: dorsal

female habitus: lateral

mesosoma: lateral



mesosoma: dorsal



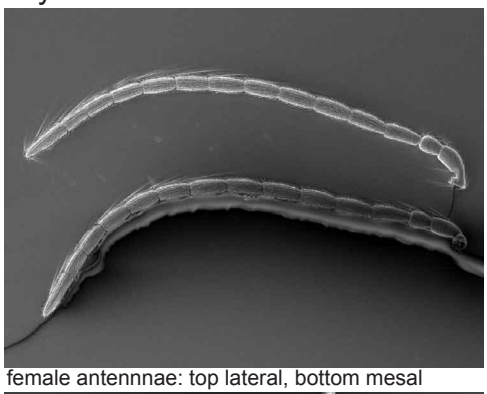
forewing: dorsal

head: anterior

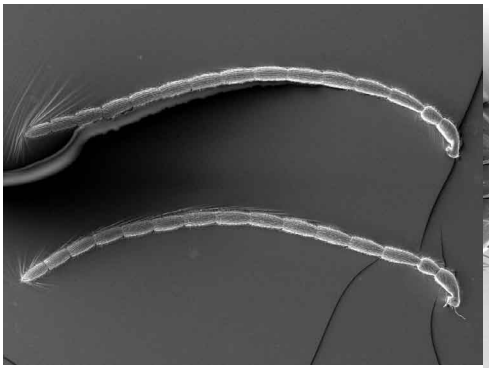
Plates of taxa in standardized views

No.	general area	specific area	view	sex	collaborator	comment	technique
01	whole insect		lateral	female	all		brightfield
02	whole insect		lateral	male	all	if sexually dimorphic taxon	brightfield
03	antennae	left lateral, right mesal	lateral	female	Heraty	include both images in one file	SEM
04	antennae	left lateral, right mesal	lateral	male	Heraty	include both images in one file	SEM
05	left antenna	basal flagellar segments (modified + 1 normal)	lateral	male	Heraty	if needed for detail	SEM
06	head		anterior	female	Heraty		SEM
07	head	clypeus and mouthparts	anteroventral	female	Heraty		SEM
08	head		posterior	female	Heraty		SEM
09	mouthparts	labrum (cleared)	anterior	female	Heraty	or optional SEM	brightfield
10	mouthparts	epipharynx	anterior	female	Heraty		brightfield
11	mouthparts	right mandible	anterior	female	Heraty	or brightfield	SEM
12	mouthparts	left mandible	posterior	female	Heraty		SEM
13	mouthparts	labium		female	Heraty		brightfield
14	mouthparts	(left) maxilla		female	Heraty		brightfield
15	mesosoma		dorsal	female	Ronquist et al.		SEM
16	mesosoma		lateral	female	Ronquist et al.		SEM
17	mesosoma		ventral	female	Ronquist et al.		SEM
18	mesosoma		anterior	female	Ronquist et al.		SEM
19	mesosoma		posterior	female	Ronquist et al.		SEM
20	forewing		dorsal	female	Sharkey		SEM
21	forewing		dorsal	female	Sharkey		brightfield
22	hindwing		dorsal	female	Sharkey		brightfield
23	hamuli	hindwing apex to the right	dorsal	female	Sharkey		SEM
24	forelegs	left posterior, right anterior		female	Ronquist et al.	include both images in one file	SEM
25	foreleg	left showing antennal cleaner	posterior	female	Ronquist et al.	close up of previous image	SEM
26	midlegs	left posterior, right anterior		female	Ronquist et al.	include both images in one file	SEM
27	hindlegs	left posterior, right anterior		female	Ronquist et al.	include both images in one file	SEM
28	hindleg	claw	anterior	female	Ronquist et al.	or posterior	SEM
29	metasoma		lateral	female	Sharkey		SEM
30	metasoma		ventral	female	Sharkey		SEM
31	metasoma		dorsal	female	Sharkey		SEM
32	metasoma	segment 1 (1st & 2nd abdominal [Sym.] or metasomal [Apo.])	lateral	female	Sharkey		SEM
33	metasoma	segment 1 (1st & 2nd abdominal [Sym.] or metasomal [Apo.])	ventral	female	Sharkey		SEM
34	metasoma	segment 1 (1st & 2nd abdominal [Sym.] or metasomal [Apo.])	dorsal	female	Sharkey		SEM
35	metasoma	apex	lateral	female	Sharkey		SEM
36	metasoma	apex	ventral	female	Sharkey		SEM
37	metasoma	apex (include cerci)	dorsal	female	Sharkey		SEM
38	metasoma		lateral	male	Sharkey		SEM
39	metasoma		ventral	male	Sharkey		SEM
40	ovipositor	ovipositor sheath apex	lateral	female	Boring		SEM
41	ovipositor	ovipositor apex	lateral	female	Boring		SEM

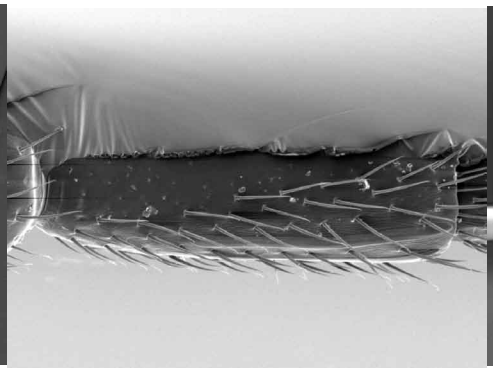
Aylax papaveris Cynipoidea: Cynipidae: Aylacini



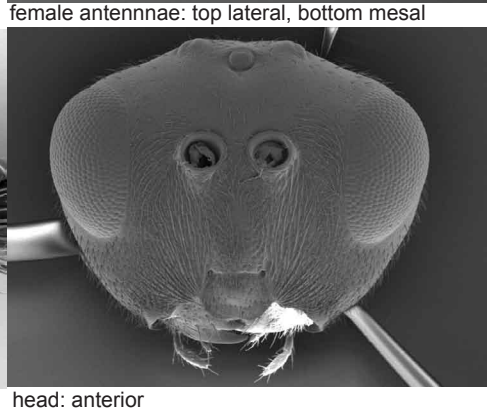
female habitus: lateral



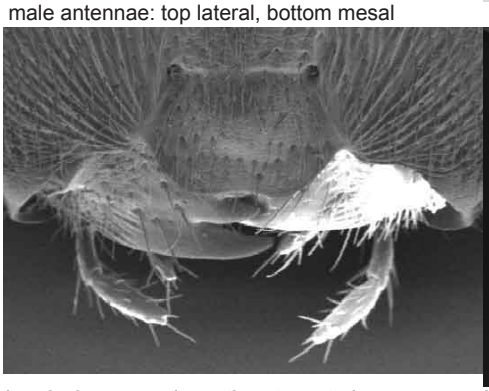
male habitus: lateral



female antennnae: top lateral, bottom mesal



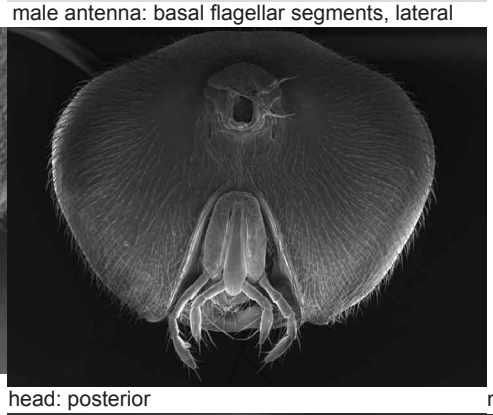
male antennae: top lateral, bottom mesal



male antenna: basal flagellar segments, lateral

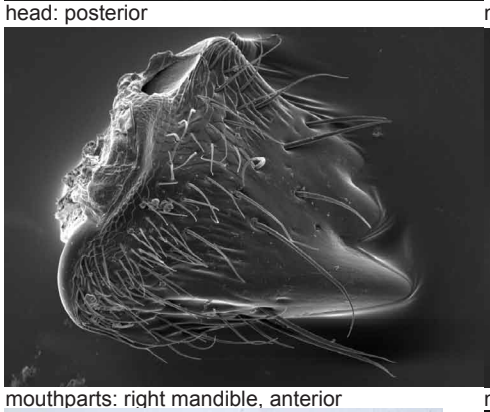
head: anterior

head: clypeus and mouthparts, anterior

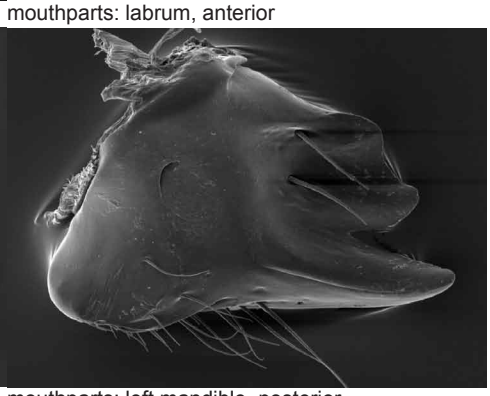


head: posterior

mouthparts: labrum, anterior



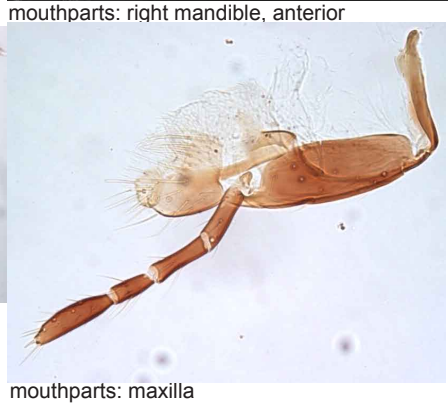
mouthparts: right mandible, anterior



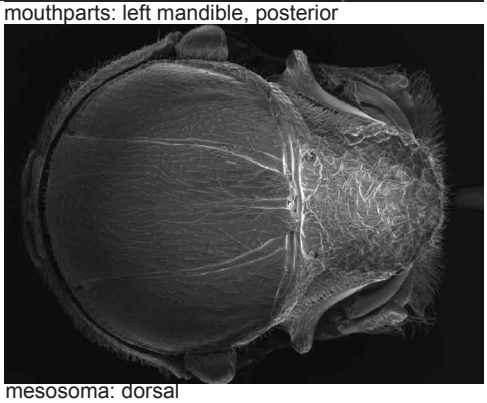
mouthparts: left mandible, posterior

mouthparts: epipharynx, anterior

mouthparts: labium

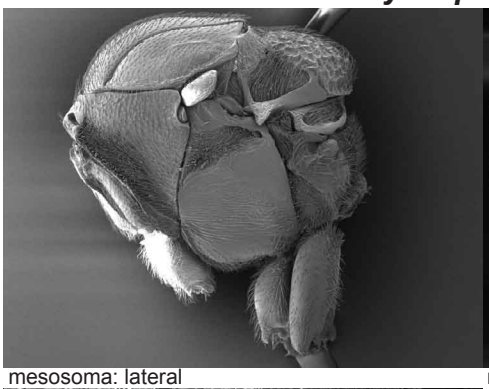


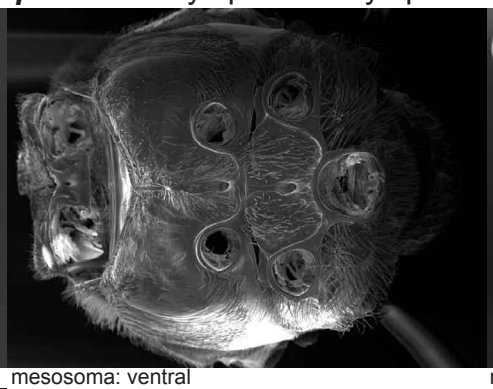
mouthparts: maxilla

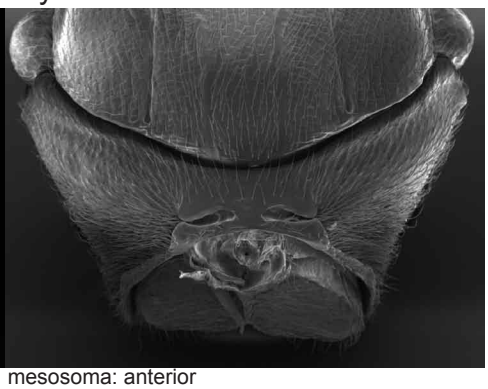


mesosoma: dorsal

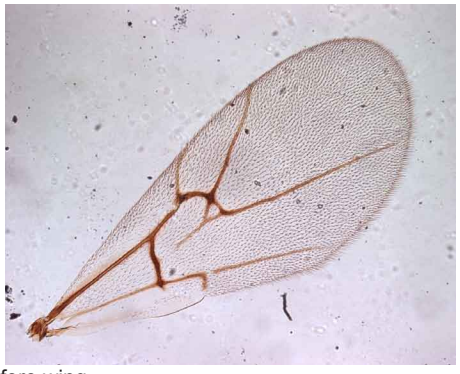
Aylax papaveris Cynipoidea: Cynipidae: Aylacini


mesosoma: lateral


mesosoma: ventral

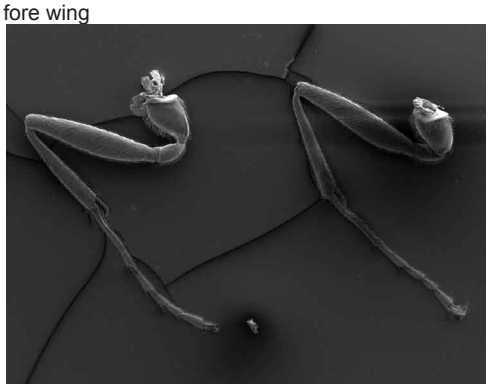

mesosoma: anterior

mesosoma: posterior

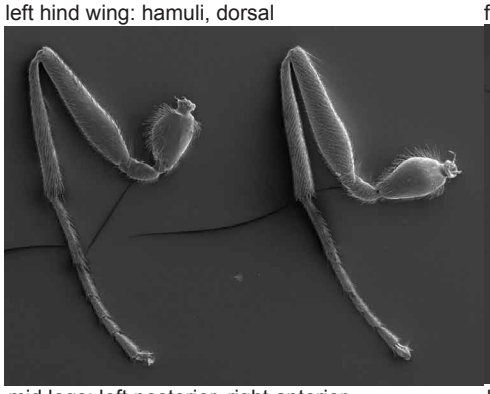

fore wing

left fore wing: dorsal

hind wing

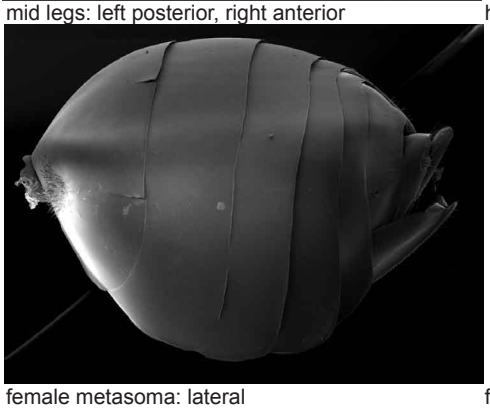

fore legs: left posterior, right anterior

left hind wing: hamuli, dorsal


mid legs: left posterior, right anterior

hind legs: top posterior, bottom anterior

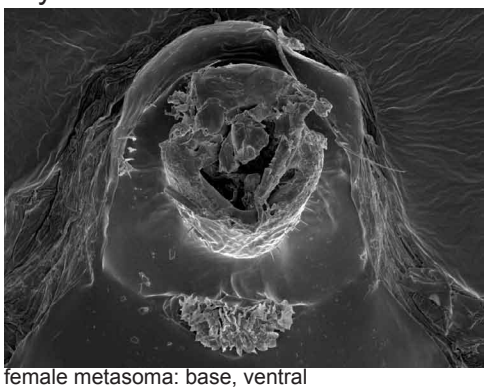
left fore leg: antennal cleaner, posterior


female metasoma: lateral

female metasoma: ventral

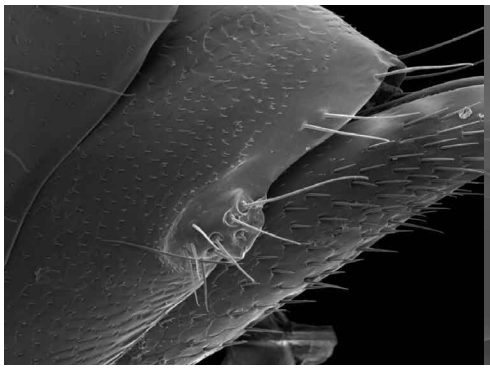
hind leg: tarsal claw

Aylax papaveris Cynipoidea: Cynipidae: Aylacini

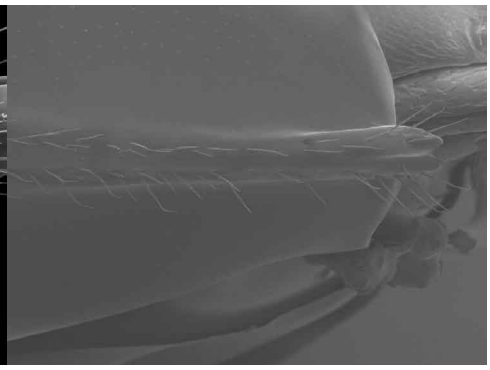


female metasoma: dorsal

female metasoma: base, lateral



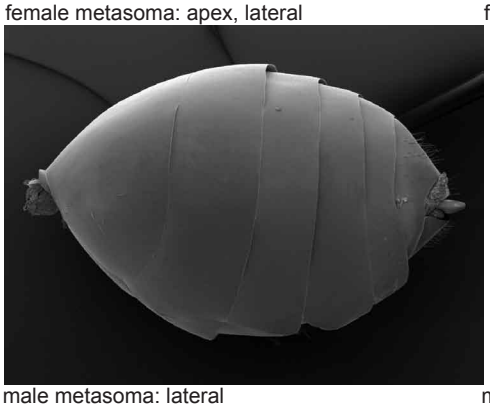
female metasoma: base, ventral



female metasoma: base, dorsal

female metasoma: apex, lateral

female metasoma: apex, ventral

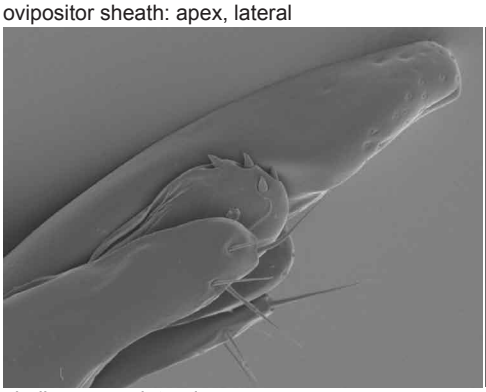


female metasoma: apex, dorsal

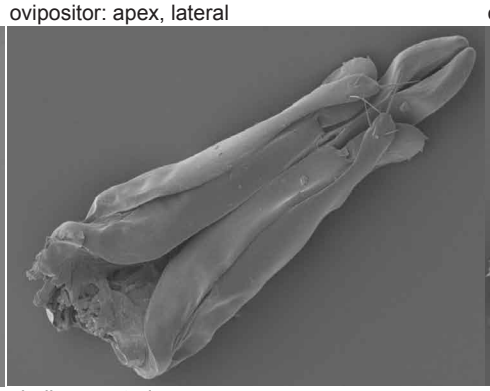
male metasoma: lateral

male metasoma: ventral

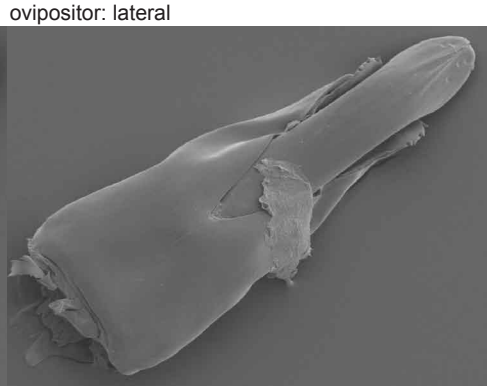
ovipositor sheath: apex, lateral



ovipositor: apex, lateral



ovipositor: lateral



phallus: apex, lateral

phallus: ventral

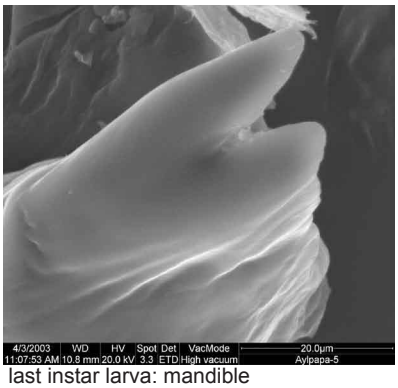
phallus: dorsal

Aylax papaveris Cynipoidea: Cynipidae: Aylacini

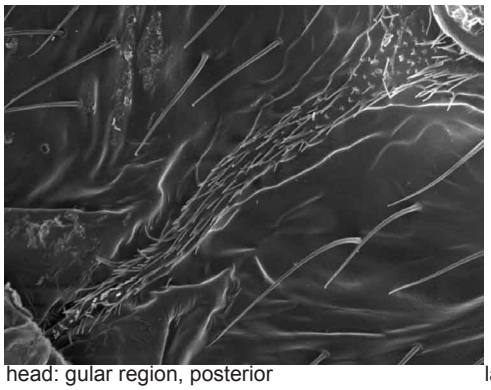
last instar larva: ventral

last instar larva: anterior

last instar larva: anterior

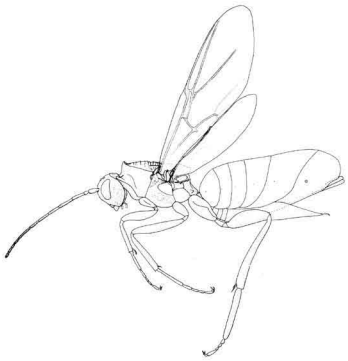


last instar larva: mandible


head: gular region, posterior

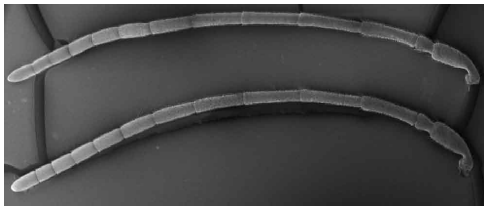
last instar larva: anterior

Ibalia rufipes Cynipoidea: Ibaliidae



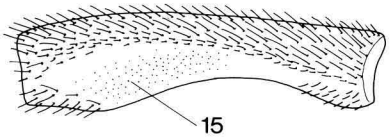
female habitus: lateral

male habitus: lateral, *Ibalia* sp.

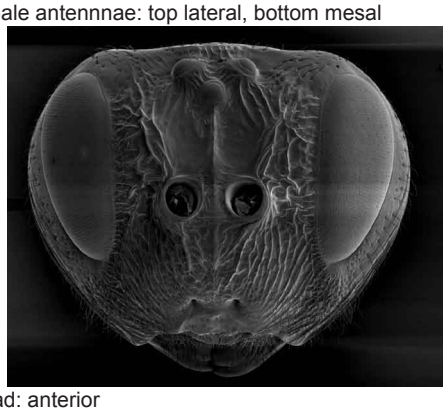


female antennnae: top lateral, bottom mesal

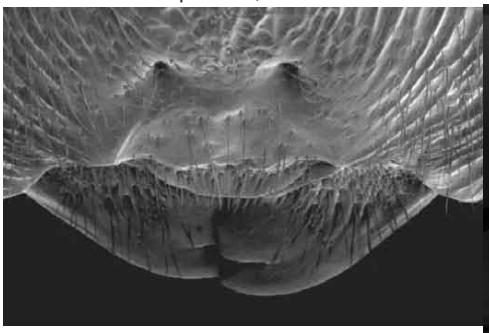
male antennae: top lateral, bottom mesal



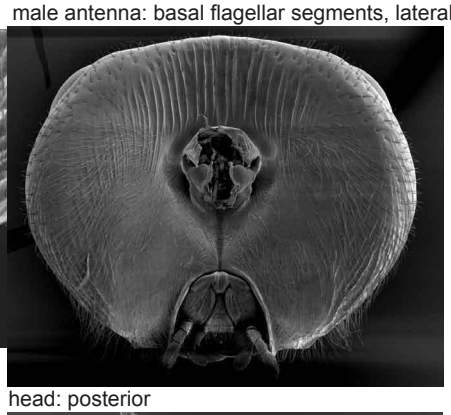
male antenna: basal flagellar segments, lateral



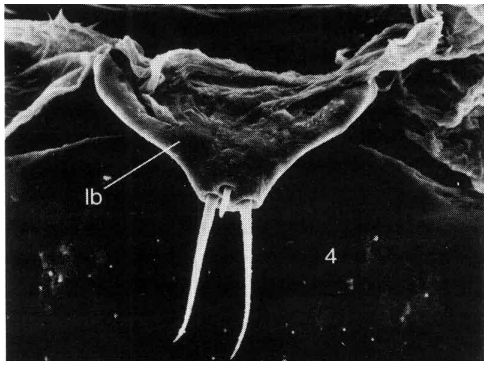
head: anterior



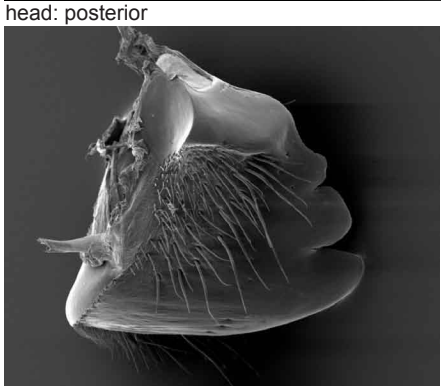
head: clypeus and mouthparts, anterior



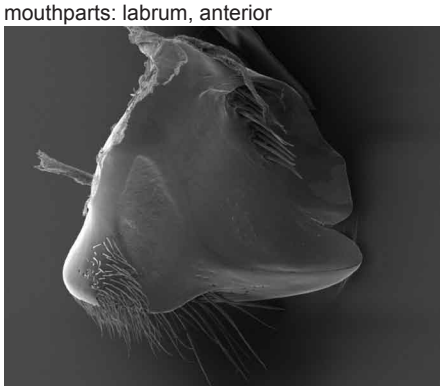
head: posterior



mouthparts: labrum, anterior

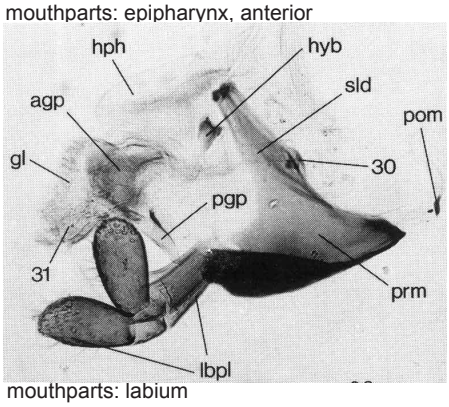


mouthparts: right mandible, anterior

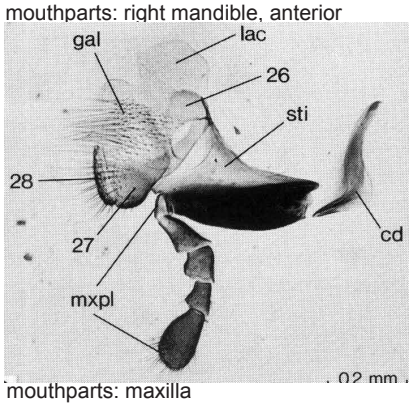


mouthparts: left mandible, posterior

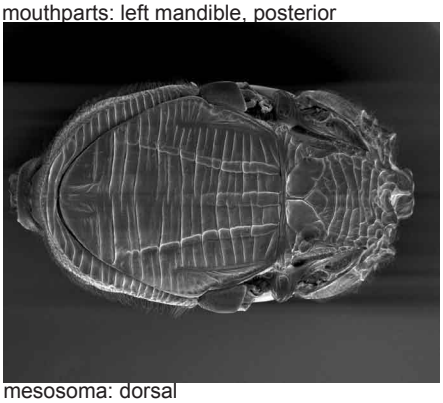
mouthparts: epipharynx, anterior



mouthparts: labium

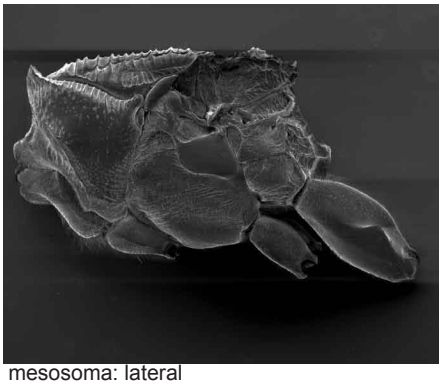


mouthparts: maxilla

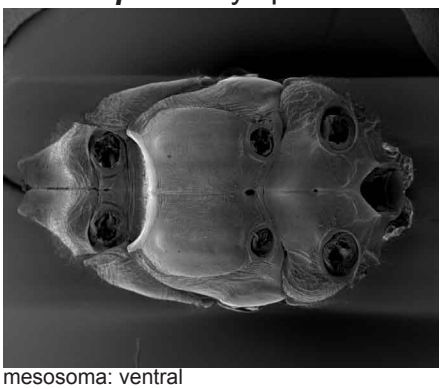


mesosoma: dorsal

Ibalia rufipes Cynipoidea: Ibaliidae



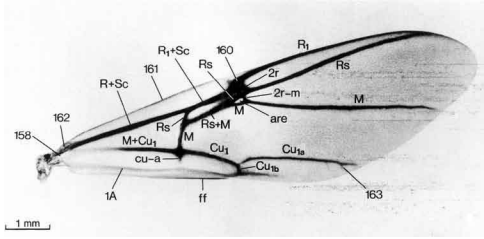
mesosoma: lateral



mesosoma: ventral

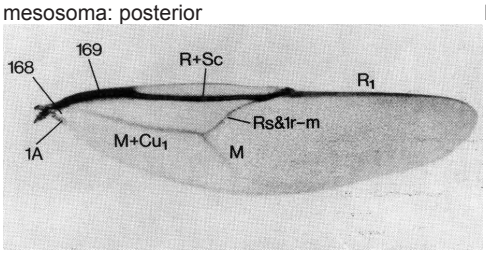
mesosoma: anterior

mesosoma: posterior

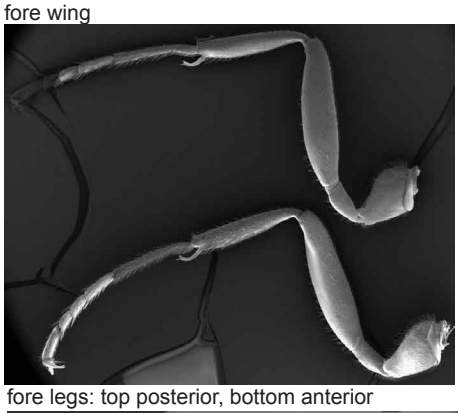


left fore wing: dorsal

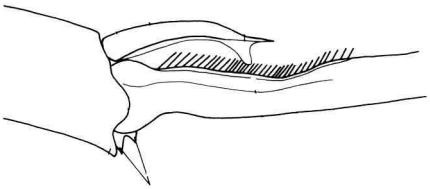
fore wing



hind wing

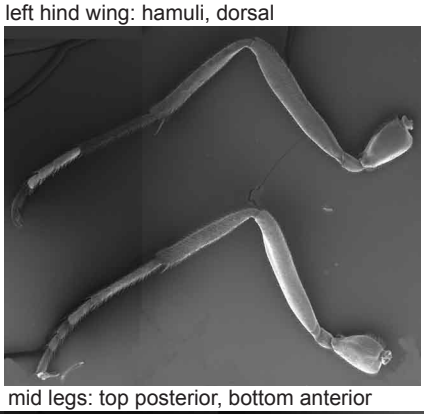


fore legs: top posterior, bottom anterior

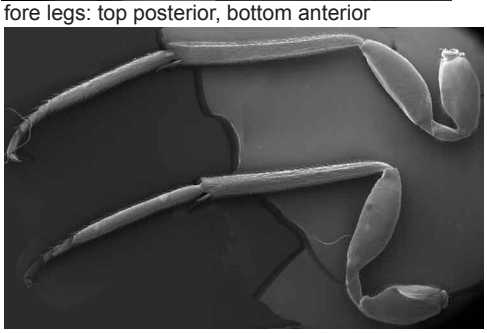


left fore leg: antennal cleaner, posterior

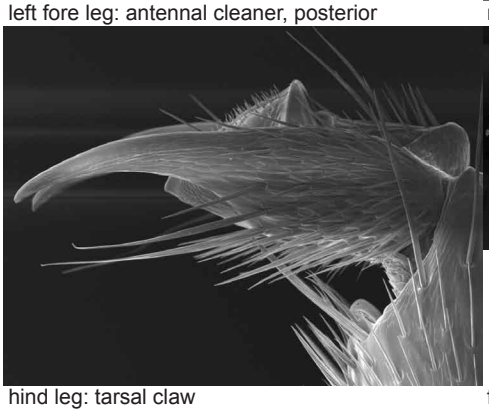
left hind wing: hamuli, dorsal



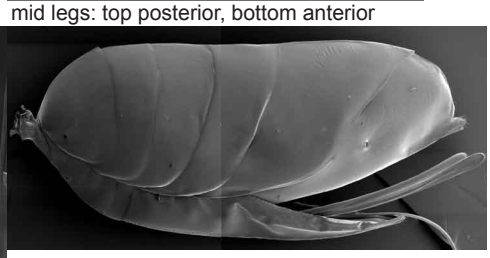
mid legs: top posterior, bottom anterior



hind legs: top posterior, bottom anterior



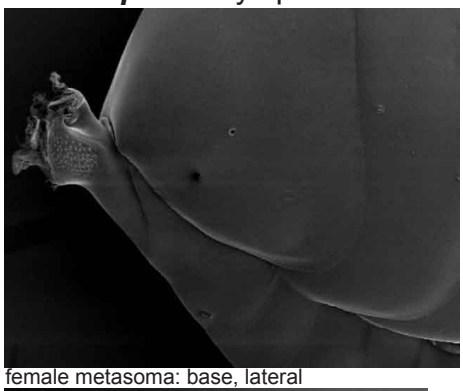
hind leg: tarsal claw



female metasoma: lateral

female metasoma: ventral

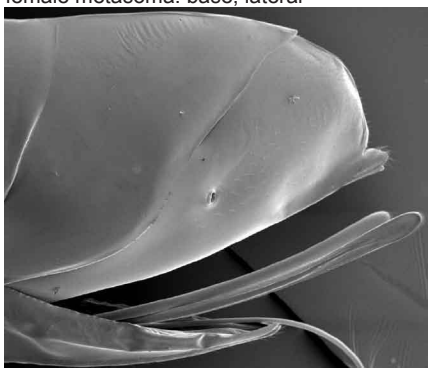
Ibalia rufipes Cynipoidea: Ibaliidae



female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral

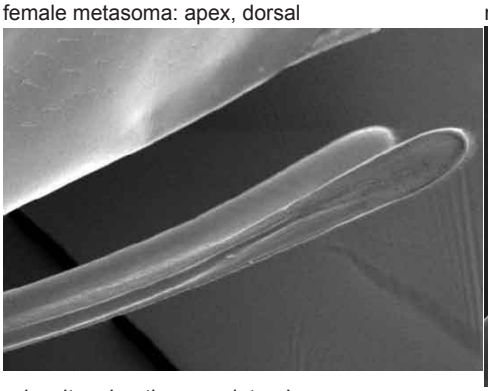


female metasoma: base, dorsal

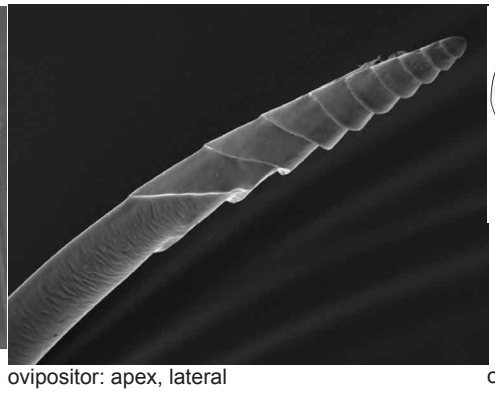
female metasoma: apex, lateral

female metasoma: apex, ventral

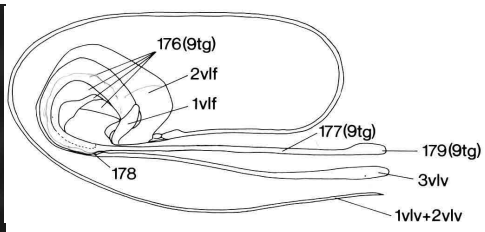
female metasoma: apex, dorsal



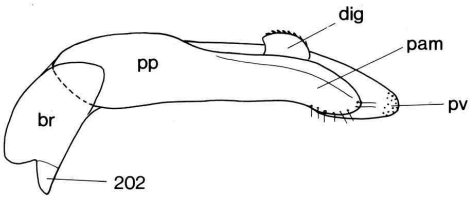
male metasoma: lateral



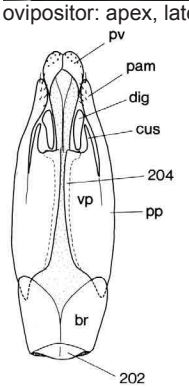
male metasoma: ventral



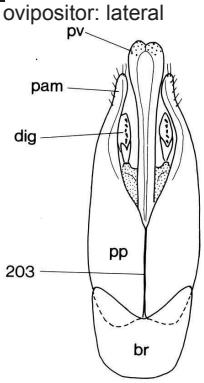
ovipositor sheath: apex, lateral



ovipositor: apex, lateral



ovipositor: lateral

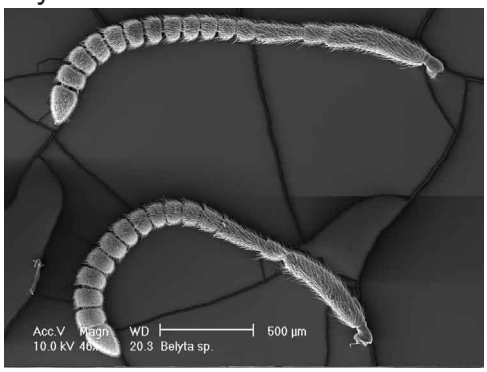


phallus: lateral

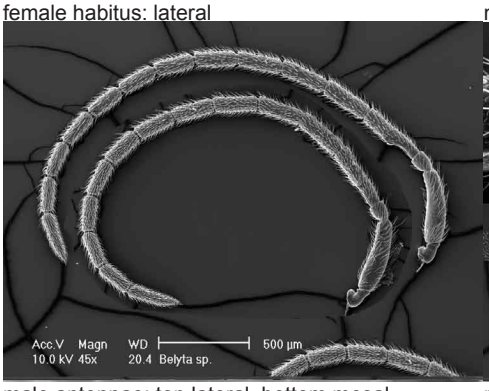
phallus: ventral

phallus: dorsal

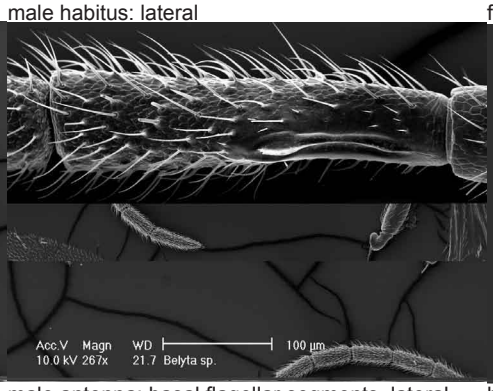
***Belyta* sp.** Proctotrupoidea: Diapriidae: Belytinae



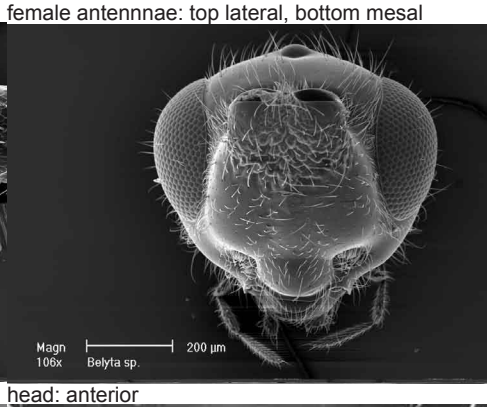
female habitus: lateral



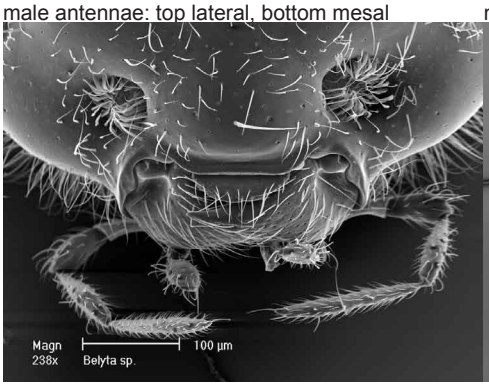
male habitus: lateral



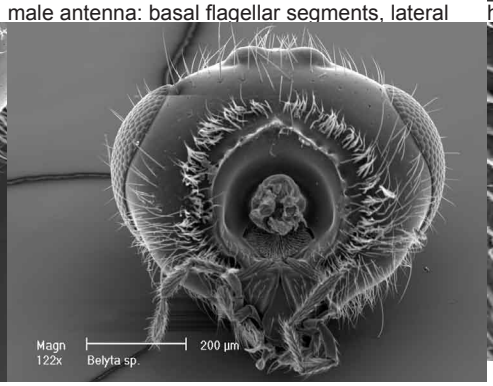
female antennnae: top lateral, bottom mesal



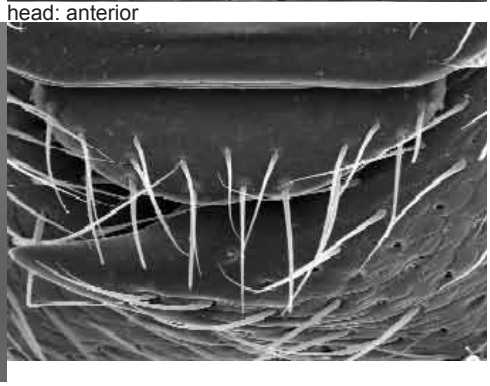
male antennae: top lateral, bottom mesal



male antenna: basal flagellar segments, lateral

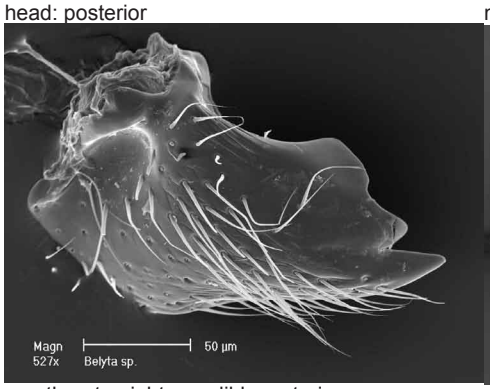


head: anterior

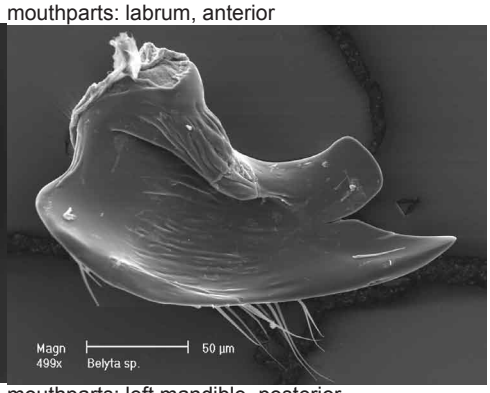


head: clypeus and mouthparts, anterior

head: posterior



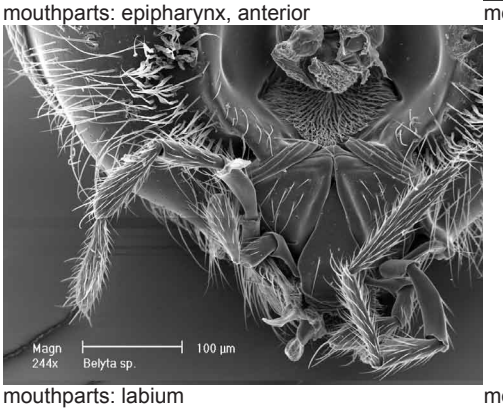
mouthparts: labrum, anterior

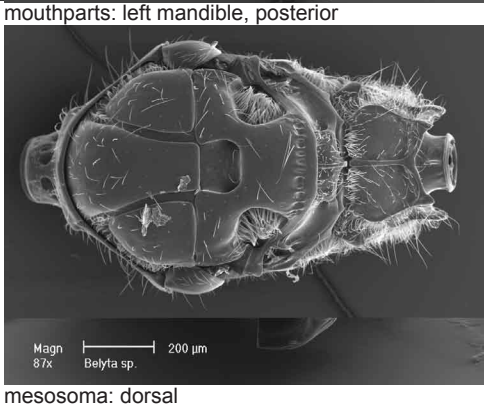


mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior





mouthparts: labium

mouthparts: maxilla

mesosoma: dorsal

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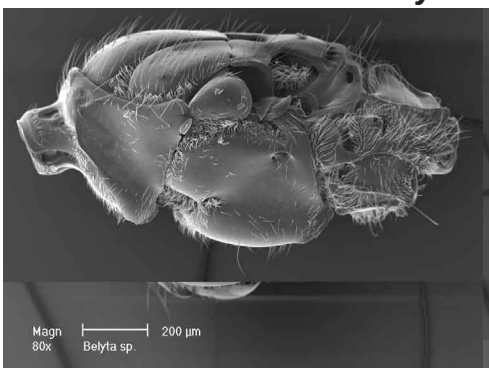
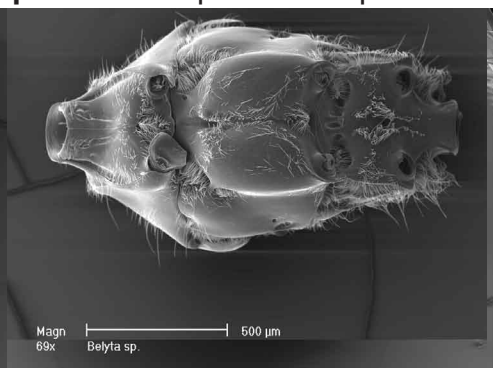
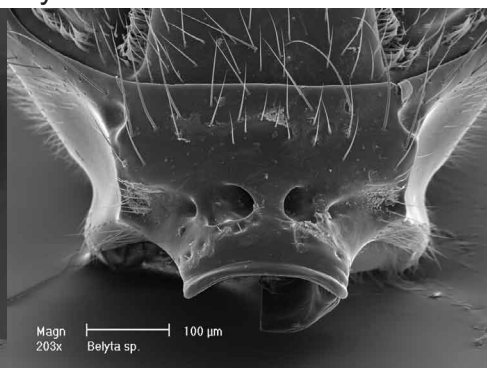
***Belyta* sp.** Proctotrupoidea: Diapriidae: Belytinae



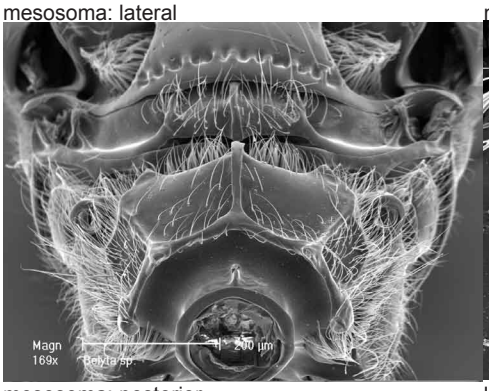
mesosoma: lateral



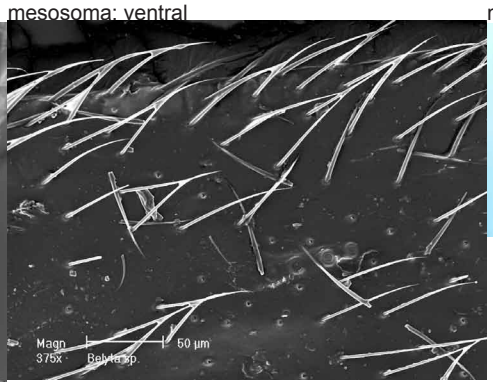
mesosoma: ventral



mesosoma: anterior



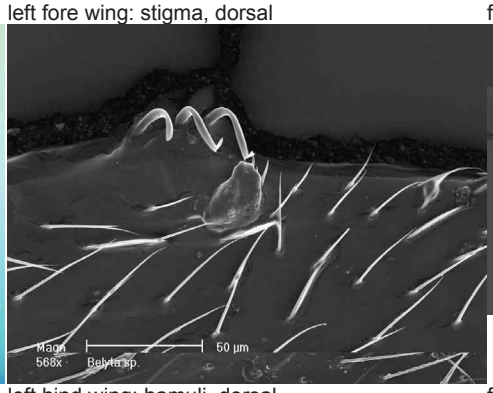
mesosoma: posterior



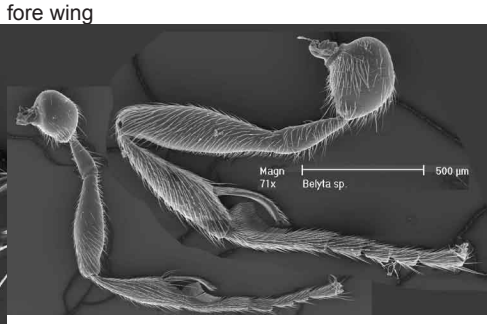
left fore wing: stigma, dorsal

fore wing

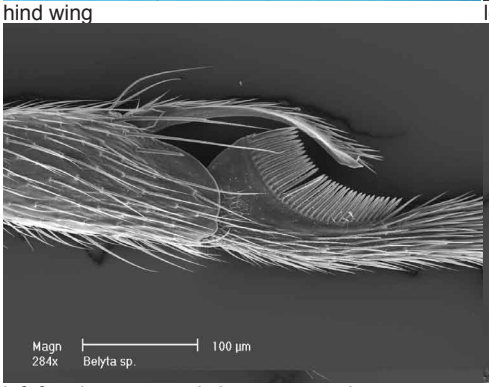
hind wing



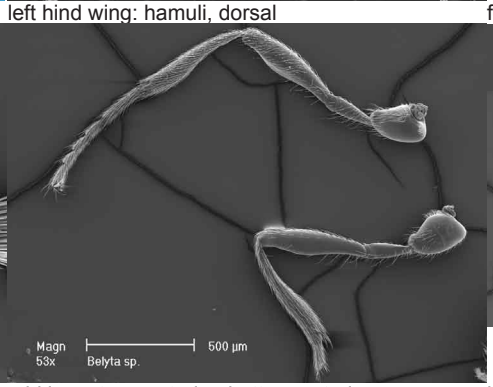
left hind wing: hamuli, dorsal



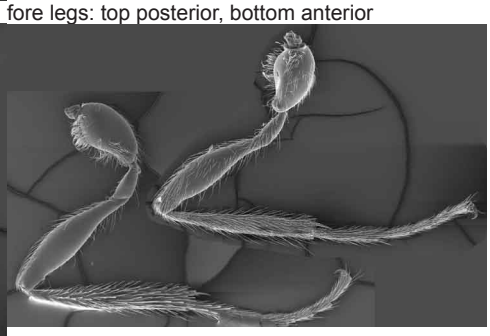
fore legs: top posterior, bottom anterior



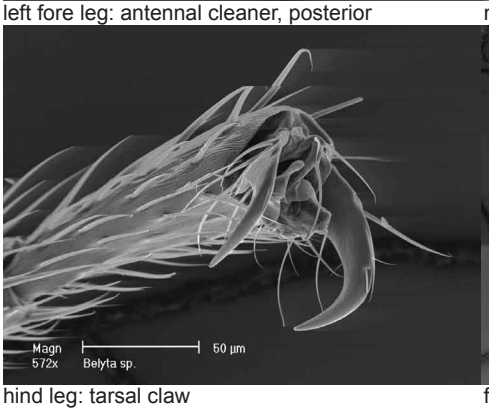
left fore leg: antennal cleaner, posterior



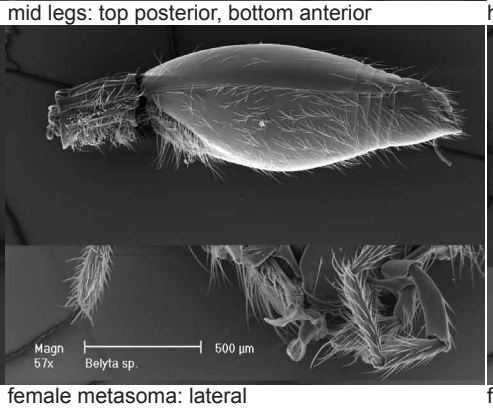
mid legs: top posterior, bottom anterior



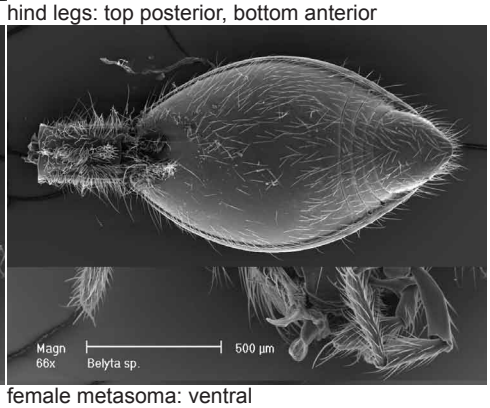
hind legs: top posterior, bottom anterior



hind leg: tarsal claw



female metasoma: lateral



female metasoma: ventral

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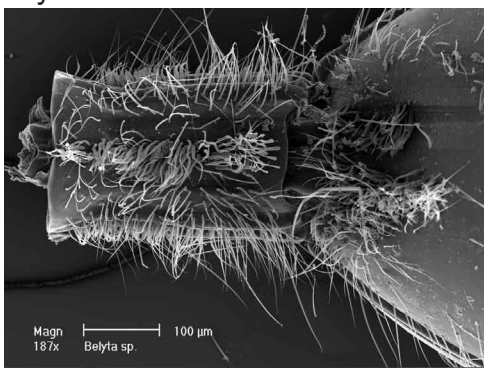
***Belyta* sp.** Proctotrupoidea: Diapriidae: Belytinae



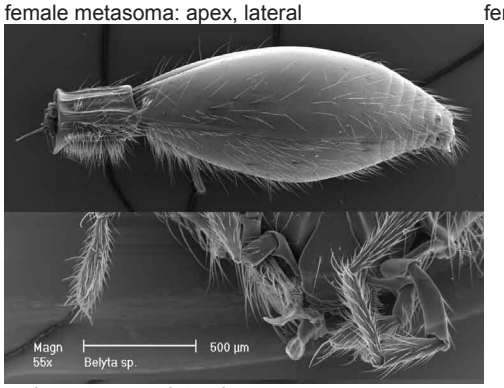
female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral

female metasoma: base, dorsal

female metasoma: apex, lateral

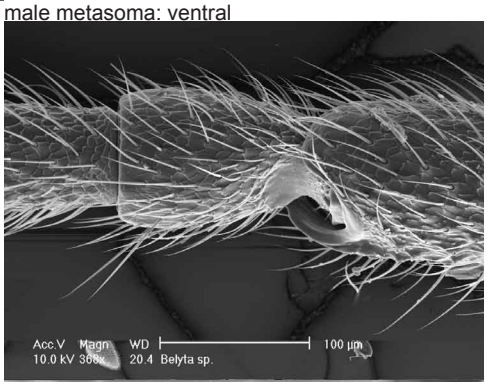


female metasoma: apex, ventral

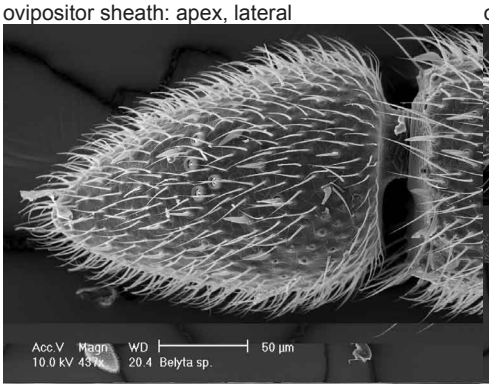
female metasoma: apex, dorsal

male metasoma: lateral

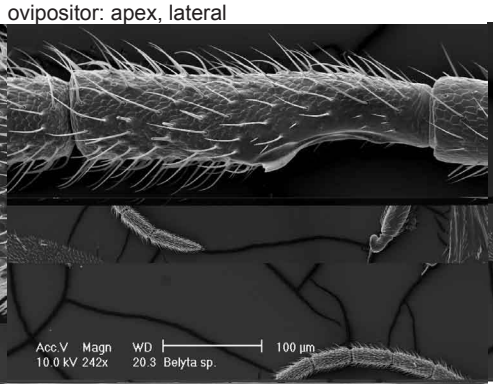
male metasoma: ventral

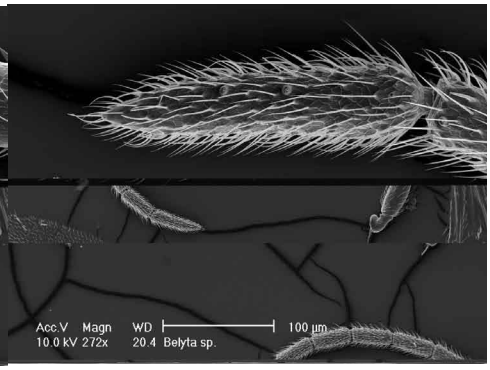


ovipositor sheath: apex, lateral



ovipositor: apex, lateral





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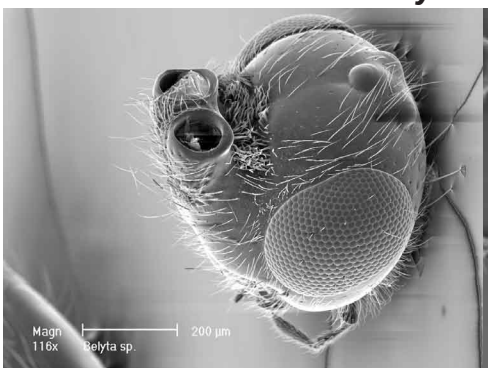
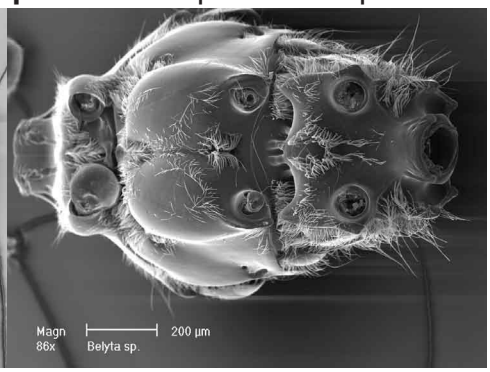
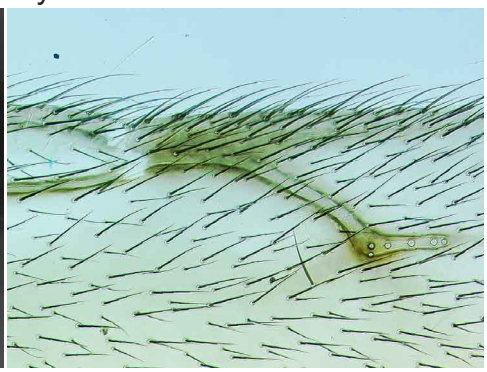
***Belyta* sp.** Proctotrupoidea: Diapriidae: Belytinae



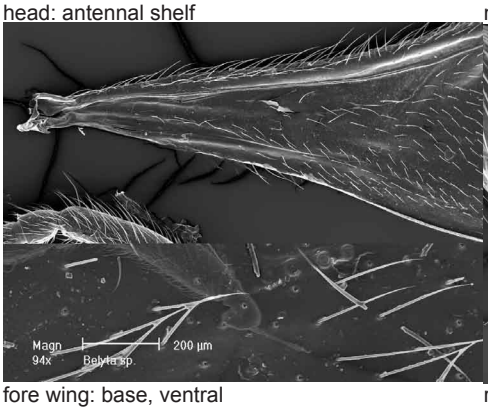
head: antennal shelf



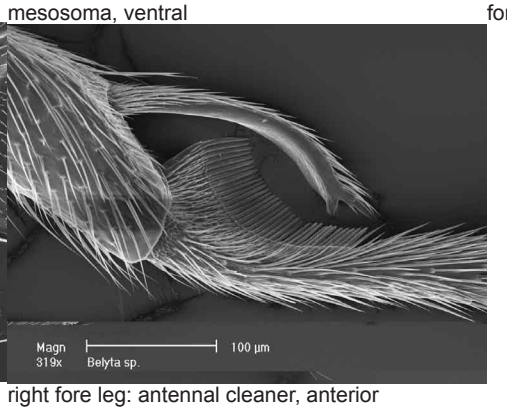
mesosoma, ventral



fore wing: detail



fore wing: base, ventral



right fore leg: antennal cleaner, anterior

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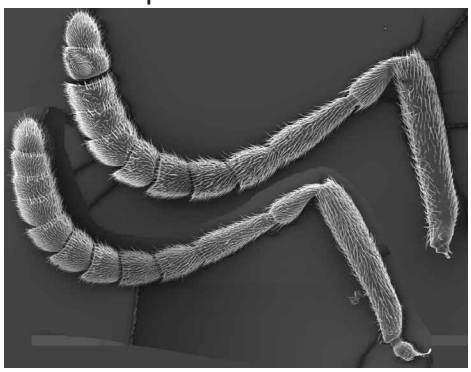
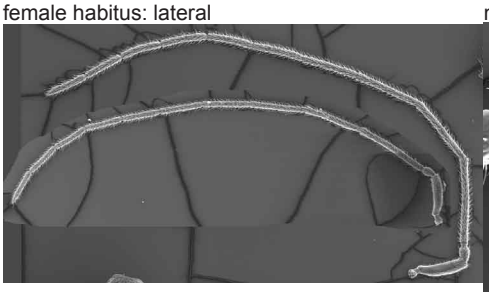
***Archaeoteleia* sp.** Platygastroidea: Scelionidae: Scelioninae: Sparasionini

female habitus: lateral

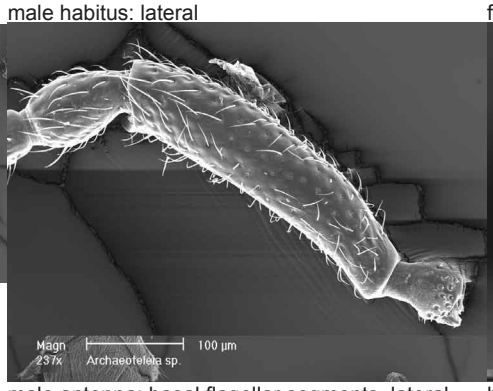
male habitus: lateral



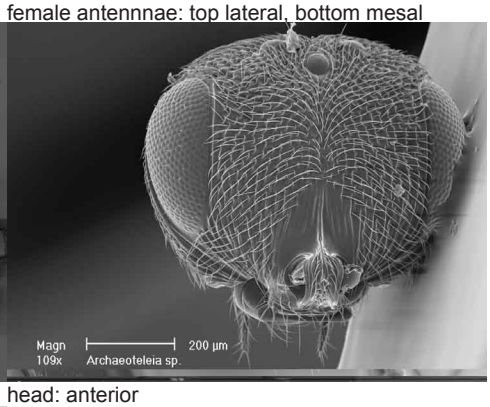
female antennnae: top lateral, bottom mesal



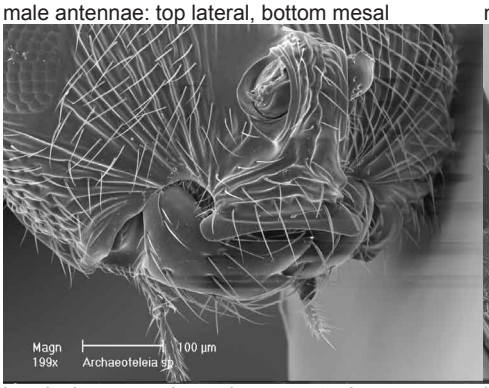
male antennae: top lateral, bottom mesal



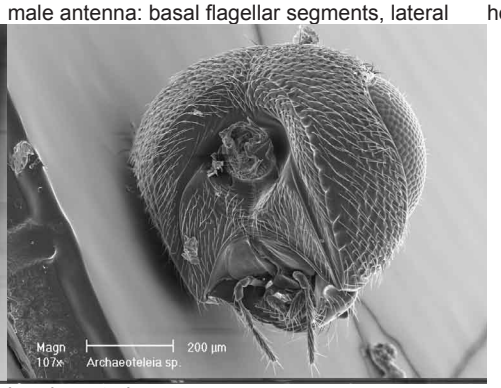
male antenna: basal flagellar segments, lateral



head: anterior



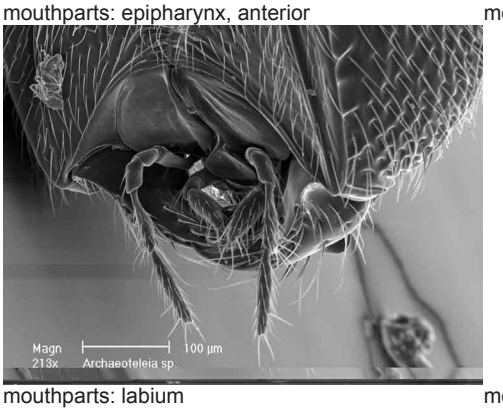
head: clypeus and mouthparts, anterior



head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

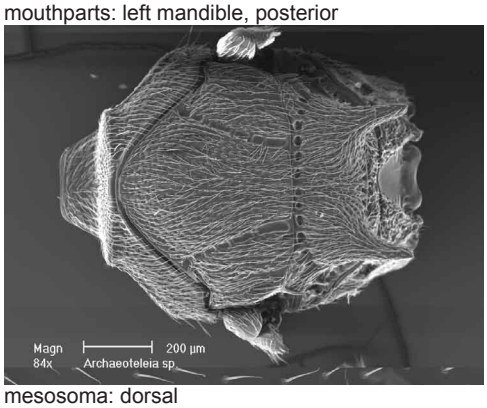


mouthparts: labium

mouthparts: right mandible, anterior

mouthparts: maxilla

mouthparts: left mandible, posterior



mesosoma: dorsal

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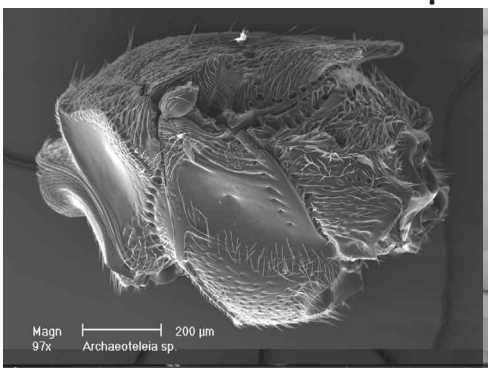
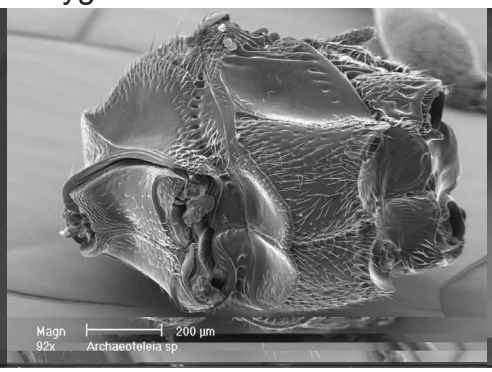
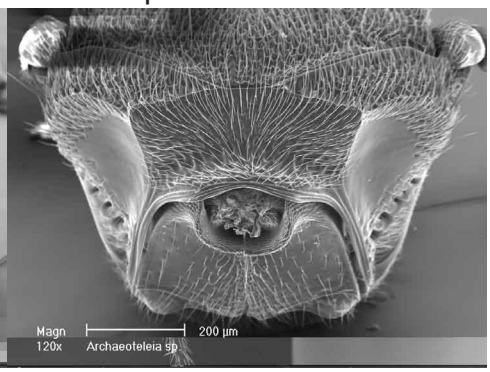
***Archaeoteleia* sp.** Platygastroidea: Scelionidae: Scelioninae:Sparasionini



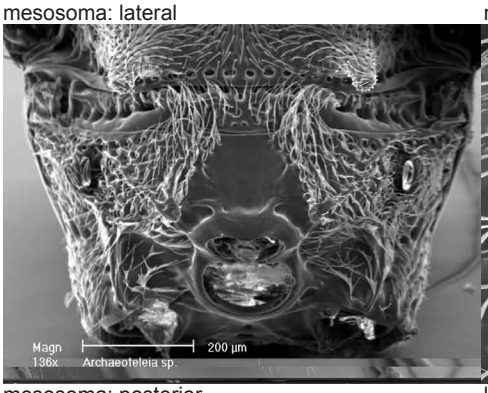
mesosoma: lateral



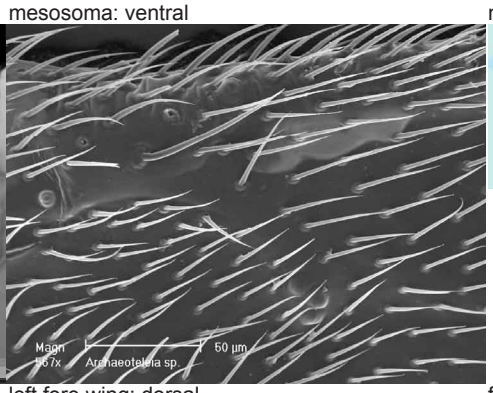
mesosoma: ventral



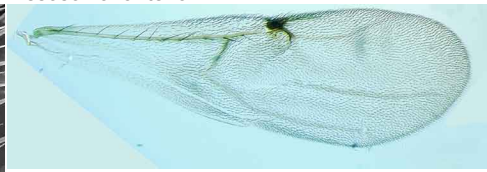
mesosoma: anterior



mesosoma: posterior

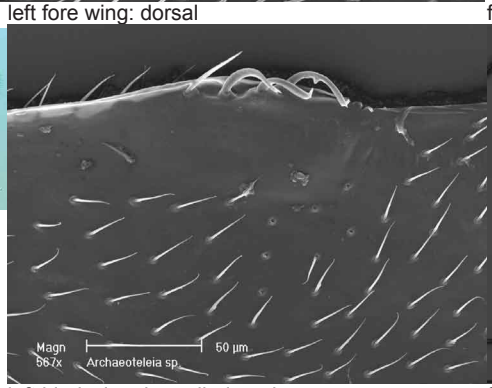


left fore wing: dorsal

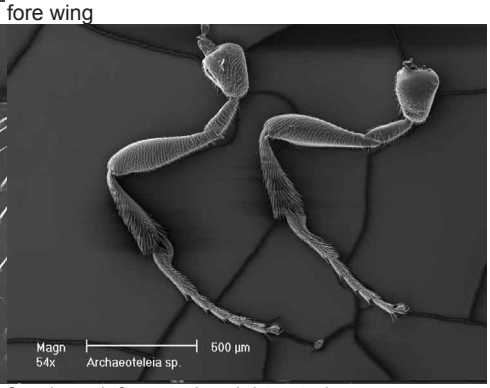


fore wing

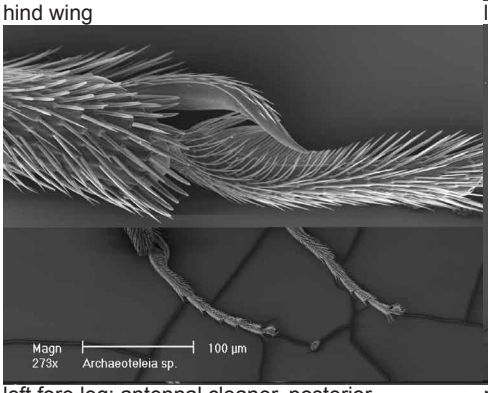
hind wing



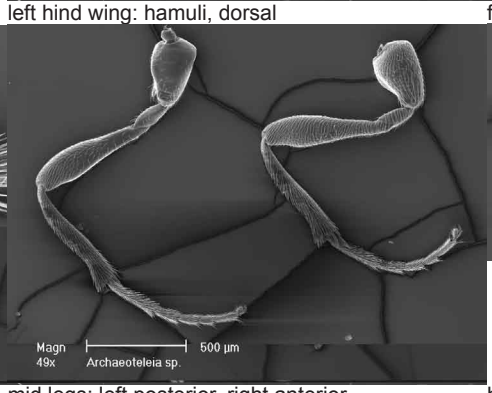
left hind wing: hamuli, dorsal



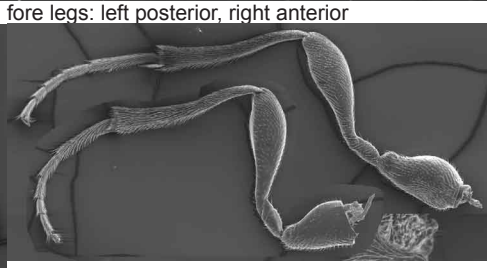
fore legs: left posterior, right anterior



left fore leg: antennal cleaner, posterior

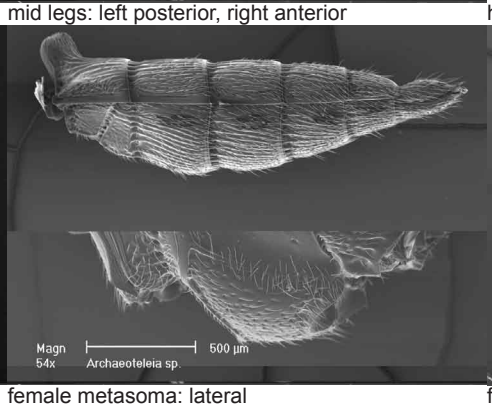


mid legs: left posterior, right anterior

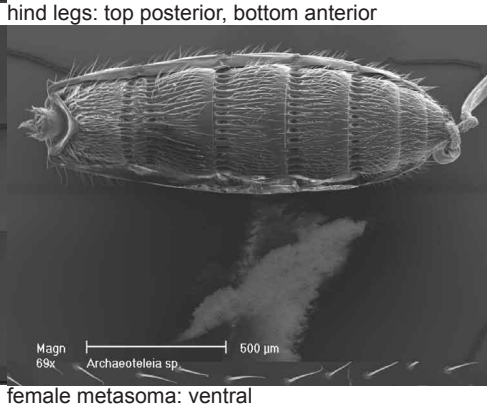


hind legs: top posterior, bottom anterior

hind leg: tarsal claw



female metasoma: lateral



female metasoma: ventral

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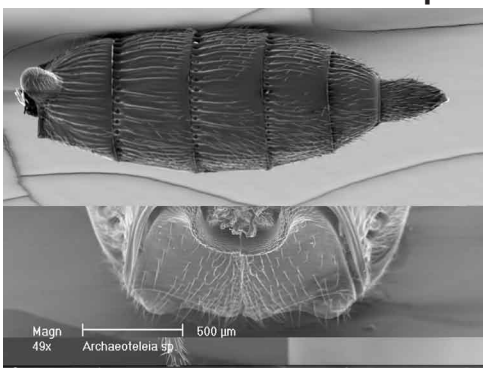
***Archaeoteleia* sp.** Platygastroidea: Scelionidae: Scelioninae: Sparasionini



female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral

female metasoma: base, dorsal

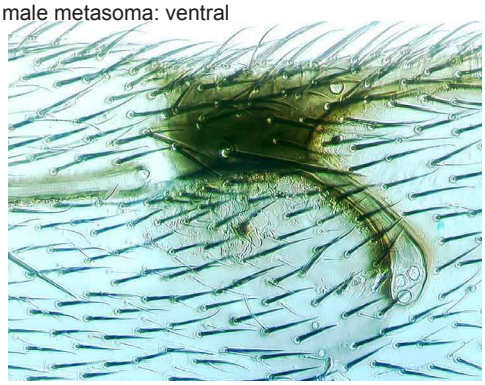
female metasoma: apex, lateral

female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

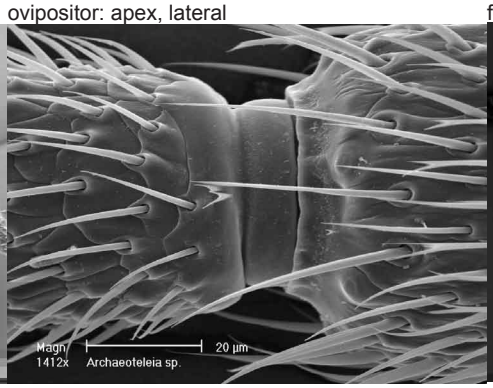
male metasoma: ventral



ovipositor sheath: apex, lateral

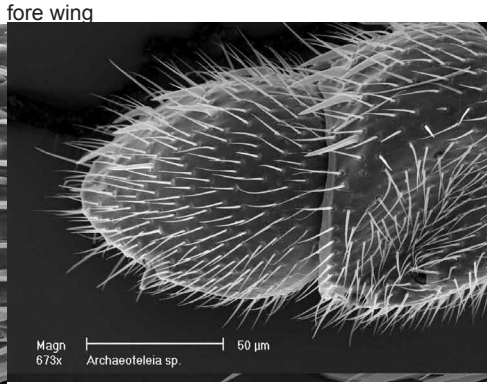
mesosoma: ventral

ovipositor: apex, lateral



antenna, female: flagellum base

fore wing



antenna, female: apex

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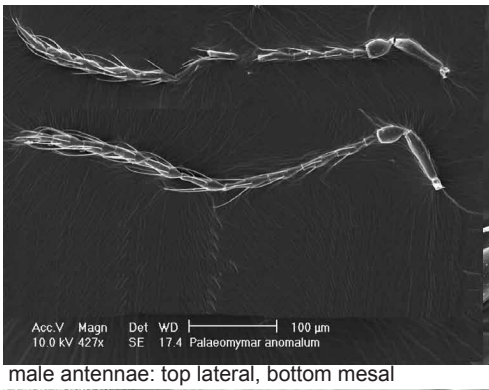
Palaeomymar anomalum Serphitoidea: Mymarommatidae

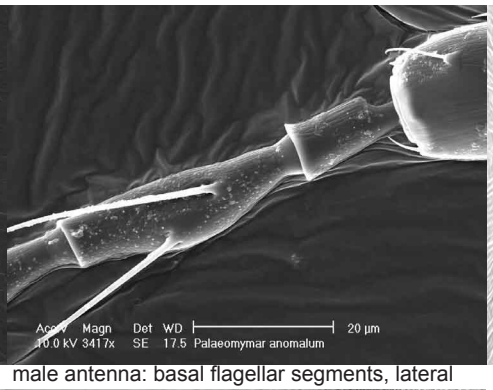
female habitus: lateral

male habitus: lateral

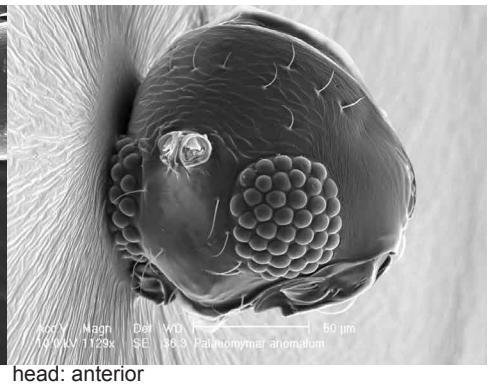
female antennnae: top lateral, bottom mesal



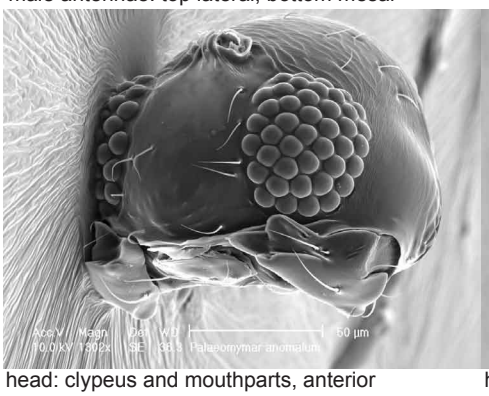
male antennae: top lateral, bottom mesal



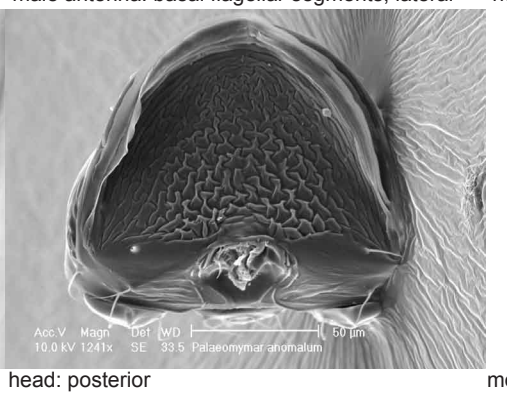
male antenna: basal flagellar segments, lateral



head: anterior



head: clypeus and mouthparts, anterior



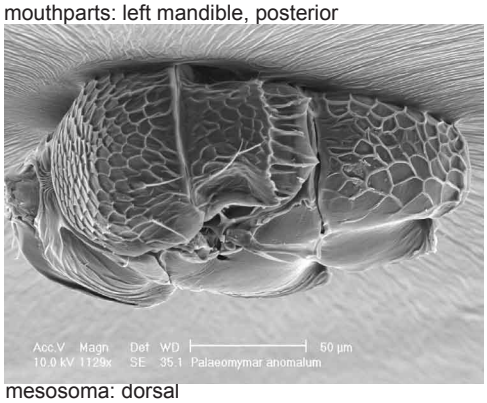
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

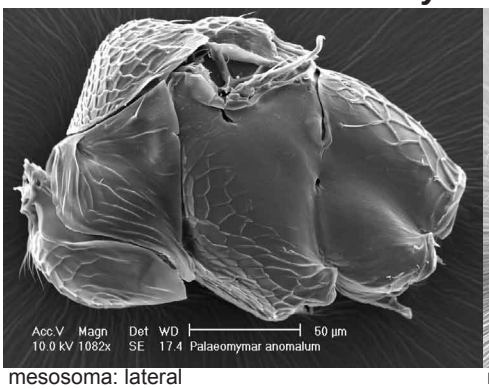


mouthparts: labium

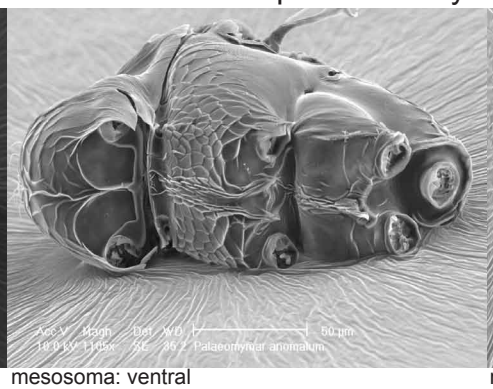
mouthparts: maxilla

mesosoma: dorsal

Palaeomymar anomalum Serphitoidea: Mymarommatidae

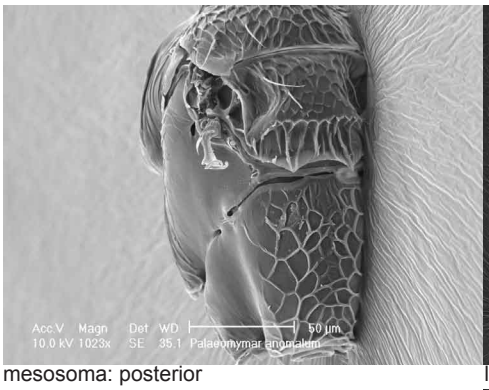


mesosoma: lateral

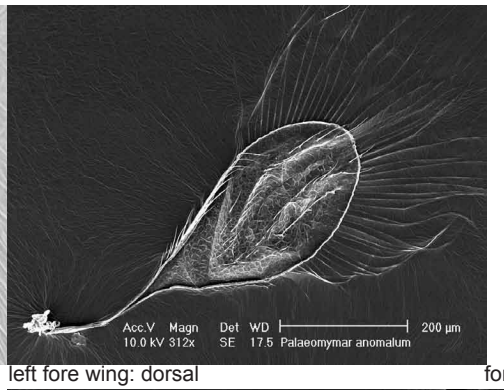


mesosoma: ventral

mesosoma: anterior



mesosoma: posterior

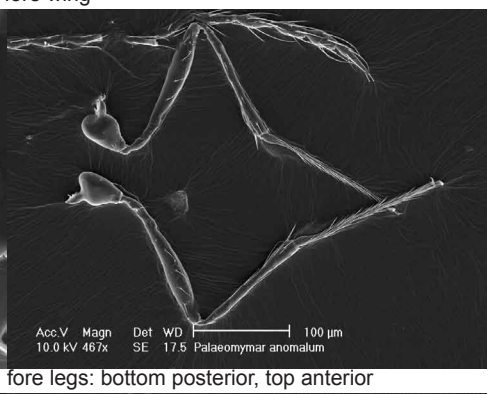


left fore wing: dorsal

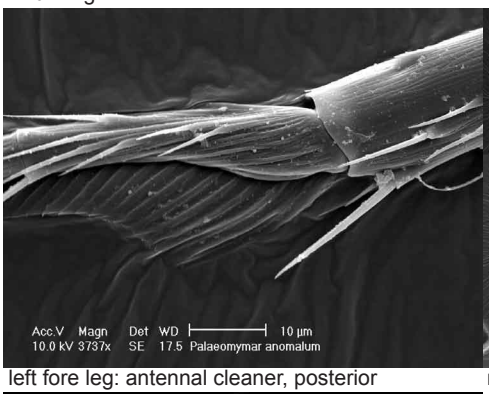
fore wing

hind wing

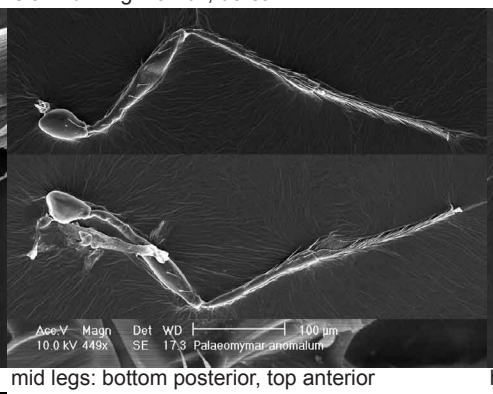
left hind wing: hamuli, dorsal



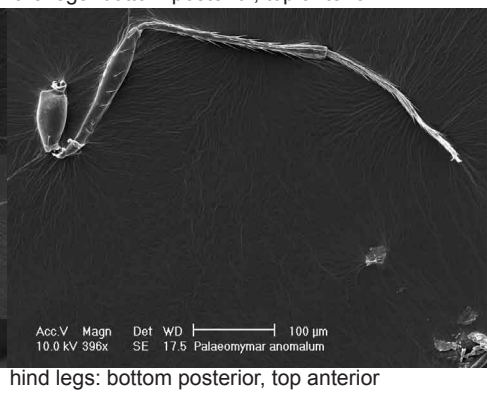
fore legs: bottom posterior, top anterior



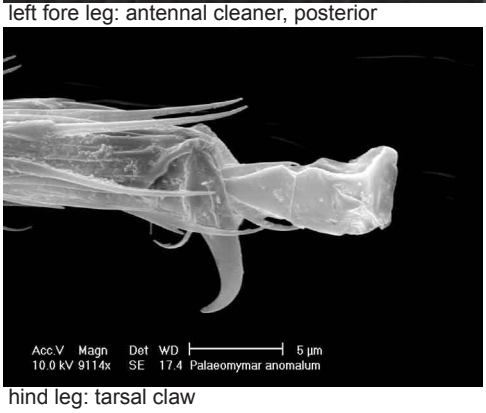
left fore leg: antennal cleaner, posterior



mid legs: bottom posterior, top anterior



hind legs: bottom posterior, top anterior



hind leg: tarsal claw

female metasoma: lateral

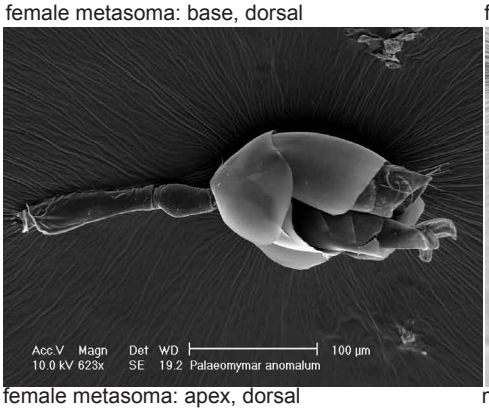
female metasoma: ventral

female metasoma: dorsal

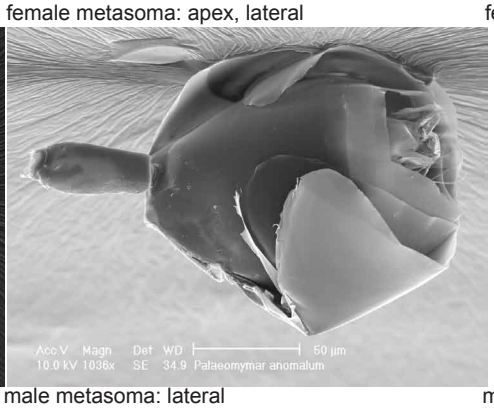
female metasoma: base, lateral

female metasoma: base, ventral

female metasoma: base, dorsal



female metasoma: apex, lateral



female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

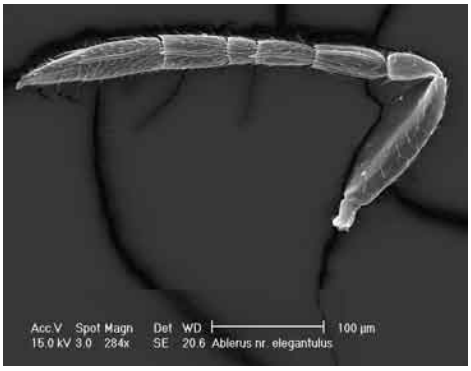
ovipositor sheath: apex, lateral

ovipositor: apex, lateral

Ablerus sp. Chalcidoidea: Aphelinidae: Azotinae

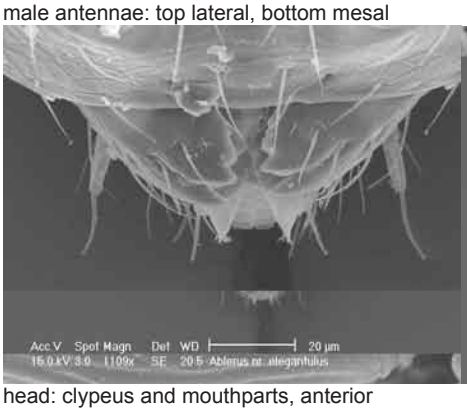
female habitus: lateral

male habitus: lateral

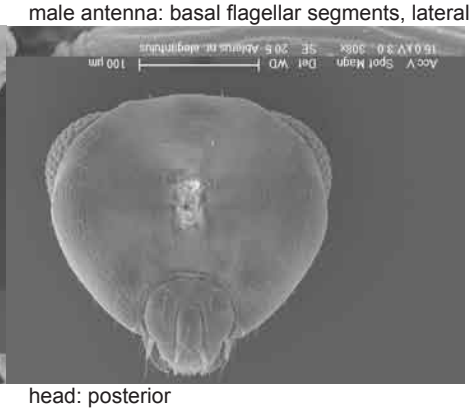


female antennae: top lateral, bottom mesal

male antennae: top lateral, bottom mesal



male antenna: basal flagellar segments, lateral



head: anterior

head: clypeus and mouthparts, anterior

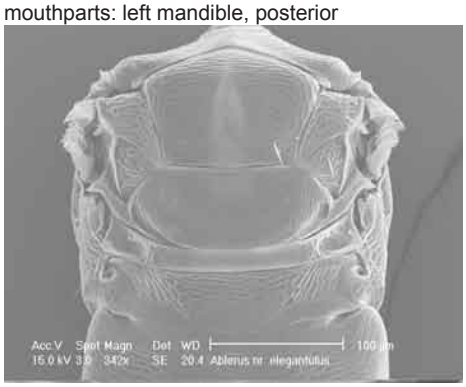
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior



mouthparts: labium

mouthparts: maxilla

mesosoma: dorsal

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Ablerus sp. Chalcidoidea: Aphelinidae: Azotinae

mesosoma: lateral

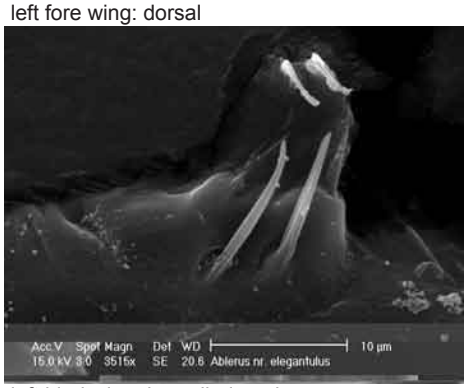
mesosoma: ventral

mesosoma: anterior

mesosoma: posterior

left fore wing: dorsal

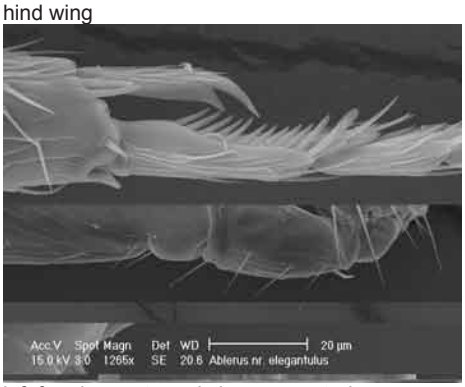
fore wing



hind wing

left hind wing: hamuli, dorsal

fore legs: top posterior, bottom anterior



left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior

hind legs: top posterior, bottom anterior

hind leg: tarsal claw

female metasoma: lateral

female metasoma: ventral

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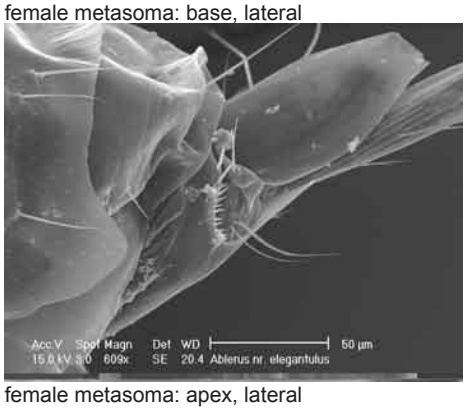
Ablerus sp. Chalcidoidea: Aphelinidae: Azotinae

female metasoma: dorsal

female metasoma: base, lateral



female metasoma: base, ventral

female metasoma: base, dorsal

female metasoma: apex, lateral

female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

ovipositor sheath: apex, lateral

ovipositor: apex, lateral

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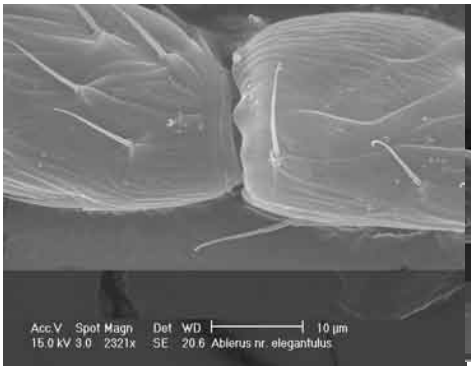
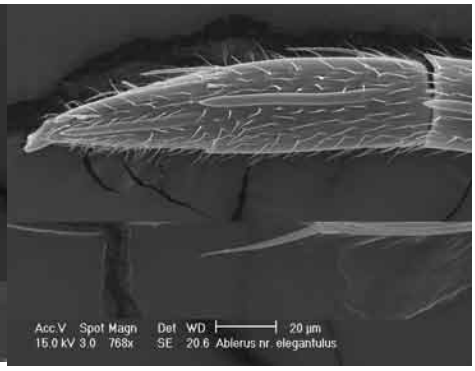
Ablerus sp. Chalcidoidea: Aphelinidae: Azotinae



antenna: flagellar base: mesal

mesocoxa: mesal



female antenna: club: mesal

forewing: stigma: dorsal

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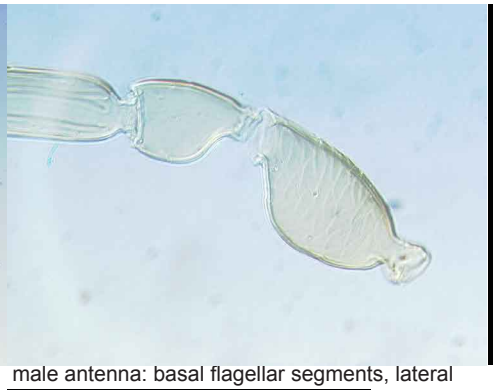
Acmopolynema varium Chalcidoidea: Mymaridae

female habitus: lateral

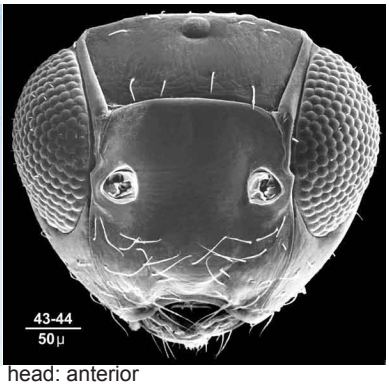
male habitus: lateral

female antennnae: top lateral, bottom mesal

male antennae: top lateral, bottom mesal

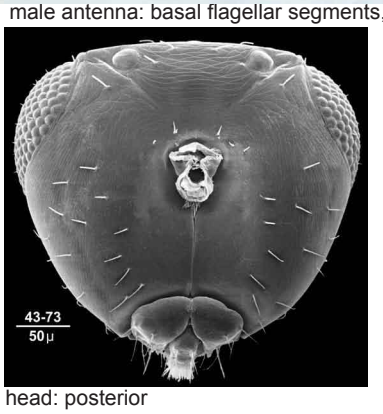


male antenna: basal flagellar segments, lateral



head: anterior

head: clypeus and mouthparts, anterior



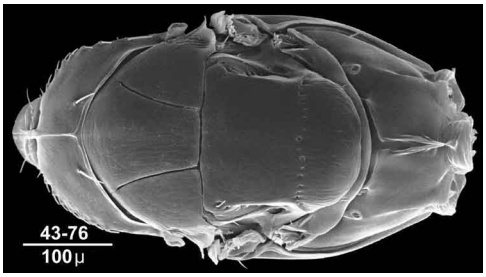
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

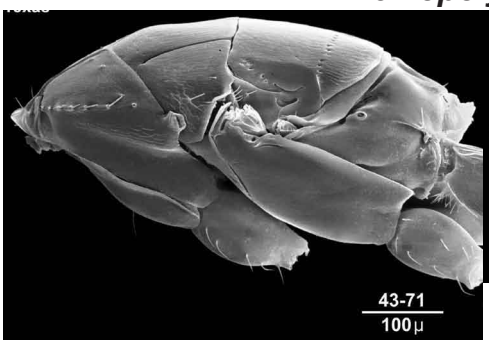


mouthparts: labium

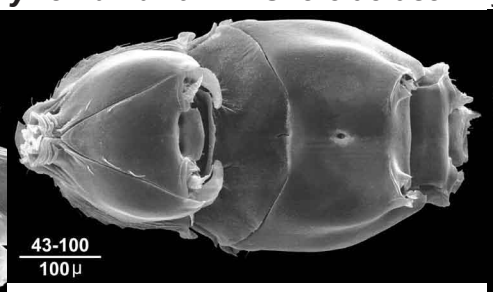
mouthparts: maxilla

mesosoma: dorsal

Acmopolynema varium Chalcidoidea: Mymaridae

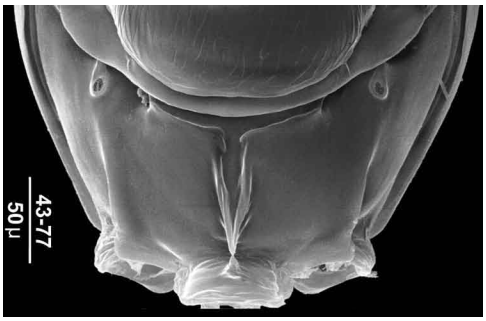


mesosoma: lateral

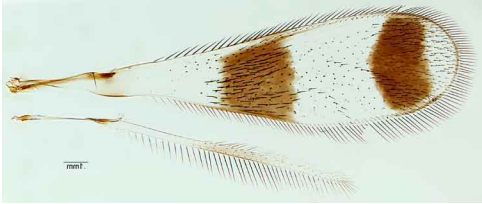


mesosoma: ventral

mesosoma: anterior



mesosoma: posterior



left fore wing: dorsal

fore wing

hind wing

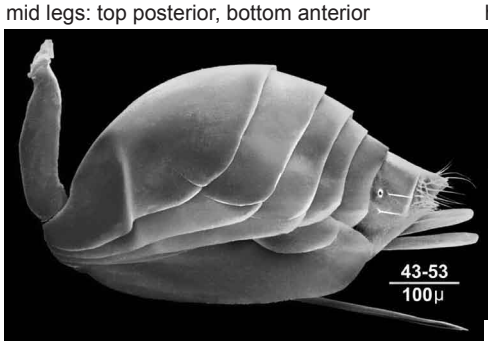
left hind wing: hamuli, dorsal

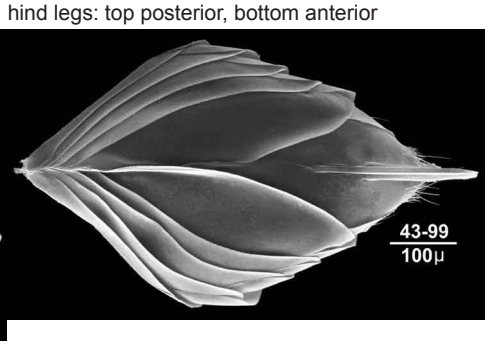
fore legs: top posterior, bottom anterior

left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior

hind legs: top posterior, bottom anterior



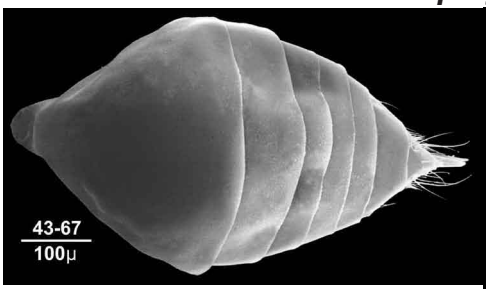


hind leg: tarsal claw

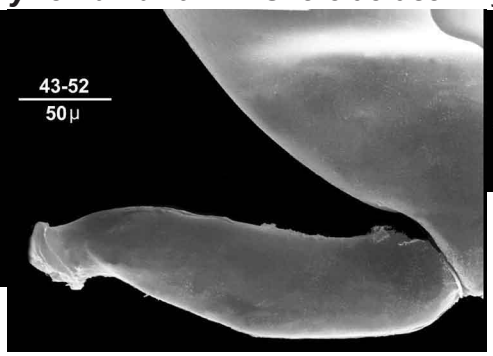
female metasoma: lateral

female metasoma: ventral

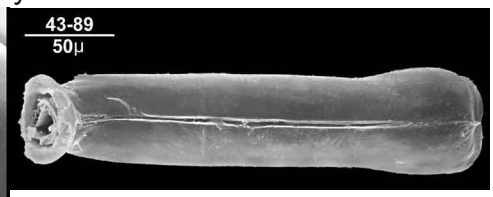
Acmopolynema varium Chalcidoidea: Mymaridae



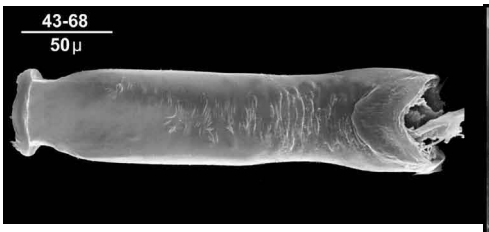
female metasoma: dorsal



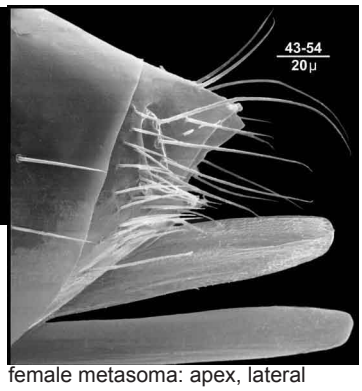
female metasoma: base, lateral



female metasoma: base, ventral

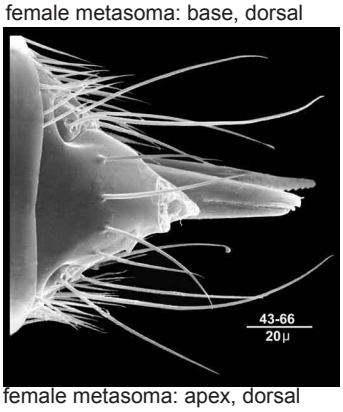


female metasoma: base, dorsal



female metasoma: apex, lateral

female metasoma: apex, ventral



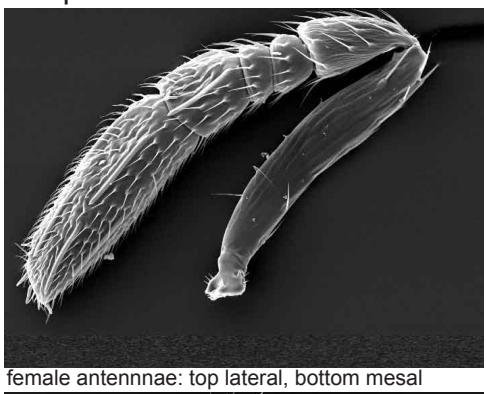
female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

ovipositor sheath: apex, lateral

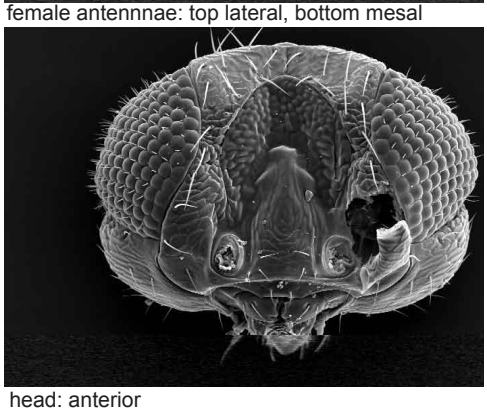
ovipositor: apex, lateral



female habitus: lateral

male habitus: lateral

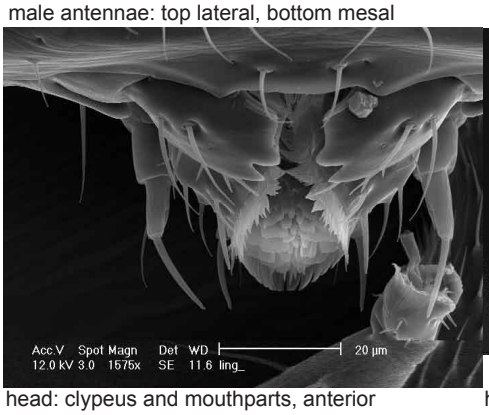
female antennnae: top lateral, bottom mesal

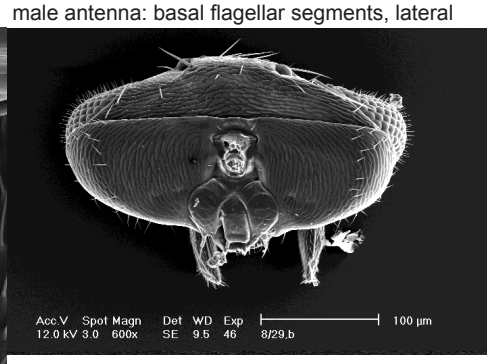


male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

head: anterior





head: clypeus and mouthparts, anterior

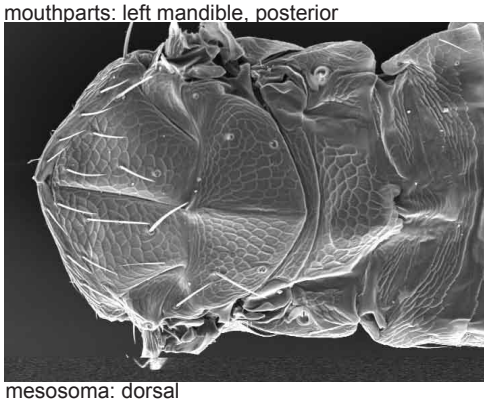
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior



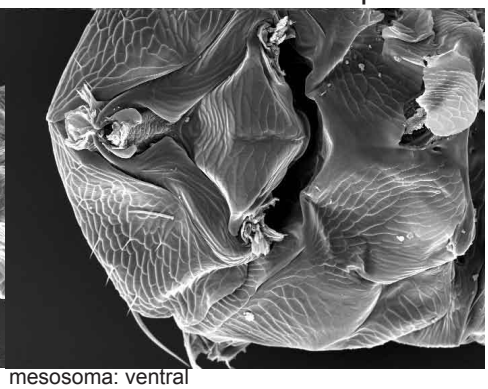
mouthparts: labium

mouthparts: maxilla

mesosoma: dorsal

Aphytis lignanensis Chalcidoidea: Aphelinidae: Aphelininae

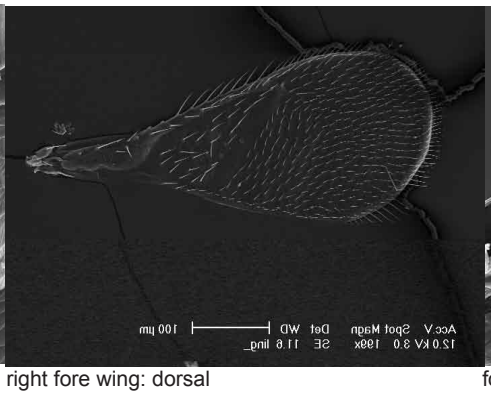
mesosoma: lateral



mesosoma: ventral

mesosoma: anterior

mesosoma: posterior



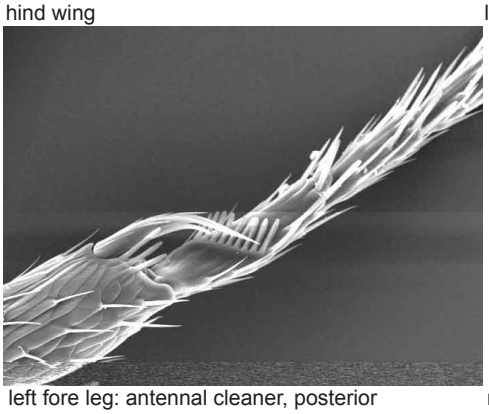
right fore wing: dorsal

fore wing

hind wing

left hind wing: hamuli, dorsal

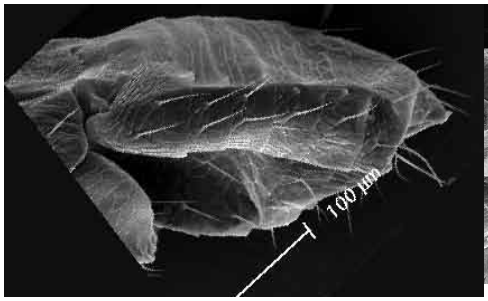
fore legs: top posterior, bottom anterior

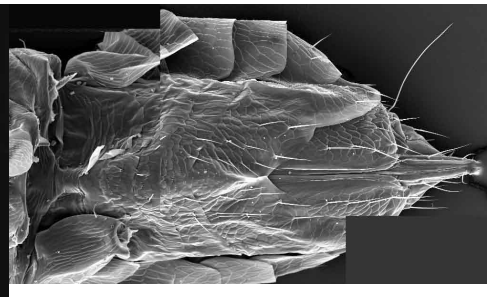


left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior

hind legs: top posterior, bottom anterior



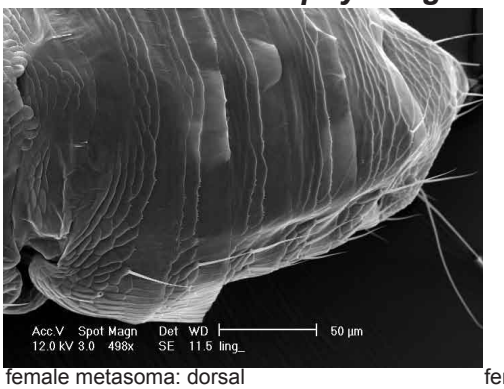


hind leg: tarsal claw

female metasoma: lateral

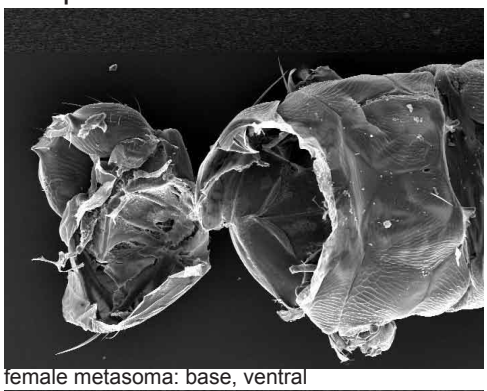
female metasoma: ventral

Aphytis lignanensis Chalcidoidea: Aphelinidae: Aphelininae

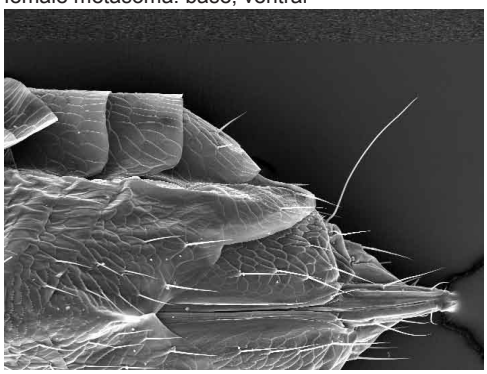


female metasoma: dorsal

female metasoma: base, lateral



female metasoma: base, ventral



female metasoma: base, dorsal

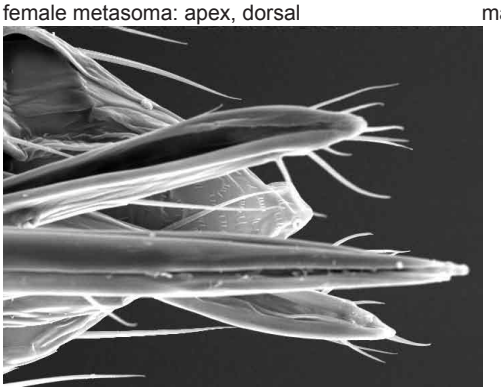
female metasoma: apex, lateral

female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral



ovipositor sheath: apex, lateral

ovipositor: apex, lateral

male metasoma: ventral

ovipositor sheath: apex, lateral

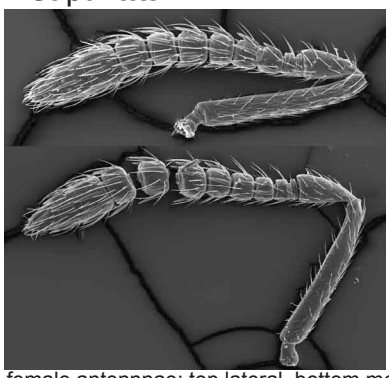
ovipositor: apex, lateral

male metasoma: ventral

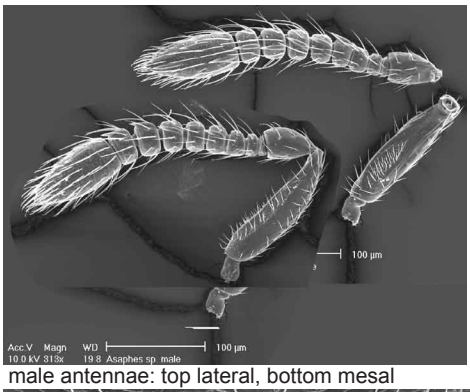
***Asaphes* sp.** Chalcidoidea: Pteromalidae: Asaphinae

female habitus: lateral

male habitus: lateral

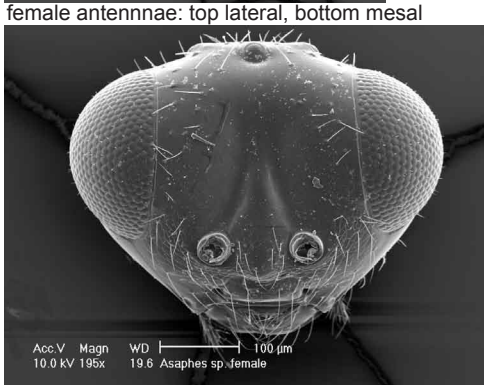


female antennnae: top lateral, bottom mesal

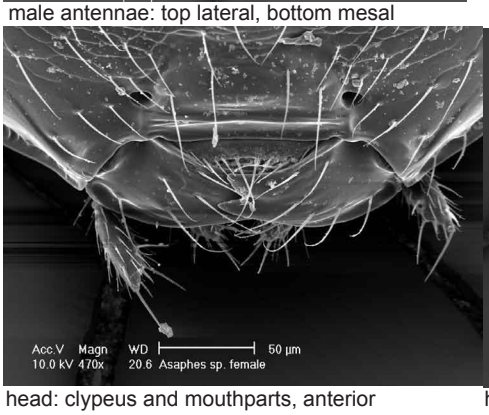


male antennae: top lateral, bottom mesal

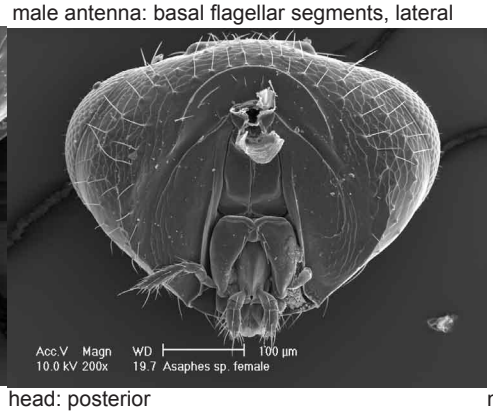
male antenna: basal flagellar segments, lateral



head: anterior



head: clypeus and mouthparts, anterior



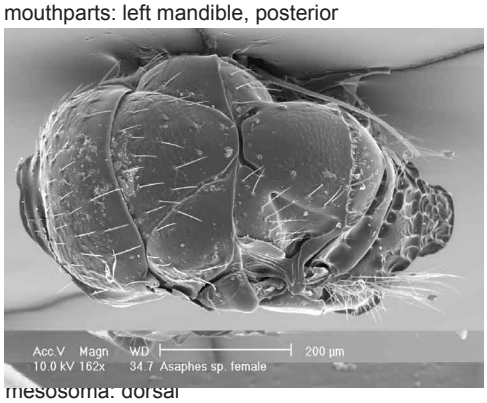
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior



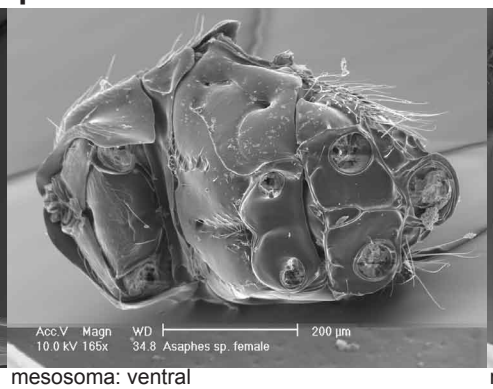
mouthparts: labium

mouthparts: maxilla

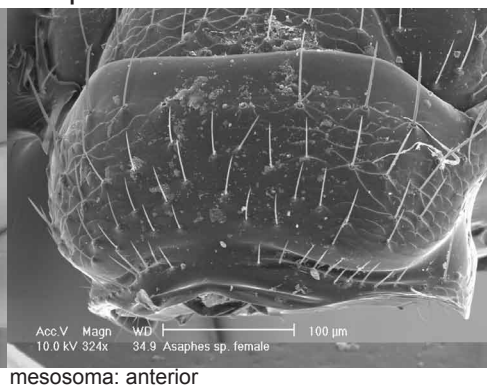
mesosoma: dorsal

***Asaphes* sp.** Chalcidoidea: Pteromalidae: Asaphinae

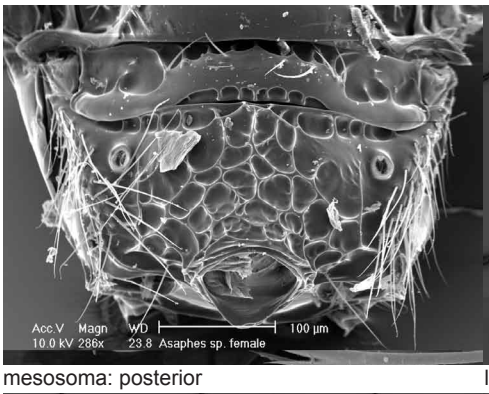
mesosoma: lateral



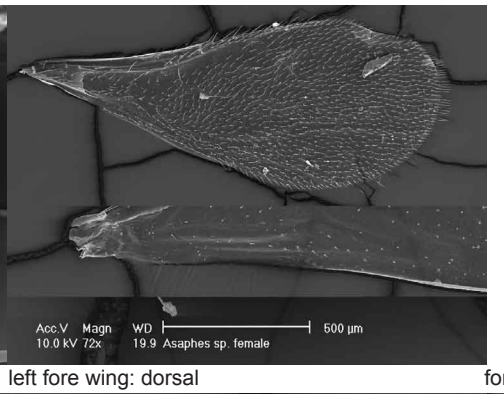
mesosoma: ventral



mesosoma: anterior

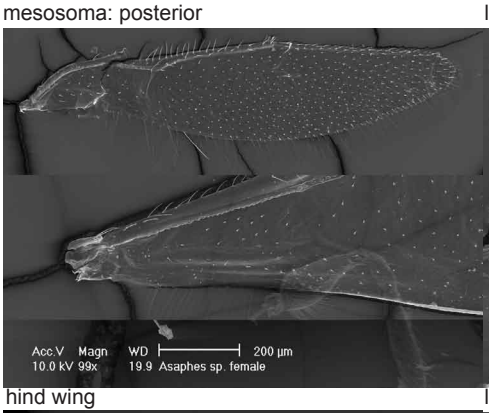


mesosoma: posterior

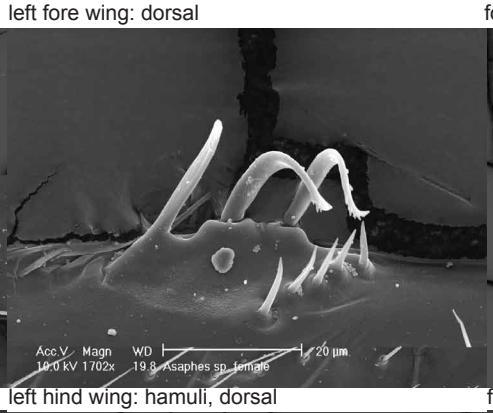


left fore wing: dorsal

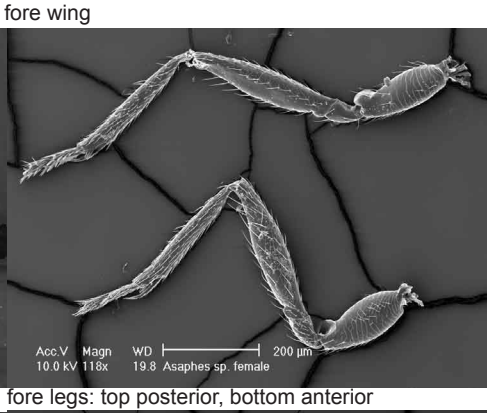
fore wing



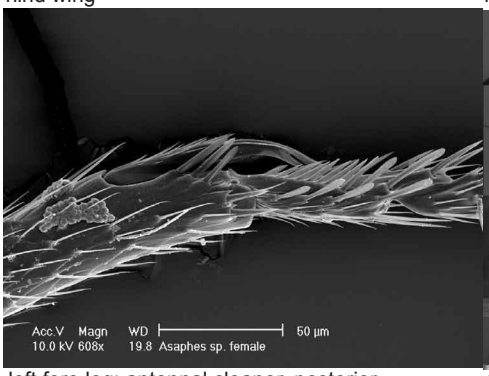
hind wing



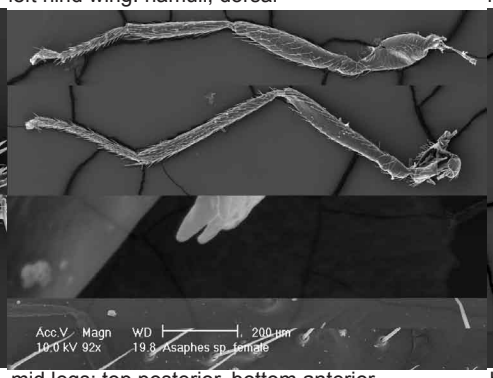
left hind wing: hamuli, dorsal



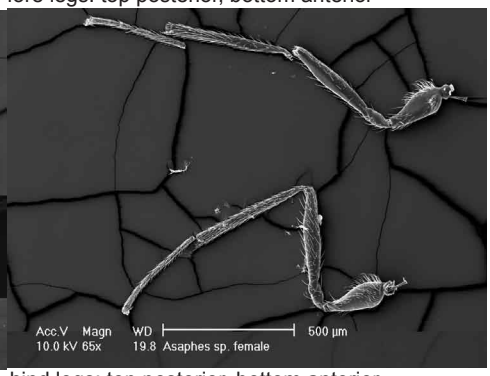
fore legs: top posterior, bottom anterior



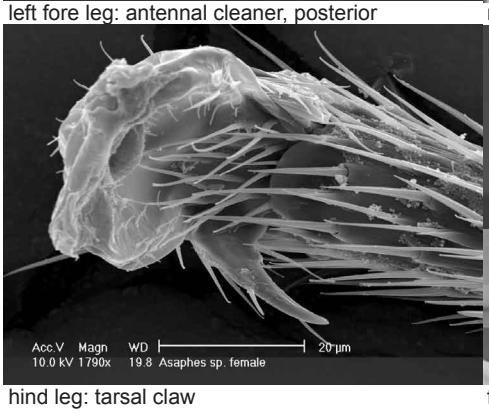
left fore leg: antennal cleaner, posterior



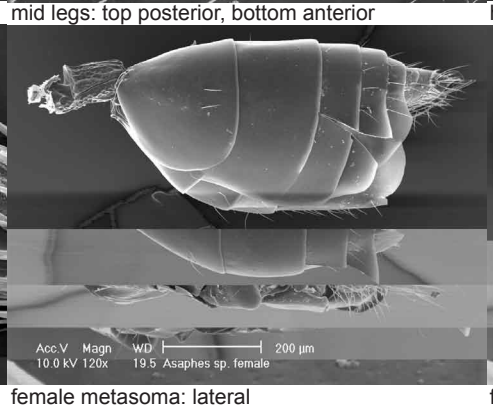
mid legs: top posterior, bottom anterior



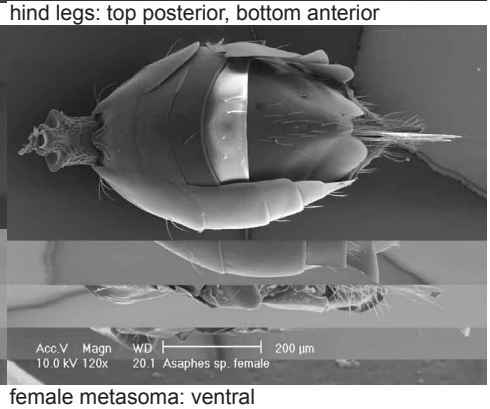
hind legs: top posterior, bottom anterior



hind leg: tarsal claw

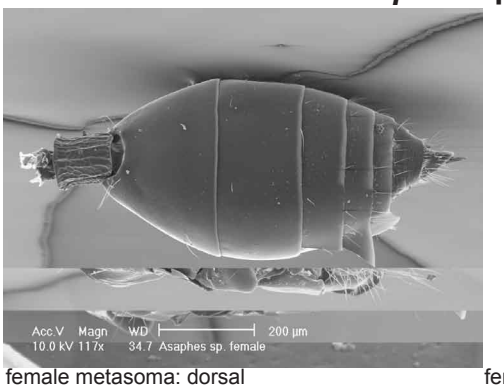


female metasoma: lateral



female metasoma: ventral

***Asaphes* sp.** Chalcidoidea: Pteromalidae: Asaphinae



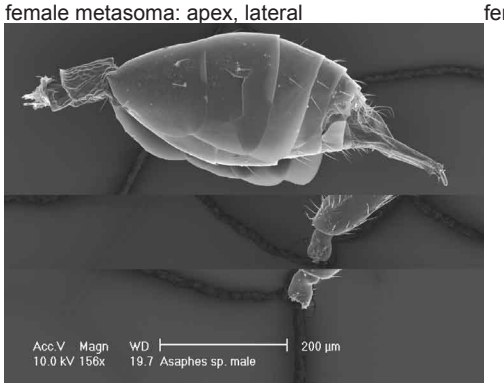
female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral

female metasoma: base, dorsal

female metasoma: apex, lateral



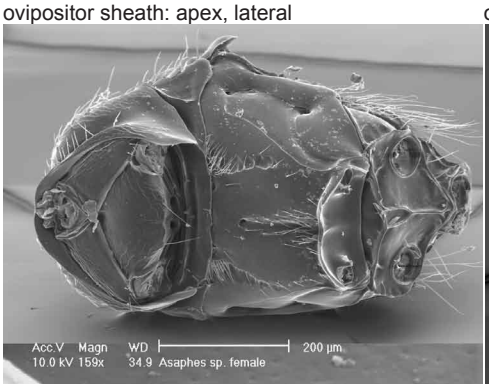
female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

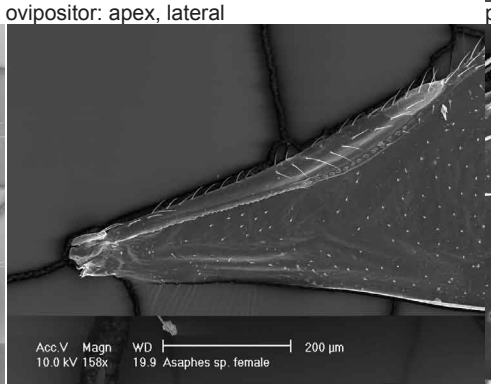
male metasoma: ventral

ovipositor sheath: apex, lateral



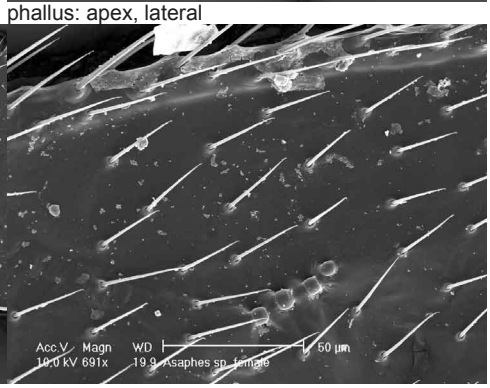
mesosoma: ventral

ovipositor: apex, lateral



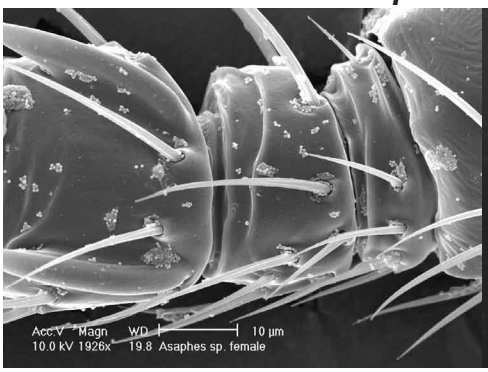
fore wing: base, ventral

phallus: apex, lateral

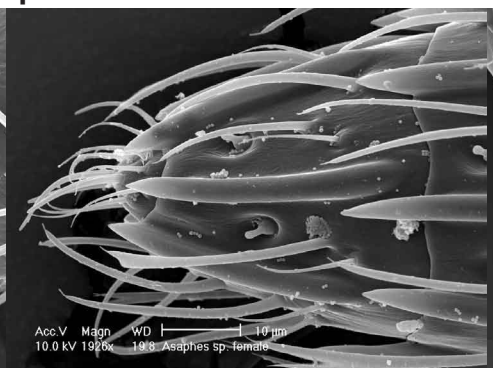


fore wing: stigma, dorsal

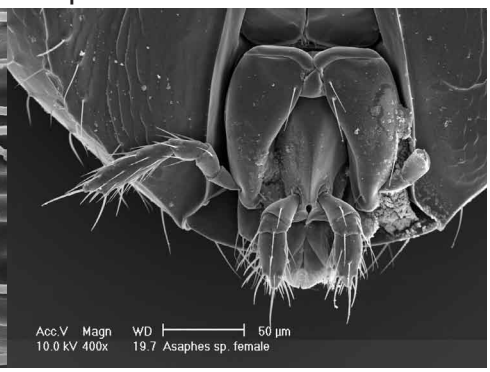
***Asaphes* sp.** Chalcidoidea: Pteromalidae: Asaphinae



antenna, female: base



antenna, female: apex

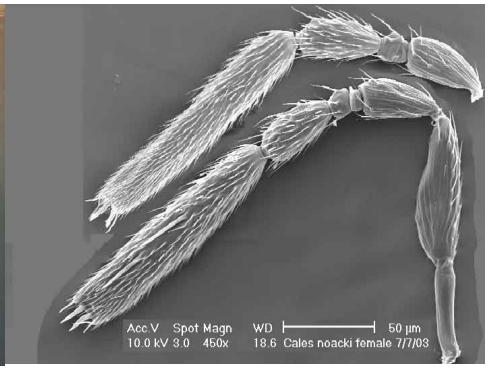


mouthparts: posterior

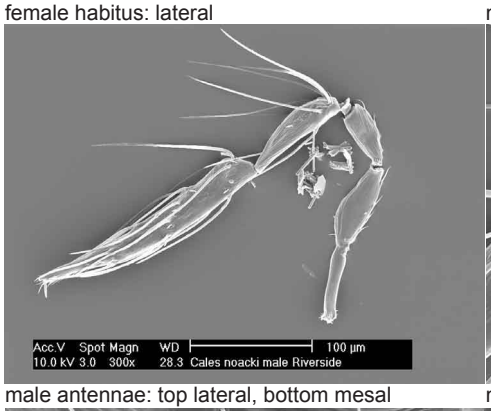
Cales noacki Chalcidoidea: Calesinae

female habitus: lateral

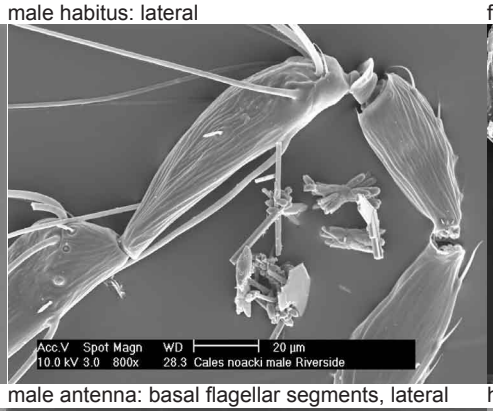
male habitus: lateral



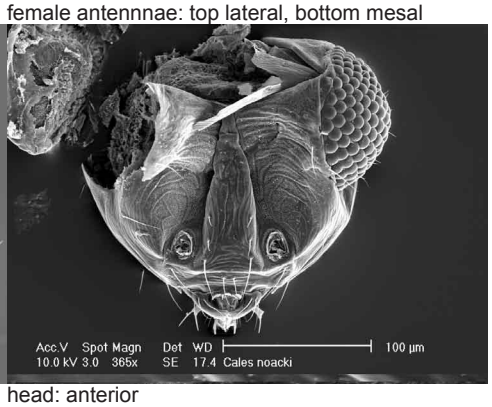
female antennnae: top lateral, bottom mesal



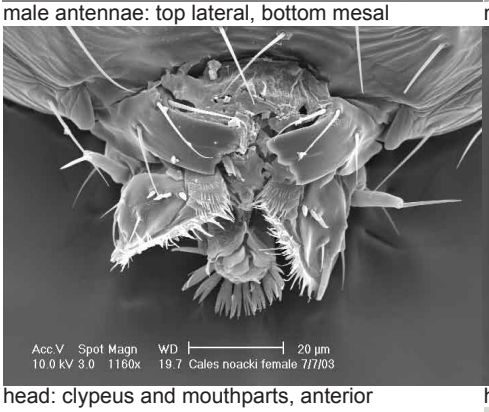
male antennae: top lateral, bottom mesal



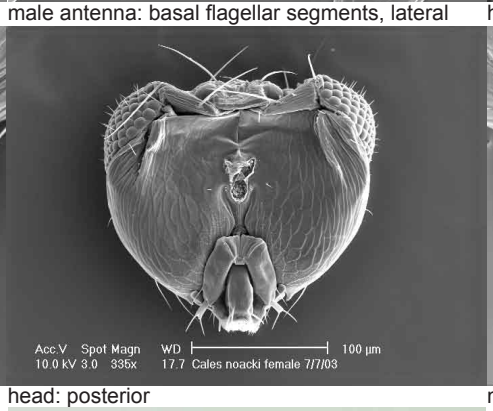
male antenna: basal flagellar segments, lateral



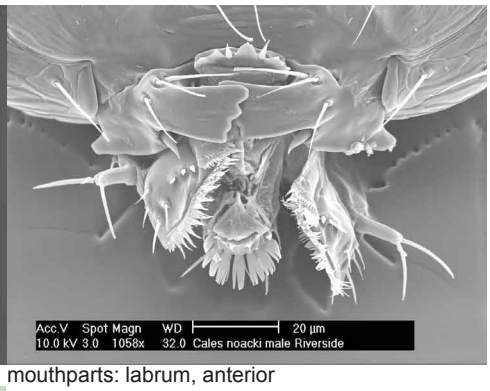
head: anterior



head: clypeus and mouthparts, anterior

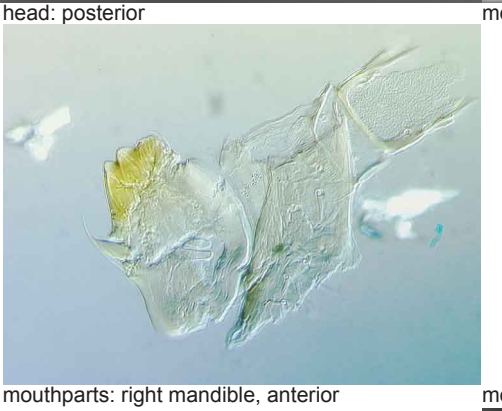


head: posterior



mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

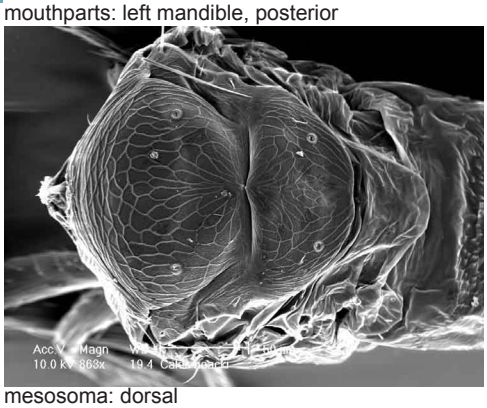


mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

mouthparts: labium

mouthparts: maxilla



mesosoma: dorsal

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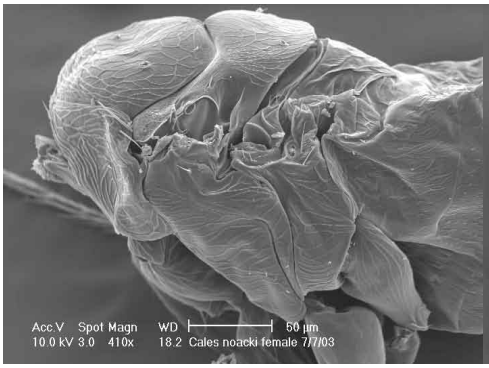
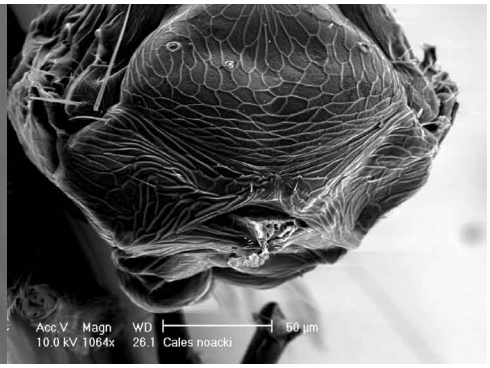
Cales noacki Chalcidoidea: Calesinae

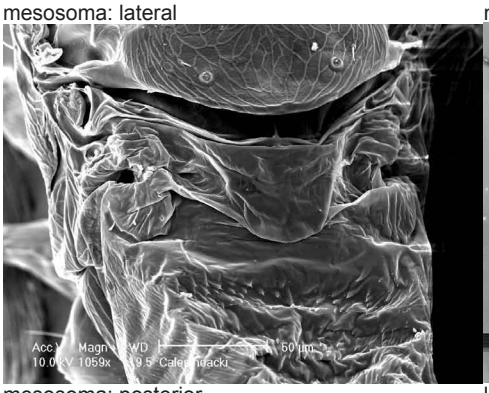


mesosoma: lateral

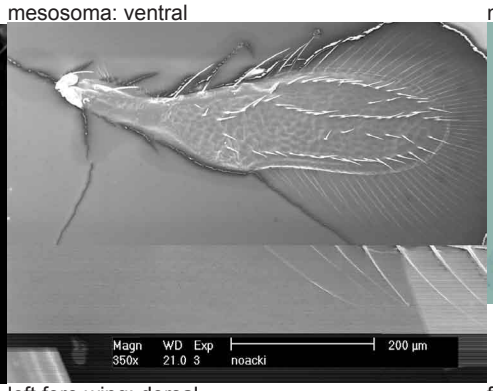
mesosoma: ventral



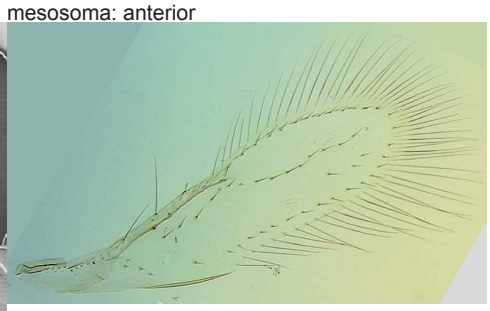
mesosoma: anterior



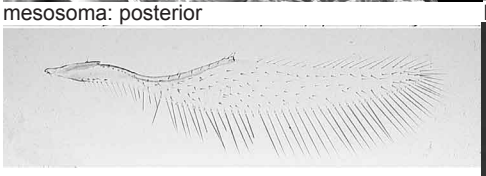
mesosoma: posterior



left fore wing: dorsal

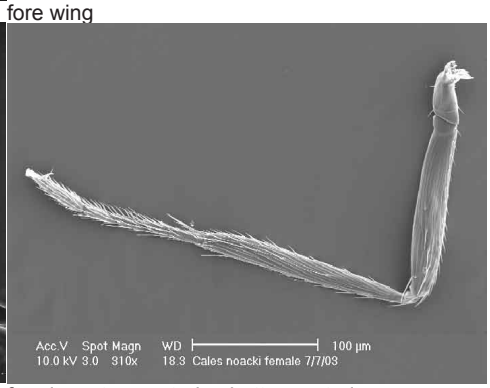


fore wing

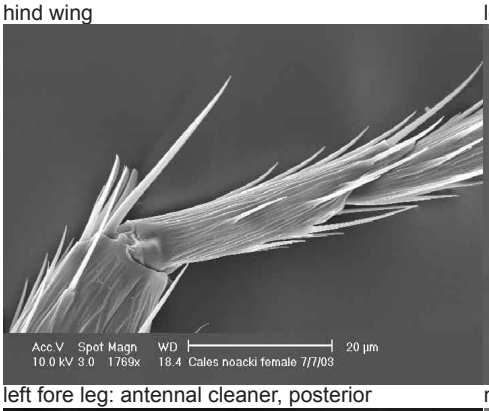


hind wing

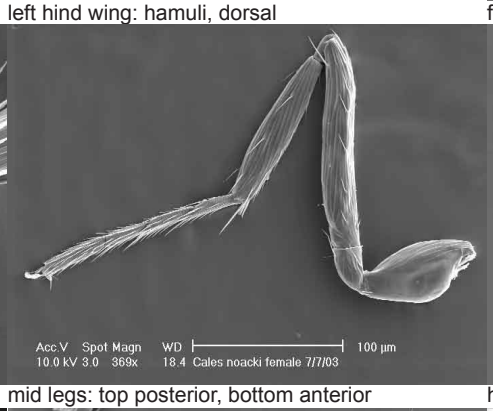
left hind wing: hamuli, dorsal



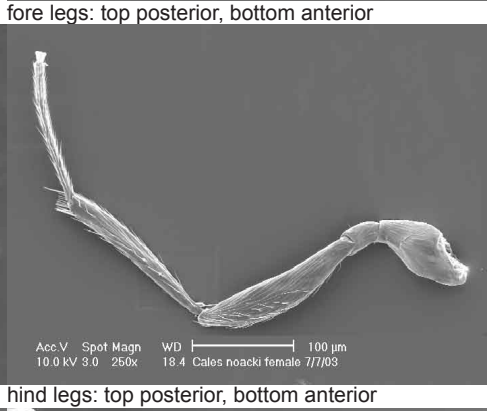
fore legs: top posterior, bottom anterior



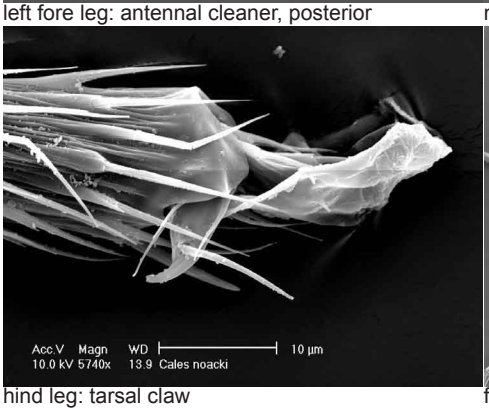
left fore leg: antennal cleaner, posterior



mid legs: top posterior, bottom anterior

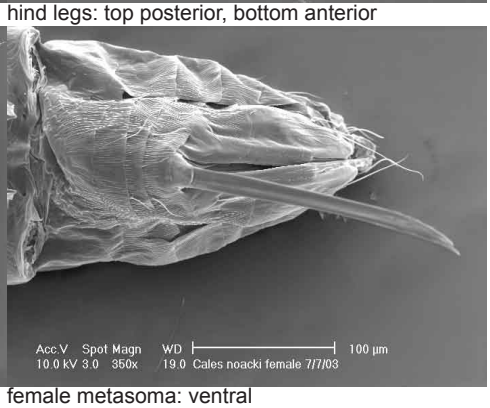


hind legs: top posterior, bottom anterior



hind leg: tarsal claw

female metasoma: lateral



female metasoma: ventral

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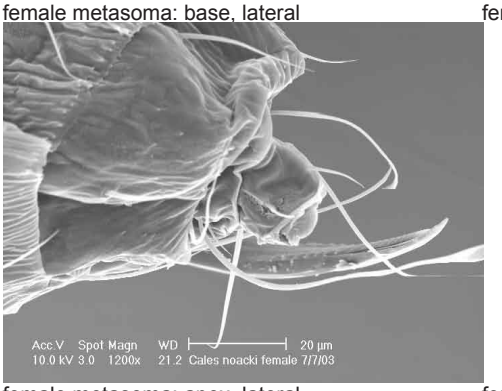
Cales noacki Chalcidoidea: Calesinae

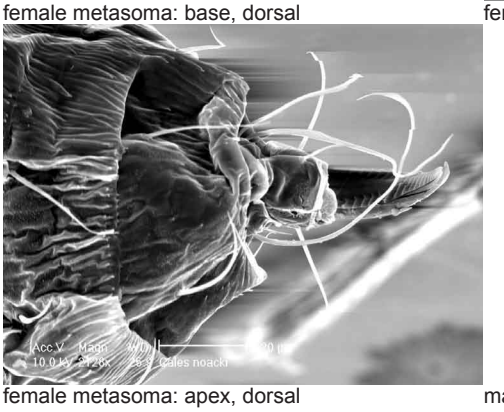
female metasoma: dorsal

female metasoma: base, lateral



female metasoma: base, ventral

female metasoma: base, dorsal



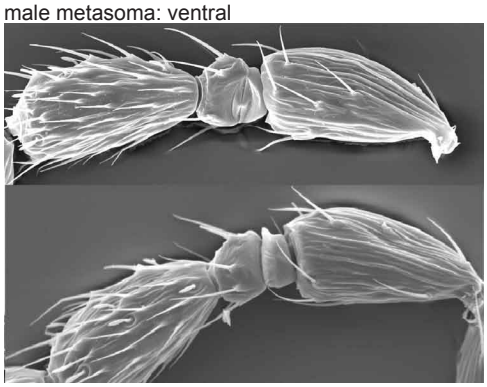
female metasoma: apex, lateral

female metasoma: apex, ventral

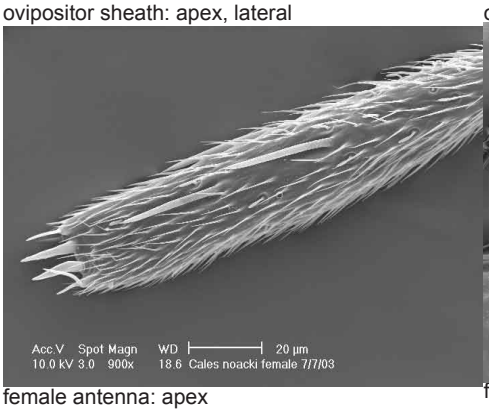
female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

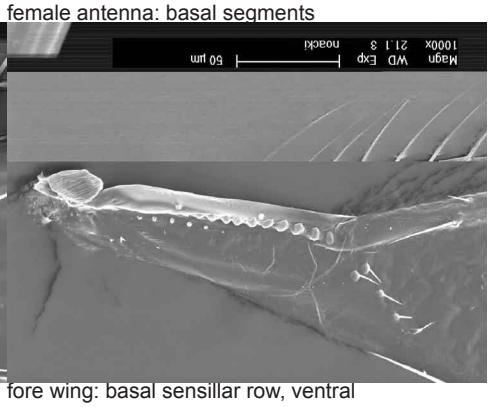


ovipositor sheath: apex, lateral



ovipositor: apex, lateral

female antenna: basal segments



female antenna: apex

fore wing: stigmal sensilla, dorsal

fore wing: basal sensillar row, ventral

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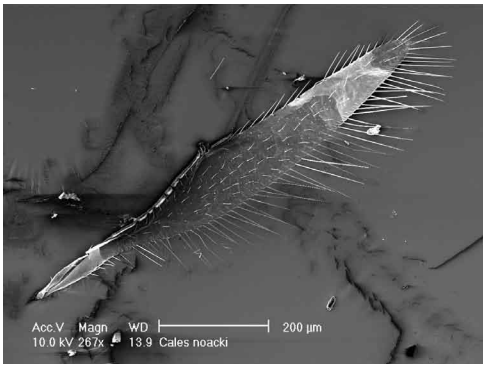
Cales noacki Chalcidoidea: Calesinae



hind wing: dorsal ovipositor phallus

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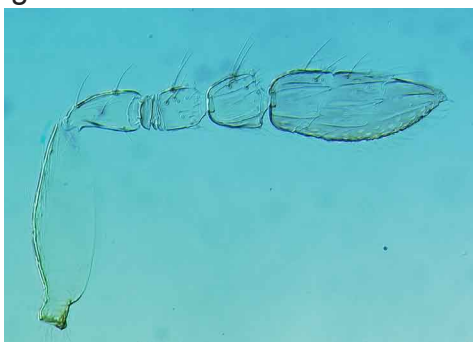
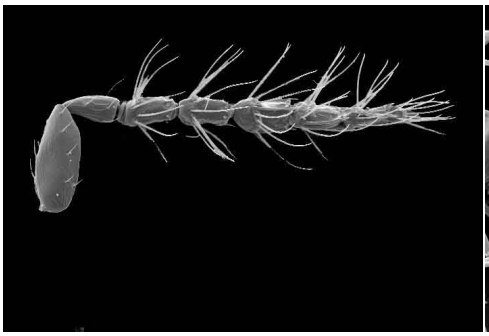
Ceratogramma etiennei Chalcidoidea: Trichogrammatidae

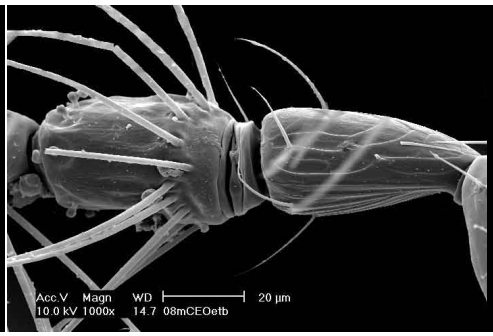


female habitus: lateral

male habitus: lateral

female antennnae: top lateral, bottom mesal

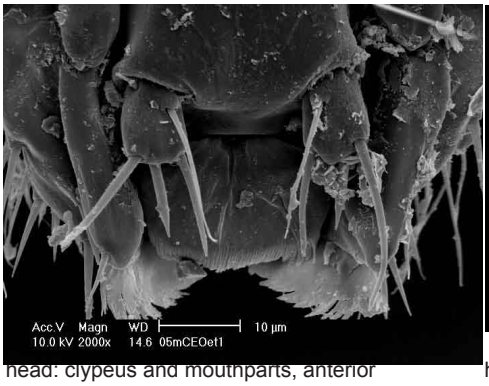




male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

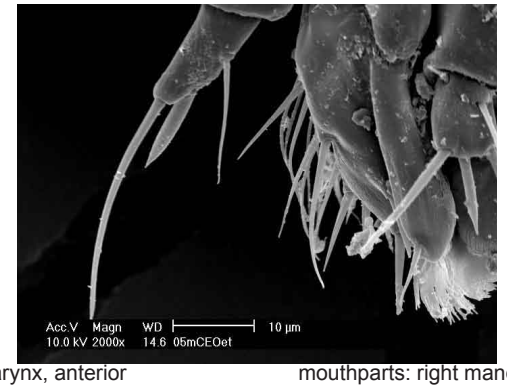
head: anterior



head: clypeus and mouthparts, anterior

head: posterior

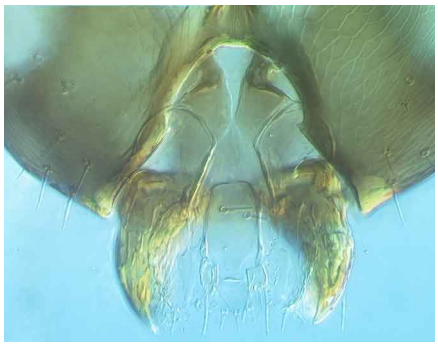
mouthparts: labrum, anterior

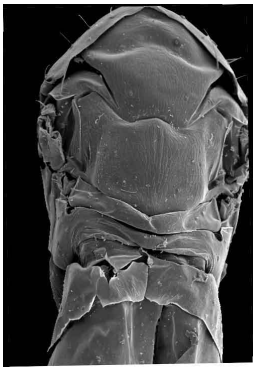


mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior



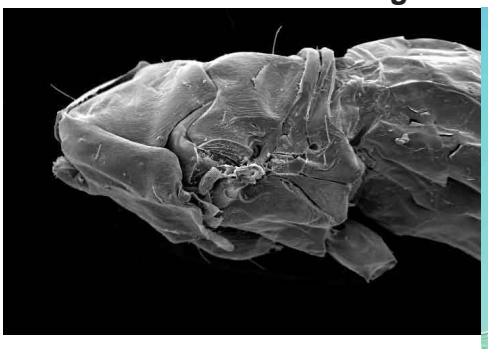


mouthparts: labium

mouthparts: maxilla

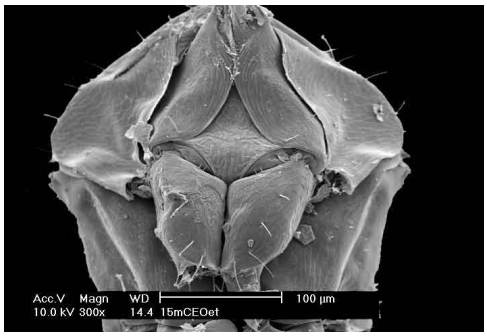
mesosoma: dorsal

Ceratogramma etiennei Chalcidoidea: Trichogrammatidae

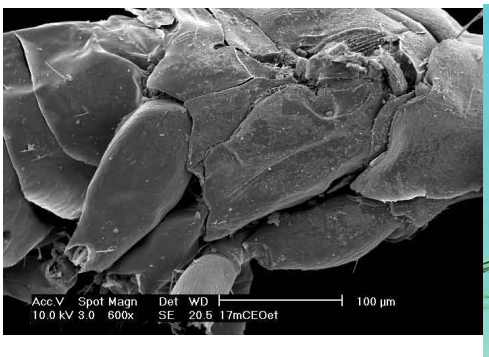


mesosoma: lateral

mesosoma: ventral

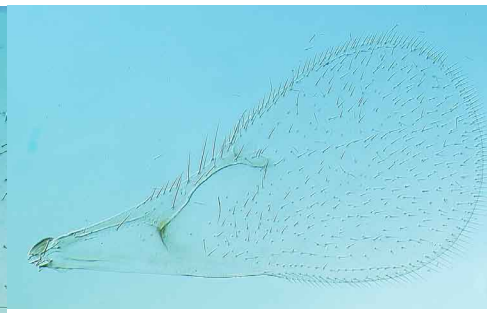


mesosoma: anterior

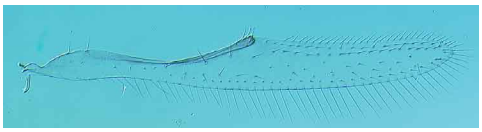


mesosoma: posterior

left fore wing: dorsal

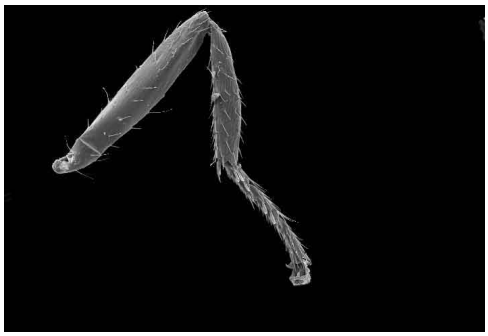


fore wing

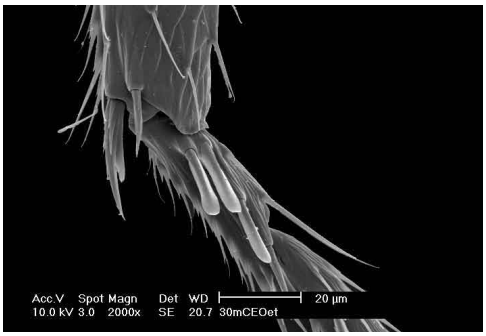


hind wing

left hind wing: hamuli, dorsal

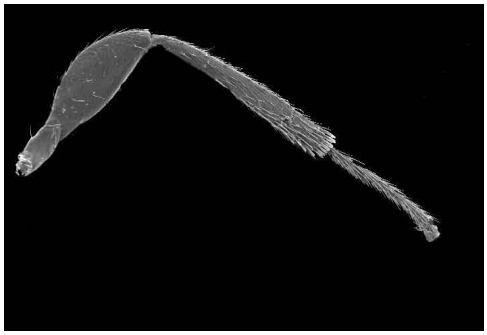


fore legs: top posterior, bottom anterior

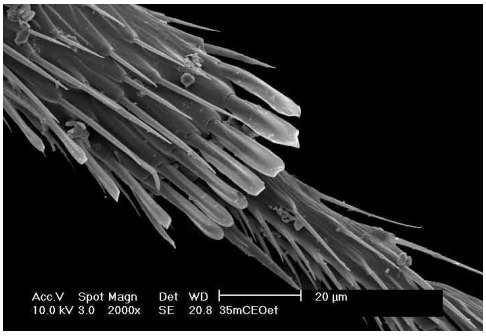


left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior



hind legs: top posterior, bottom anterior



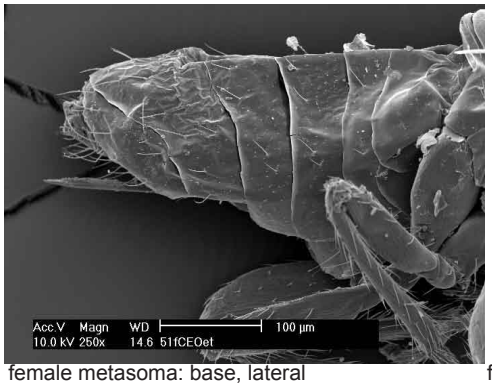
hind leg: tarsal claw

female metasoma: lateral

female metasoma: ventral

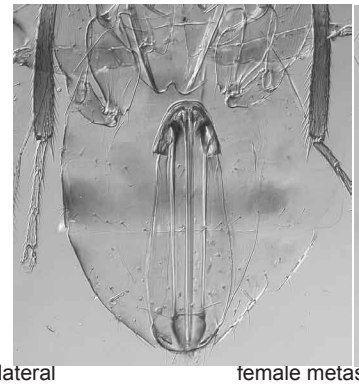
Ceratogramma etiennei Chalcidoidea: Trichogrammatidae

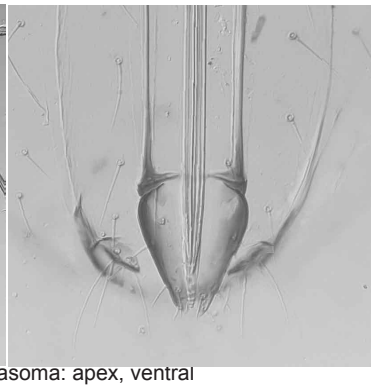
female metasoma: dorsal



female metasoma: base, lateral

female metasoma: base, ventral

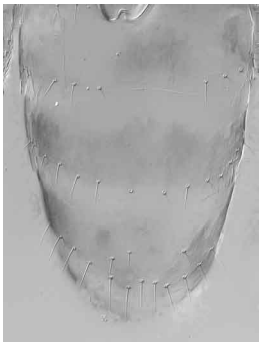




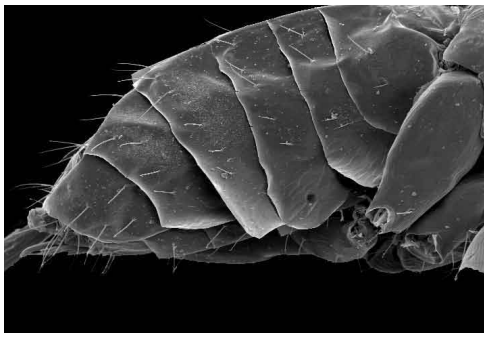
female metasoma: base, dorsal

female metasoma: apex, lateral

female metasoma: apex, ventral

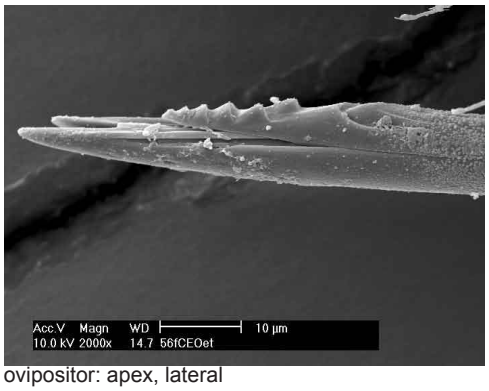


male metasoma: dorsal



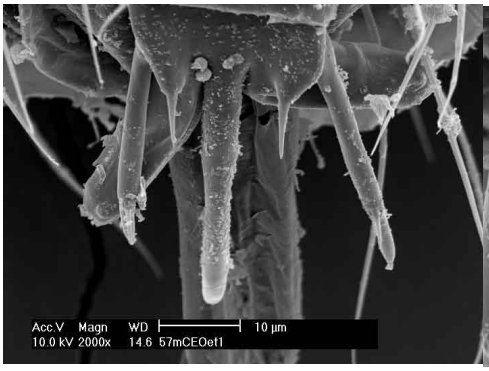
male metasoma: lateral

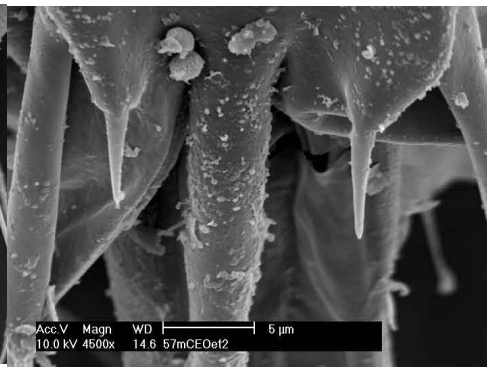
male metasoma: ventral



ovipositor sheath: apex, lateral

ovipositor: apex, lateral

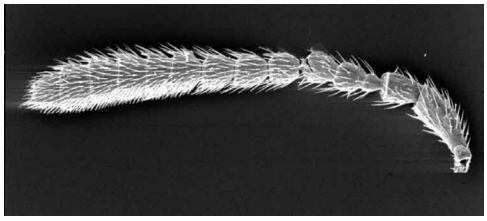




Chiloe micropteron Chalcidoidea: Rotoitidae

female habitus: lateral

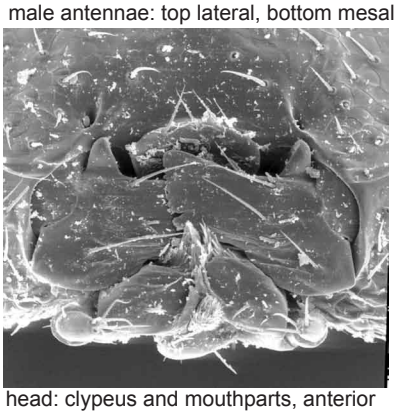
male habitus: lateral



female antennnae: top lateral, bottom mesal

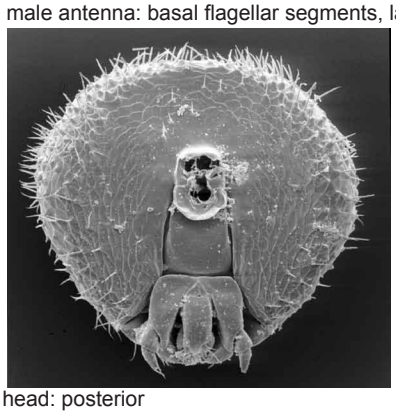
head: anterior

male antennae: top lateral, bottom mesal



head: clypeus and mouthparts, anterior

male antenna: basal flagellar segments, lateral



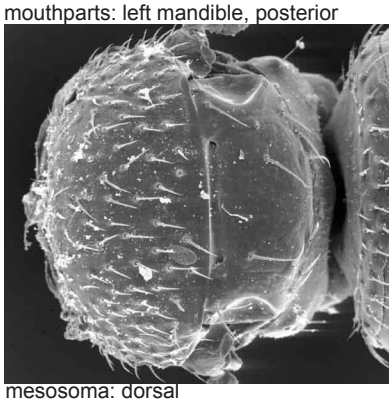
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior



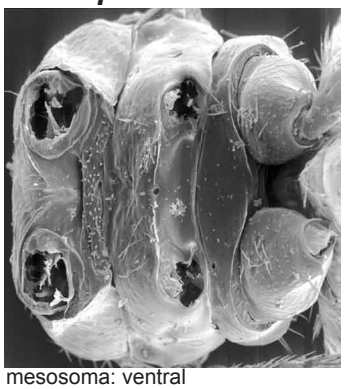
mesosoma: dorsal

mouthparts: labium

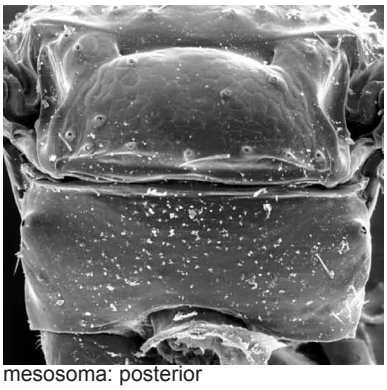
mouthparts: maxilla

Chiloe micropteron Chalcidoidea: Rotoitidae

mesosoma: lateral


mesosoma: ventral

mesosoma: anterior


mesosoma: posterior

left fore wing: dorsal

fore wing

hind wing

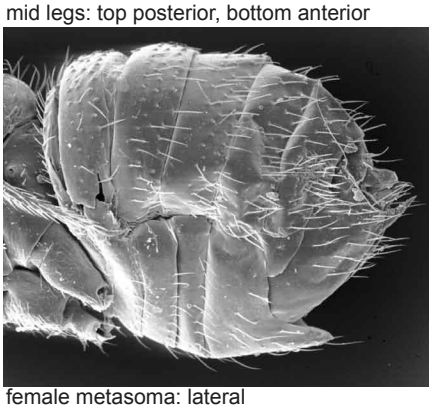
left hind wing: hamuli, dorsal

fore legs: top posterior, bottom anterior

left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior

hind legs: top posterior, bottom anterior


hind leg: tarsal claw

female metasoma: lateral

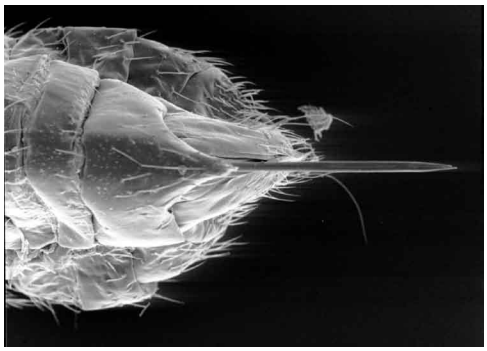
female metasoma: ventral

Chiloe micropteron Chalcidoidea: Rotoitidae

female metasoma: dorsal

female metasoma: base, lateral

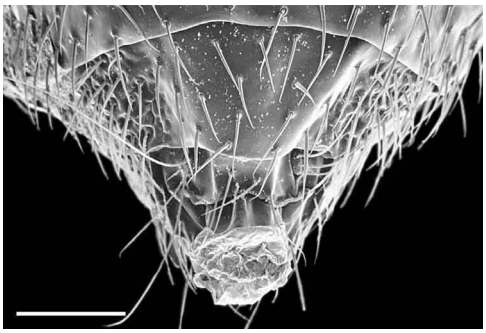
female metasoma: base, ventral



female metasoma: base, dorsal

female metasoma: apex, lateral

female metasoma: apex, ventral



female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

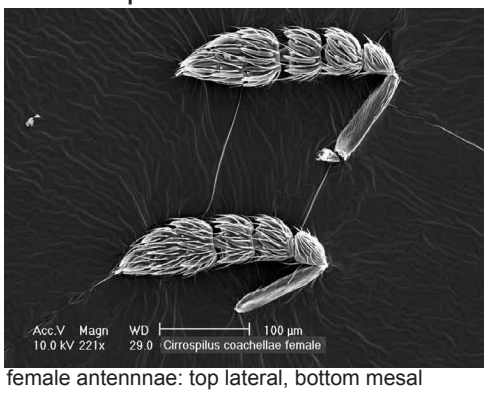
ovipositor sheath: apex, lateral

ovipositor: apex, lateral

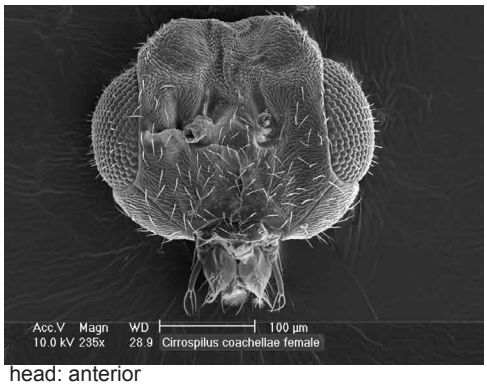
Cirrospilus coachellae Chalcidoidea: Eulophidae: Eulophinae

female habitus: lateral

male habitus: lateral



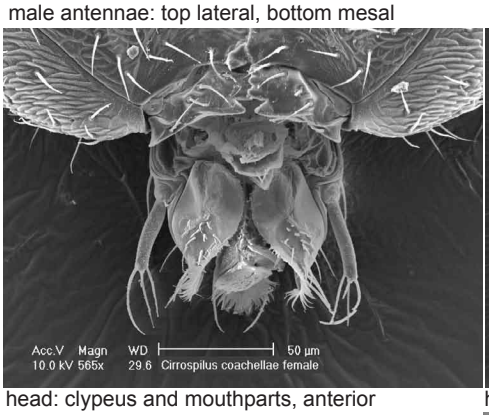
female antennnae: top lateral, bottom mesal



male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

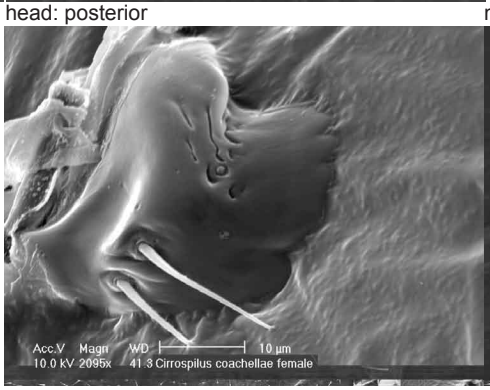
head: anterior



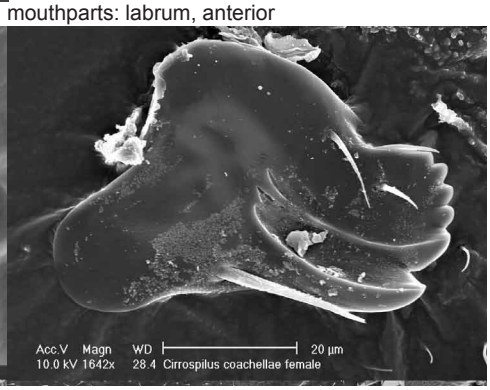
head: clypeus and mouthparts, anterior

head: posterior

mouthparts: labrum, anterior

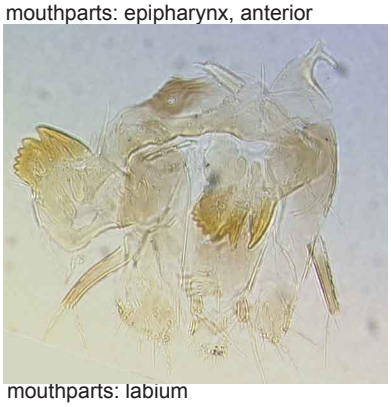


mouthparts: right mandible, anterior

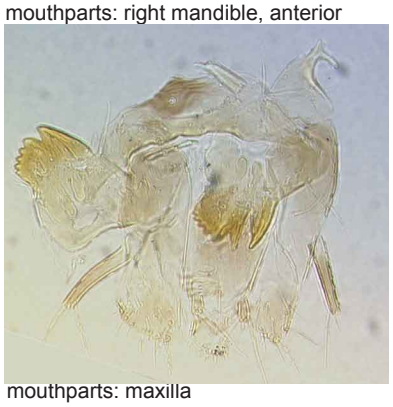


mouthparts: left mandible, posterior

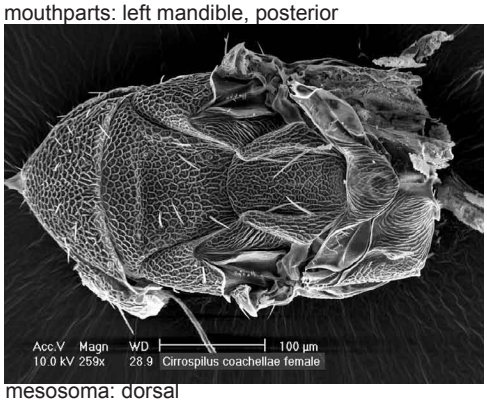
mouthparts: epipharynx, anterior



mouthparts: labium

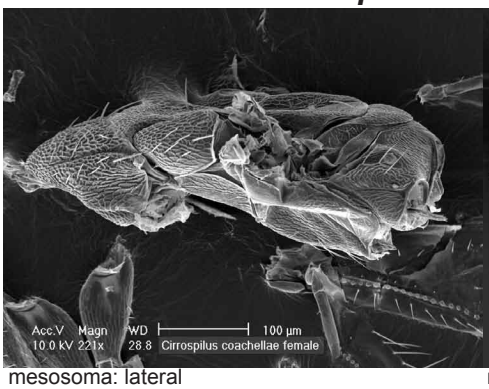


mouthparts: maxilla

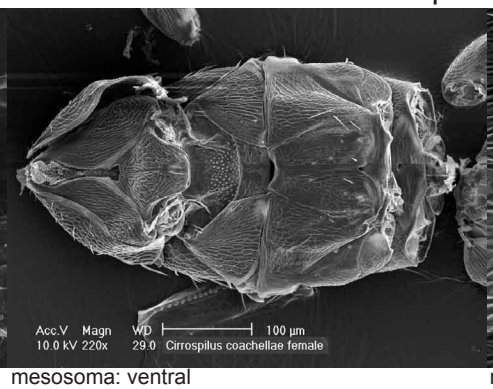


mesosoma: dorsal

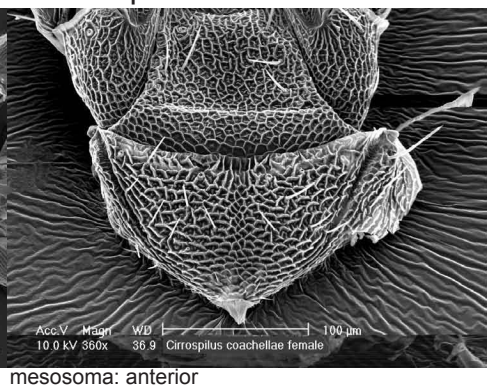
Cirrospilus coachellae Chalcidoidea: Eulophidae: Eulophinae



mesosoma: lateral

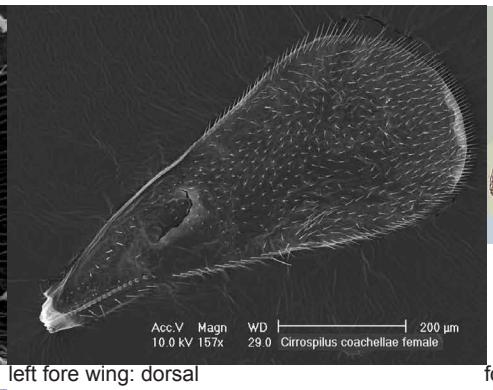


mesosoma: ventral

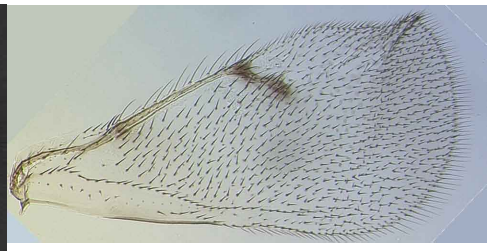


mesosoma: anterior

mesosoma: posterior

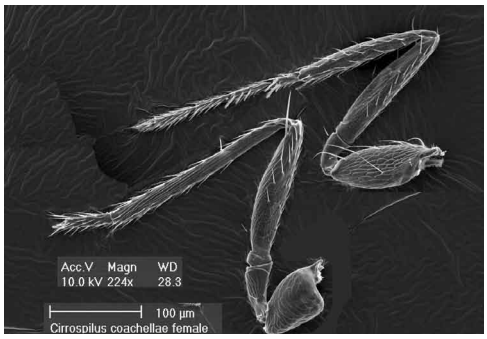


left fore wing: dorsal



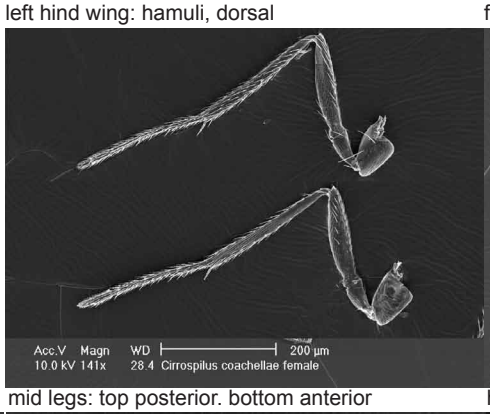
fore wing

hind wing

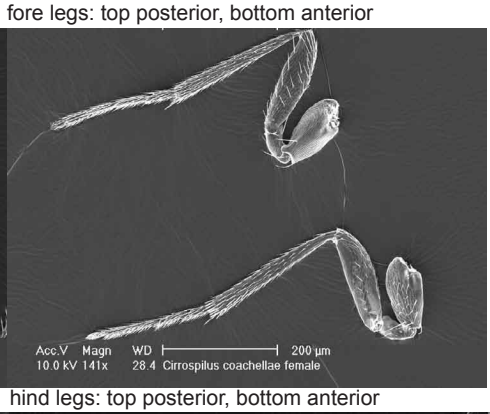


fore legs: top posterior, bottom anterior

left hind wing: hamuli, dorsal

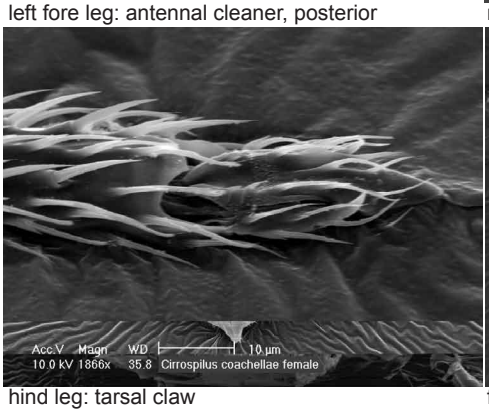


mid legs: top posterior. bottom anterior

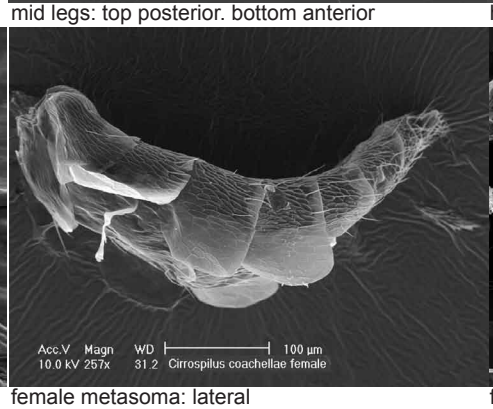


hind legs: top posterior, bottom anterior

left fore leg: antennal cleaner, posterior



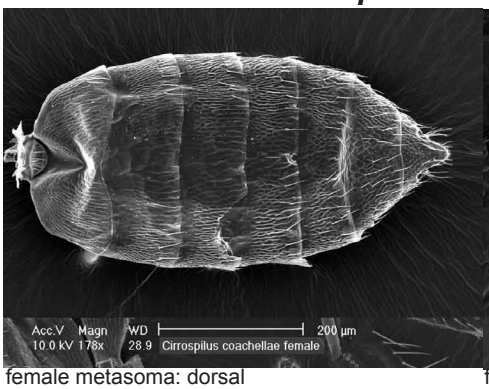
hind leg: tarsal claw



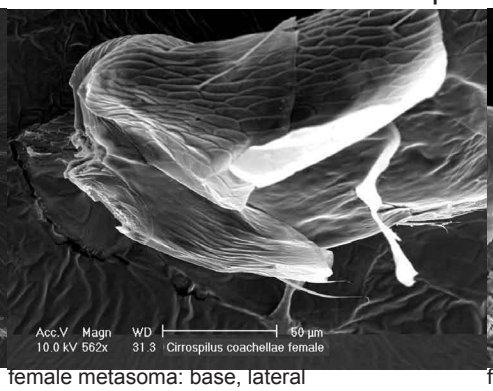
female metasoma: lateral

female metasoma: ventral

Cirrospilus coachellae Chalcidoidea: Eulophidae: Eulophinae



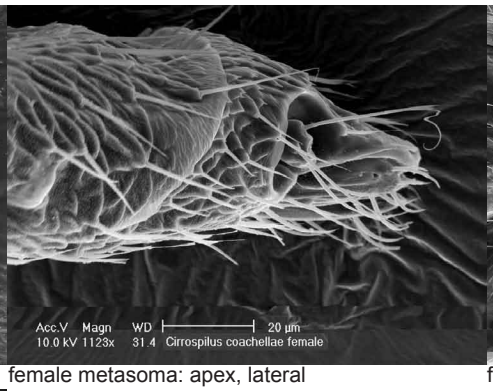
female metasoma: dorsal



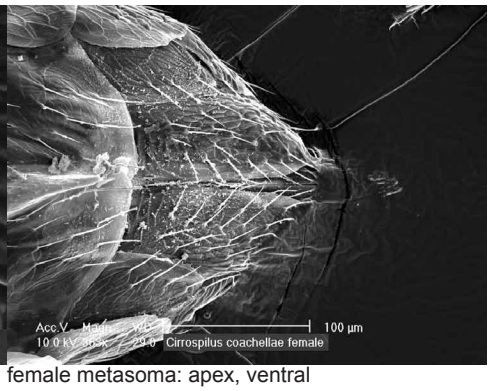
female metasoma: base, lateral

female metasoma: base, ventral

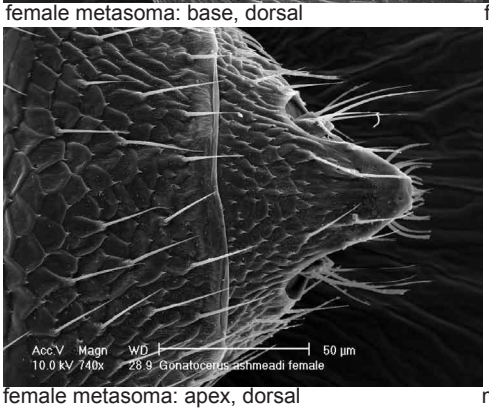
female metasoma: base, dorsal



female metasoma: apex, lateral



female metasoma: apex, ventral



female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

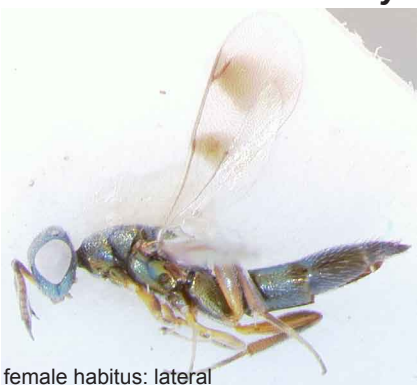
fore wing: stigma, dorsal

ovipositor sheath: apex, lateral

ovipositor: apex, lateral

ovipositor

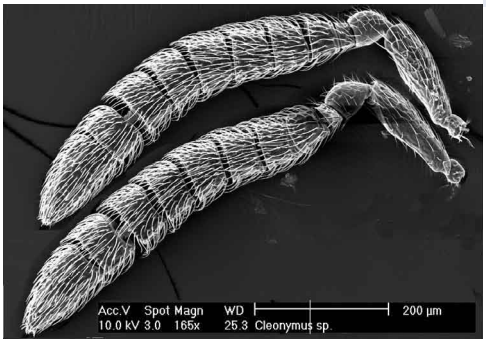
***Cleonymus* sp.** Chalcidoidea: Pteromalidae: Cleonyminae



female habitus: lateral

male habitus: lateral

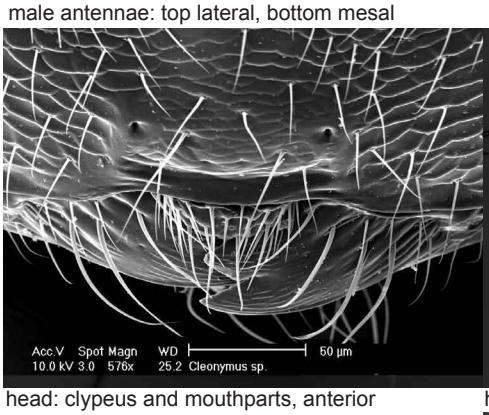
female antennnae: top lateral, bottom mesal

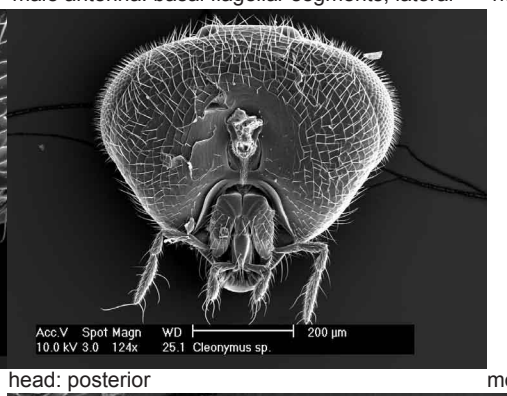


male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

head: anterior

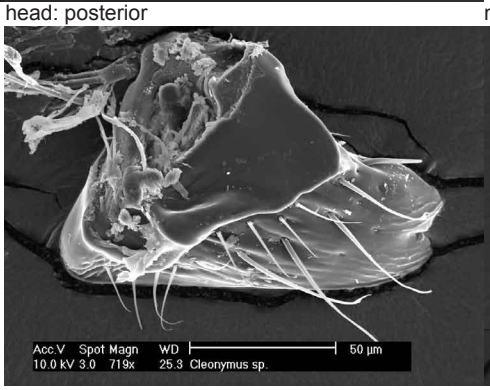


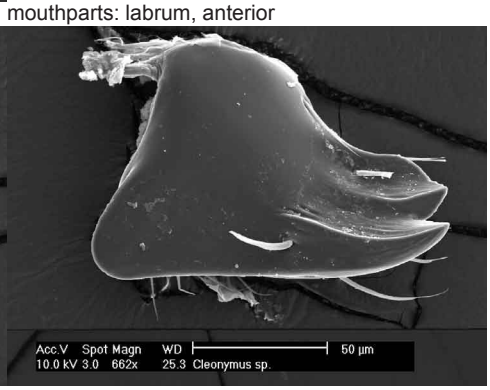


head: clypeus and mouthparts, anterior

head: posterior

mouthparts: labrum, anterior





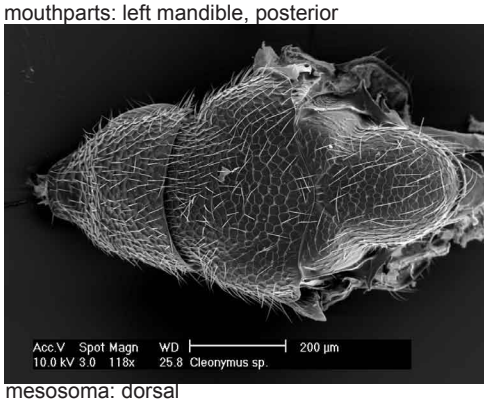
mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

mouthparts: labium

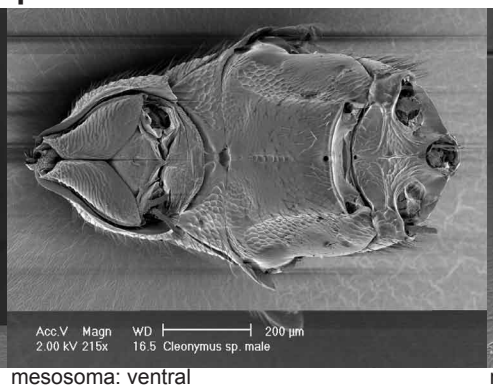
mouthparts: maxilla



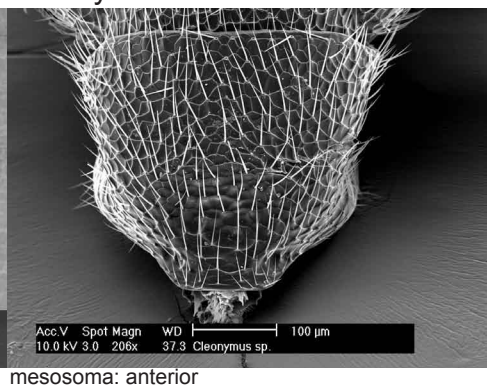
mesosoma: dorsal

***Cleonymus* sp.** Chalcidoidea: Pteromalidae: Cleonyminae

mesosoma: lateral

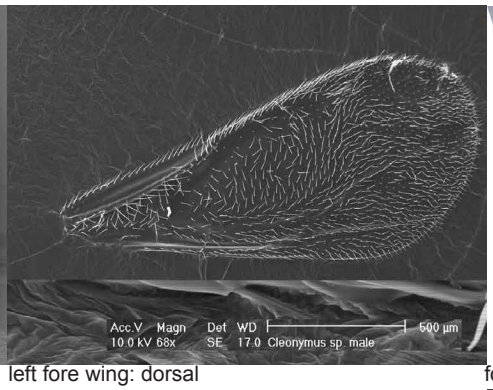


mesosoma: ventral

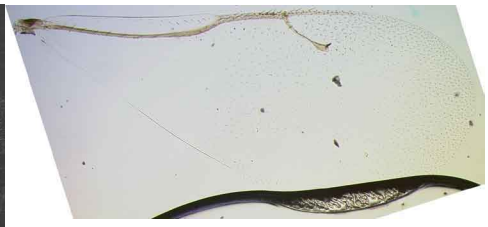


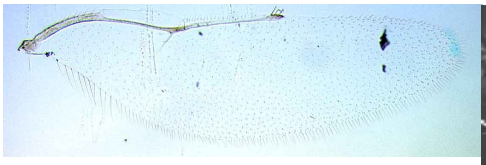
mesosoma: anterior

mesosoma: posterior

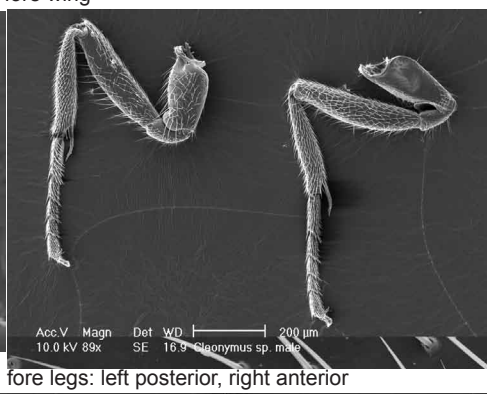


left fore wing: dorsal

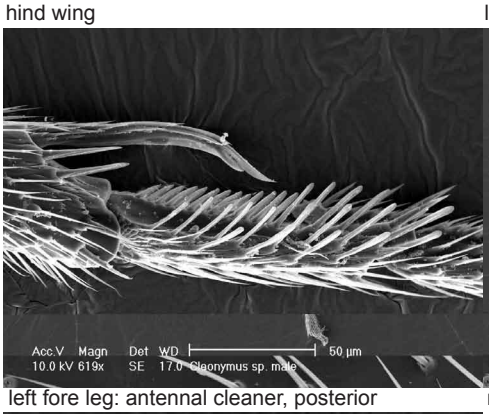

fore wing


hind wing

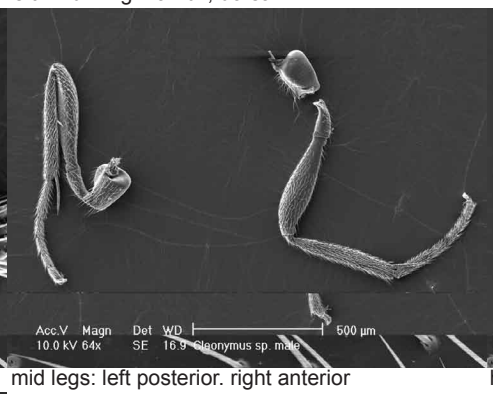
left hind wing: hamuli, dorsal



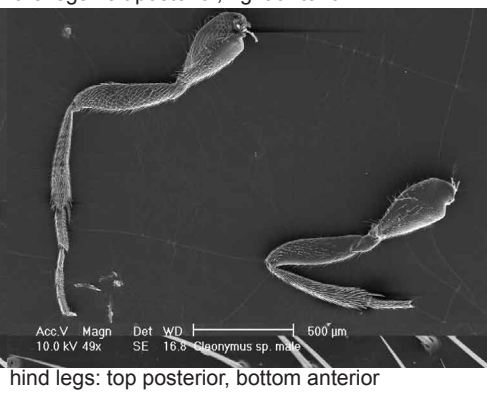
fore legs: left posterior, right anterior



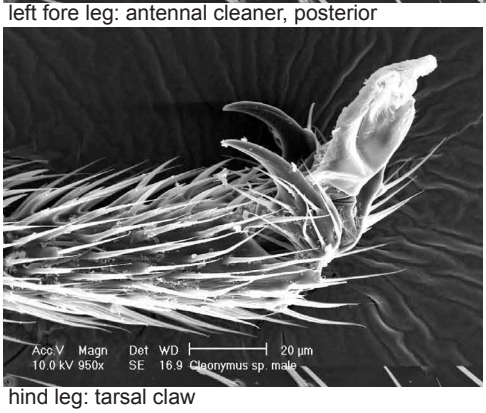
left fore leg: antennal cleaner, posterior



mid legs: left posterior. right anterior



hind legs: top posterior, bottom anterior



hind leg: tarsal claw

female metasoma: lateral

female metasoma: ventral

***Cleonymus* sp.** Chalcidoidea: Pteromalidae: Cleonyminae

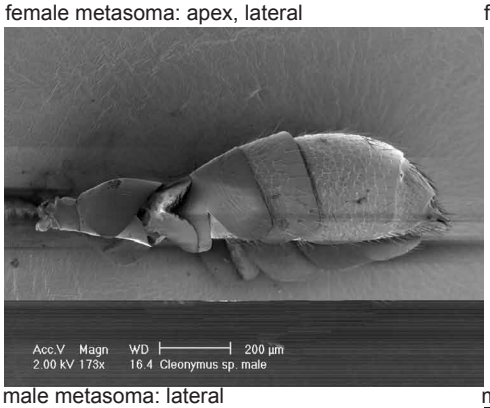
female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral

female metasoma: base, dorsal

female metasoma: apex, lateral

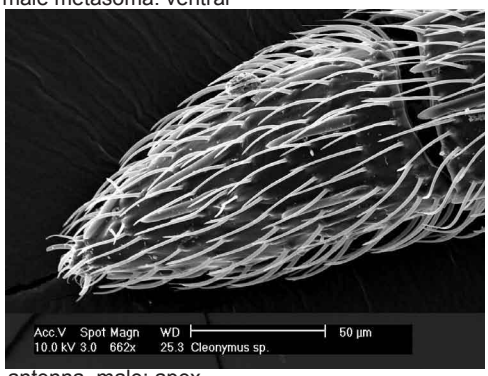


female metasoma: apex, ventral

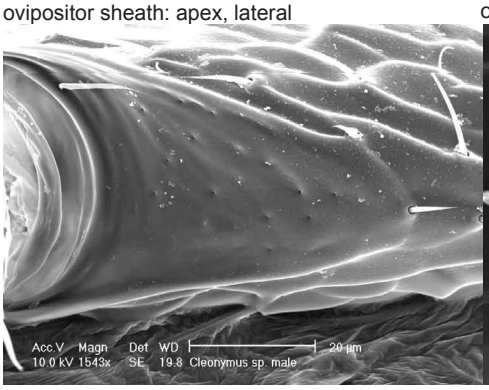
female metasoma: apex, dorsal

male metasoma: lateral

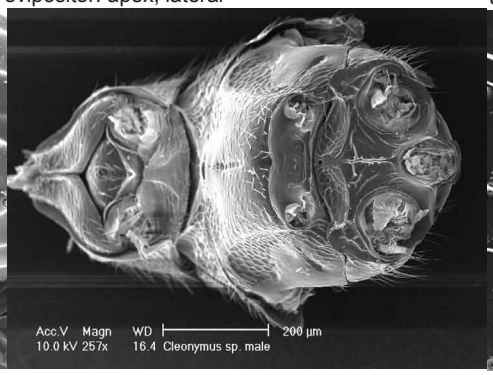
male metasoma: ventral



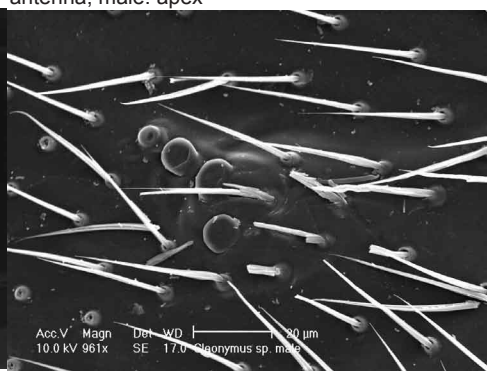
ovipositor sheath: apex, lateral



ovipositor: apex, lateral



antenna, male: apex

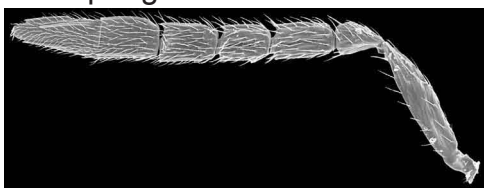


antenna, male: scape, ventral

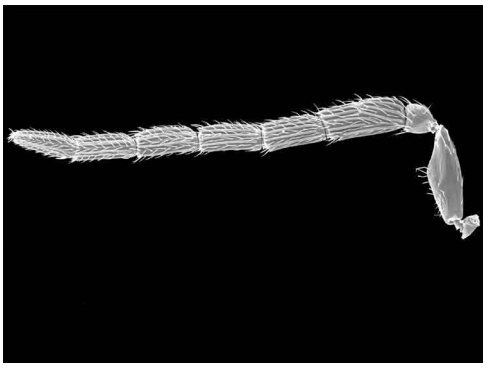
mesosoma, ventral

fore wing: stigma, dorsal

Coccobius fulvus Chalcidoidea: Aphelinidae: Coccophaginae

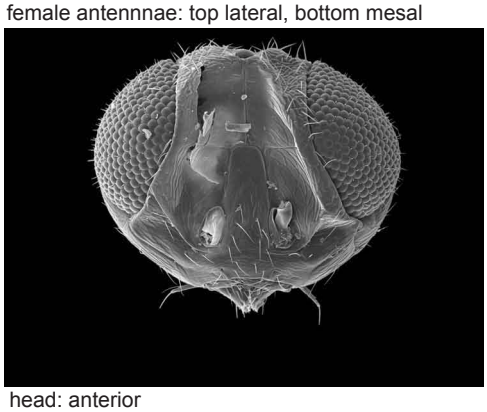


female habitus: lateral

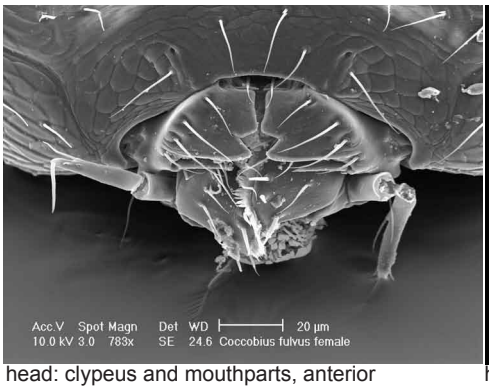


male habitus: lateral

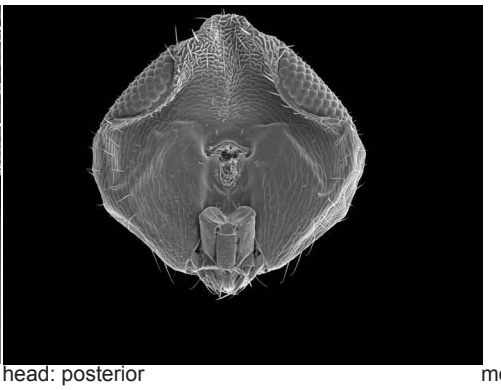
female antennnae: top lateral, bottom mesal



male antennae: top lateral, bottom mesal



male antenna: basal flagellar segments, lateral



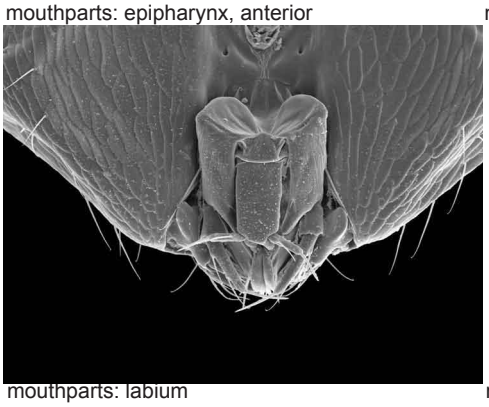
head: anterior

head: clypeus and mouthparts, anterior

head: posterior

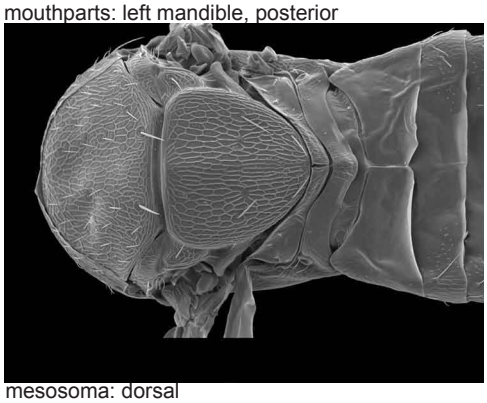
mouthparts: labrum, anterior

mouthparts: epipharynx, anterior



mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

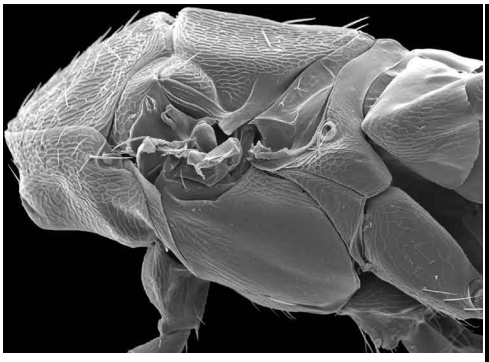


mouthparts: labium

mouthparts: maxilla

mesosoma: dorsal

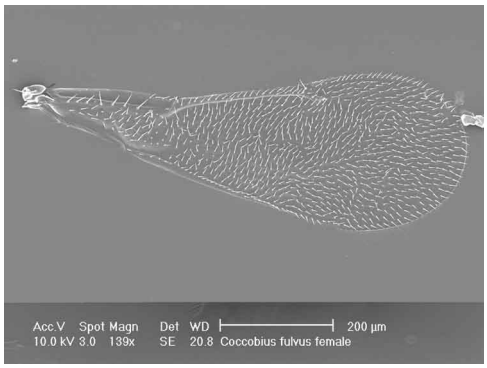
Coccobius fulvus Chalcidoidea: Aphelinidae: Coccophaginae



mesosoma: lateral

mesosoma: ventral

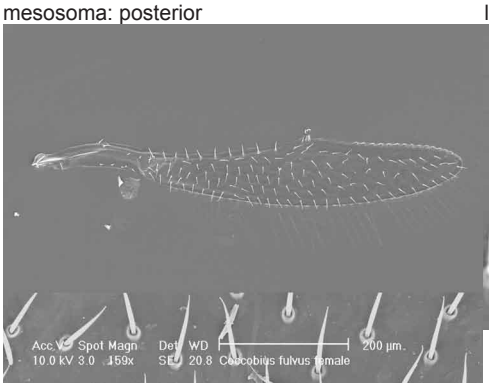
mesosoma: anterior



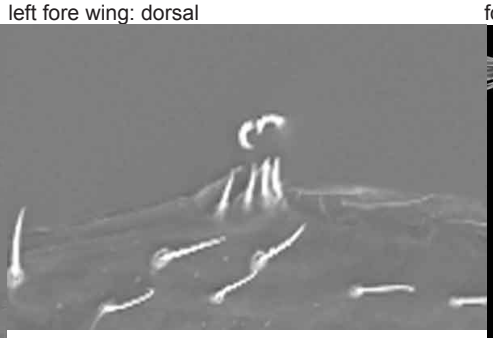
mesosoma: posterior

left fore wing: dorsal

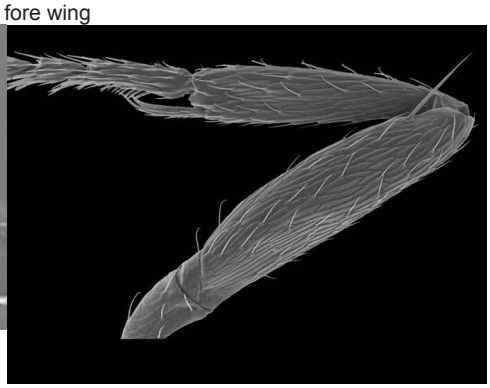
fore wing



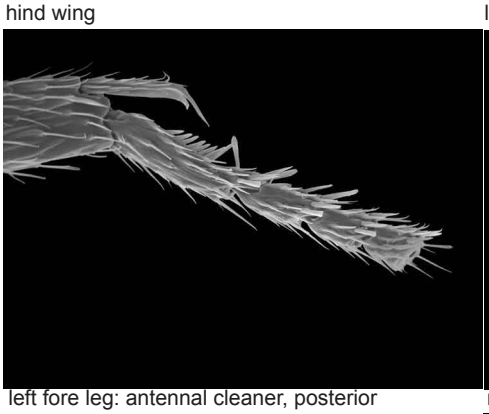
hind wing



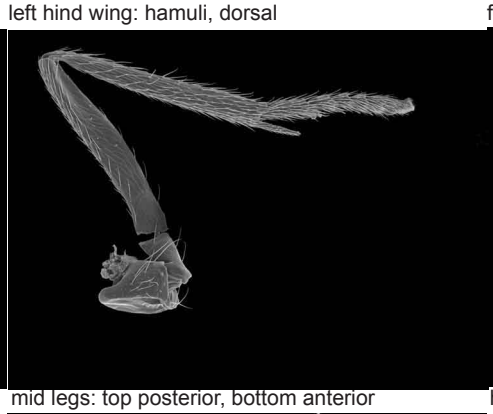
left hind wing: hamuli, dorsal



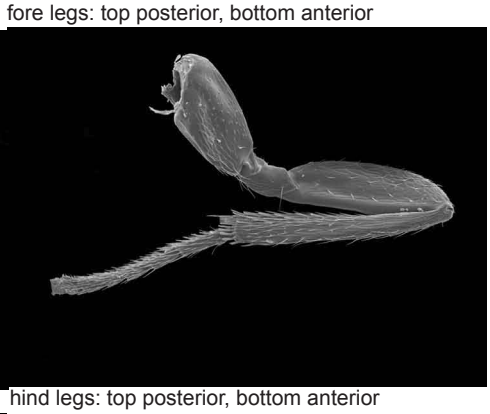
fore legs: top posterior, bottom anterior



left fore leg: antennal cleaner, posterior

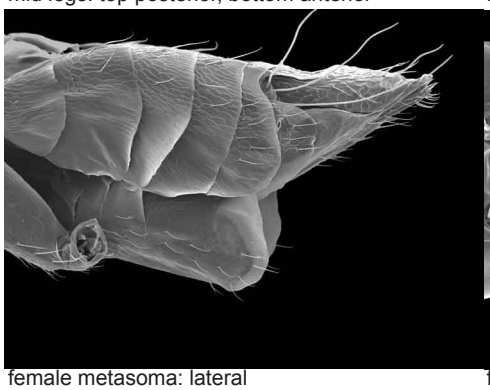


mid legs: top posterior, bottom anterior

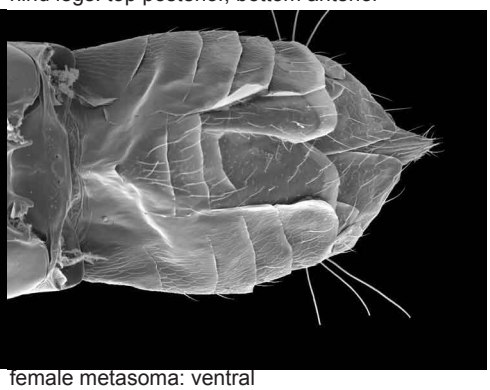


hind legs: top posterior, bottom anterior

hind leg: tarsal claw

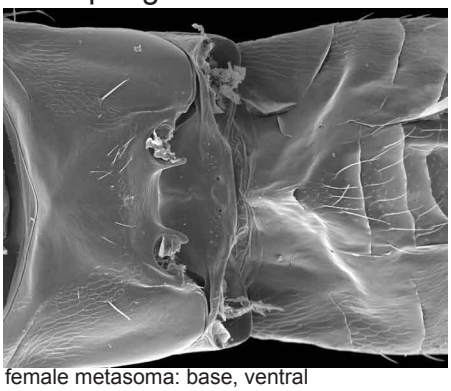


female metasoma: lateral



female metasoma: ventral

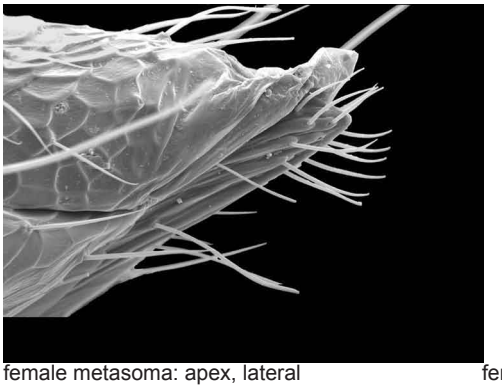
Coccobius fulvus Chalcidoidea: Aphelinidae: Coccophaginae



female metasoma: dorsal

female metasoma: base, lateral

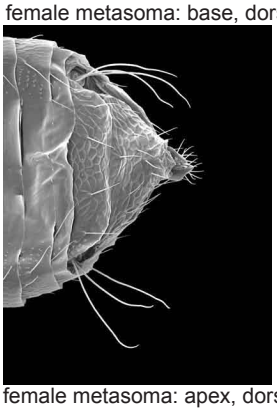
female metasoma: base, ventral

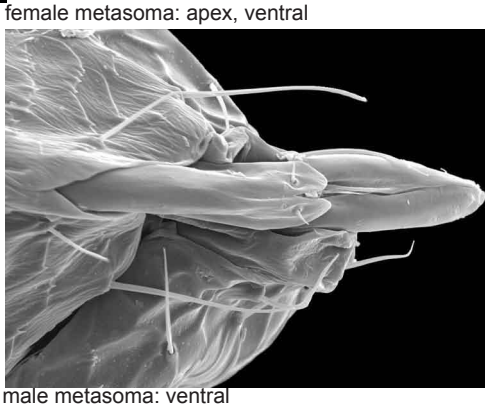


female metasoma: base, dorsal

female metasoma: apex, lateral

female metasoma: apex, ventral





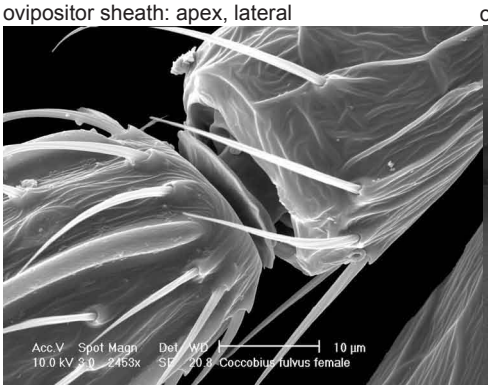
female metasoma: apex, dorsal

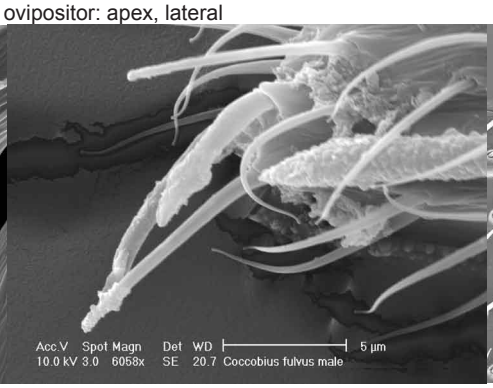
male metasoma: lateral

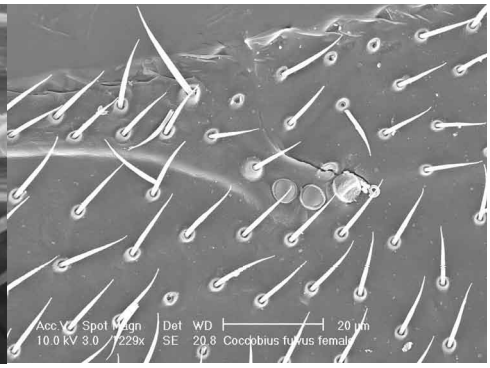
male metasoma: ventral

ovipositor sheath: apex, lateral

ovipositor: apex, lateral





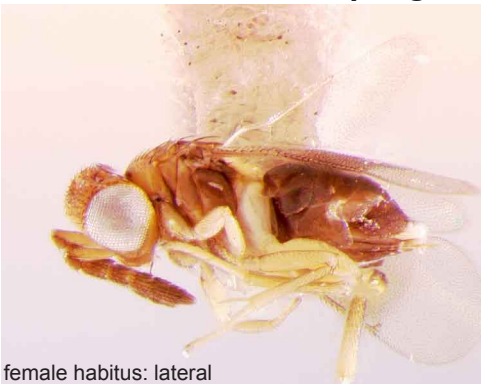


antenna, female: base

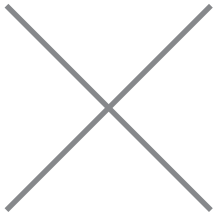
antenna, male: apex

fore wing: stigma, dorsal

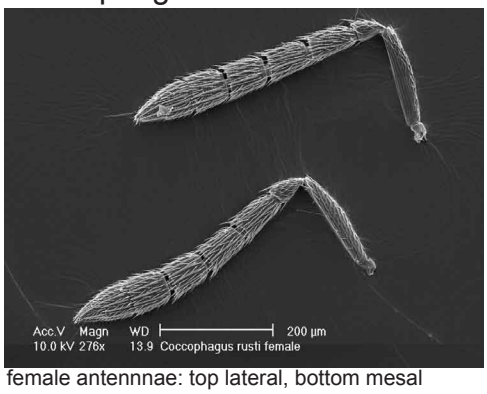
Coccophagus rusti Chalcidoidea: Aphelinidae: Coccophaginae



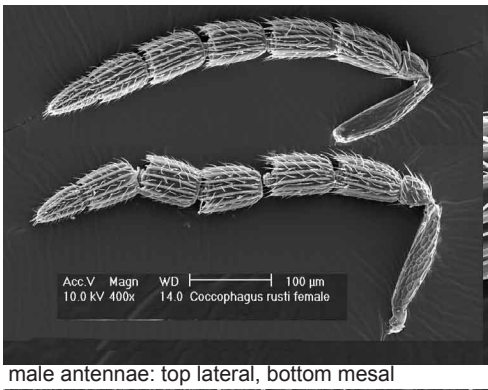
female habitus: lateral



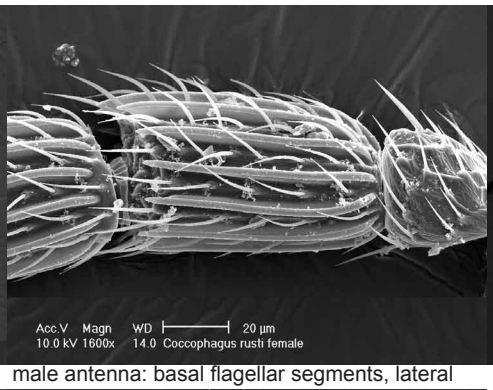
male habitus: lateral



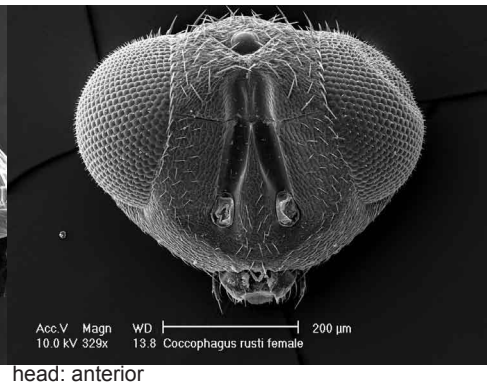
female antennnae: top lateral, bottom mesal



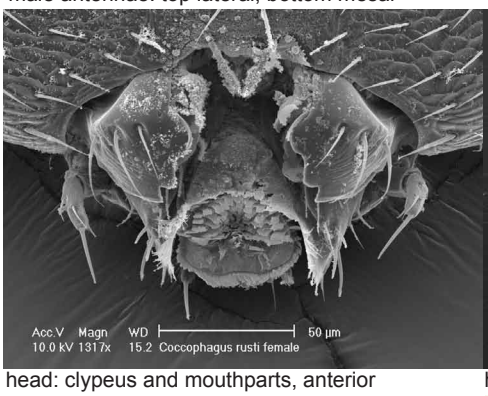
male antennae: top lateral, bottom mesal



male antenna: basal flagellar segments, lateral



head: anterior



head: clypeus and mouthparts, anterior

head: posterior

mouthparts: labrum, anterior

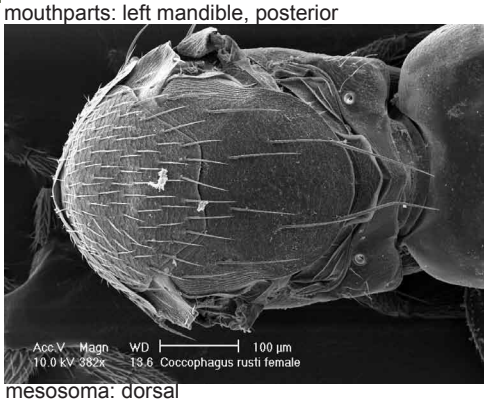
mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

mouthparts: labium

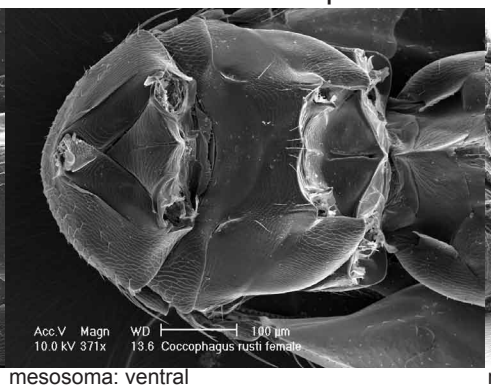
mouthparts: maxilla



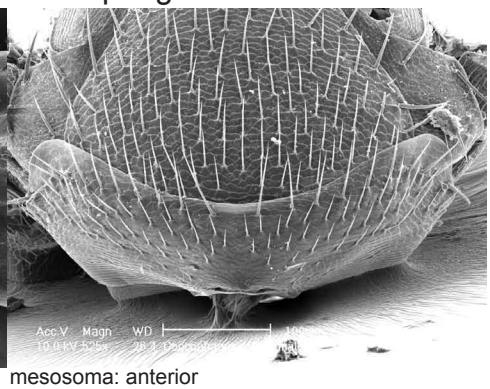
mesosoma: dorsal

Coccophagus rusti Chalcidoidea: Aphelinidae: Coccophaginae

mesosoma: lateral

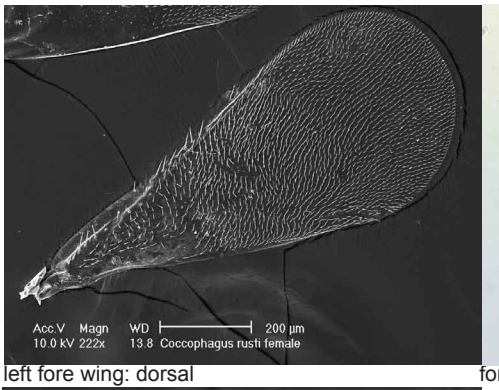


mesosoma: ventral

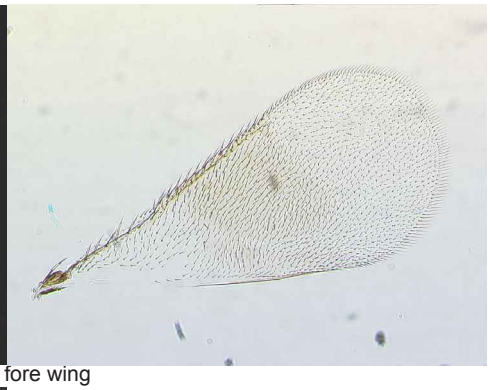


mesosoma: anterior

mesosoma: posterior

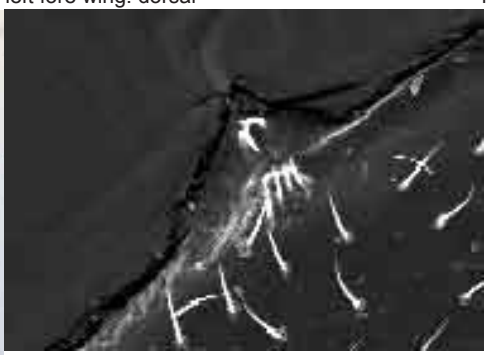


left fore wing: dorsal



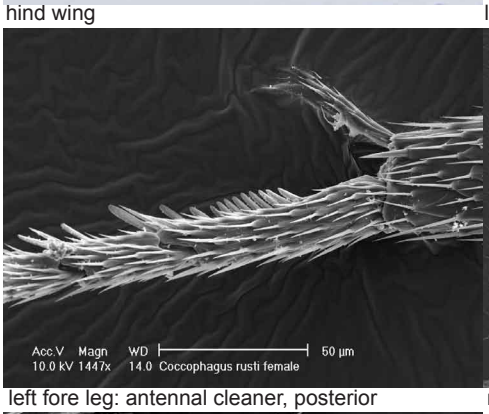
fore wing

hind wing

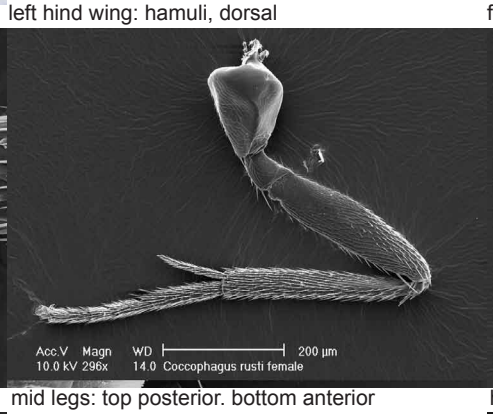


left hind wing: hamuli, dorsal

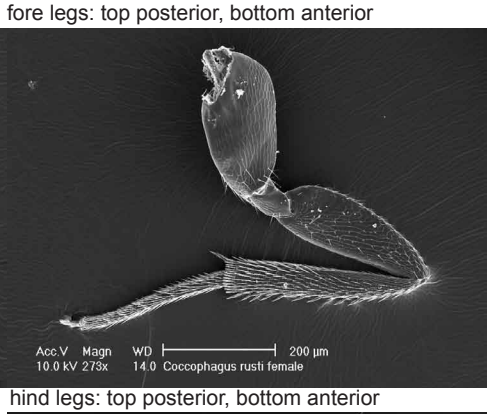
fore legs: top posterior, bottom anterior



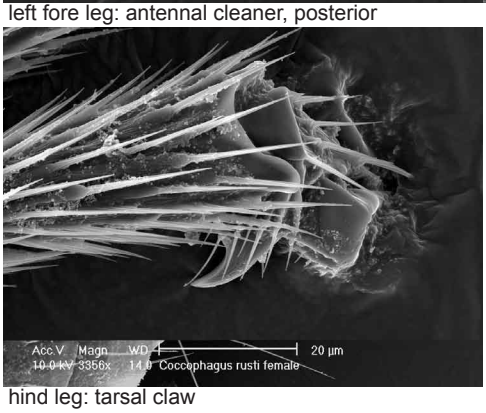
left fore leg: antennal cleaner, posterior



mid legs: top posterior. bottom anterior

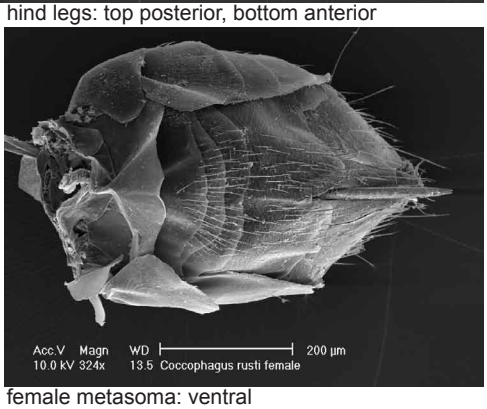


hind legs: top posterior, bottom anterior



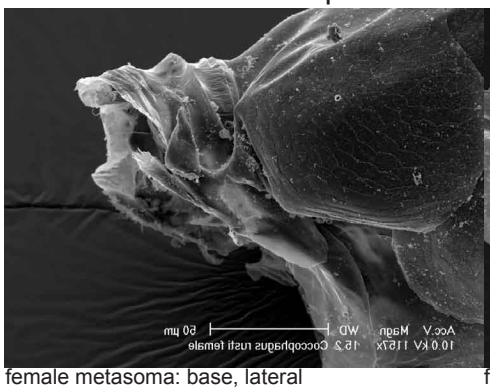
hind leg: tarsal claw

female metasoma: lateral

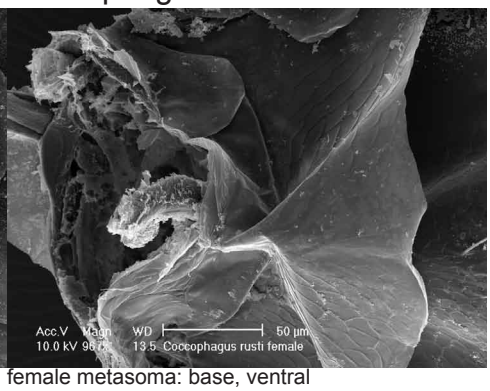


female metasoma: ventral

Coccophagus rusti Chalcidoidea: Aphelinidae: Coccophaginae

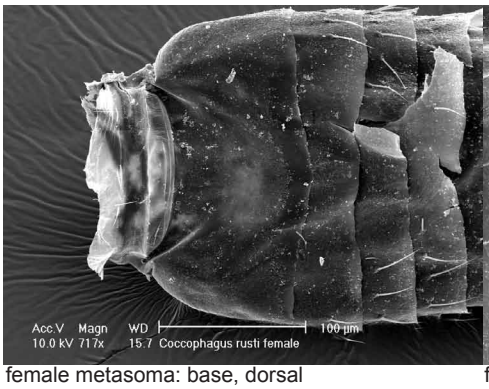


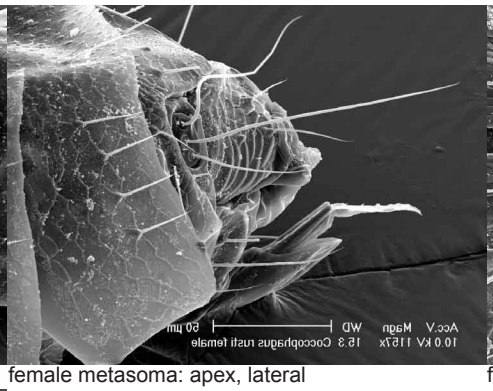
female metasoma: dorsal

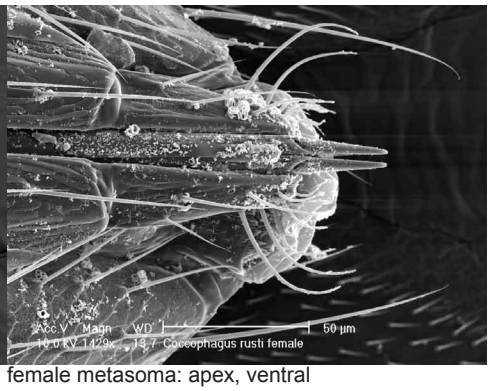


female metasoma: base, lateral

female metasoma: base, ventral



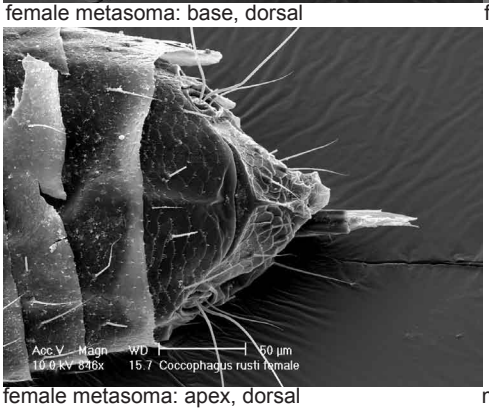




female metasoma: base, dorsal

female metasoma: apex, lateral

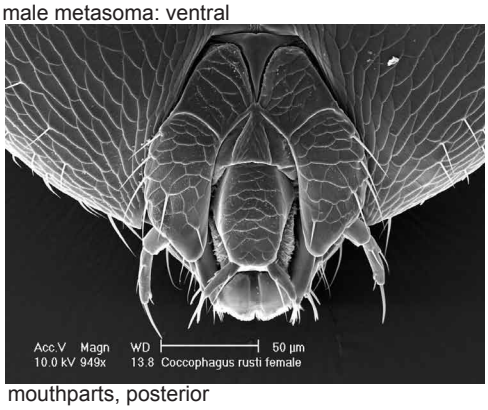
female metasoma: apex, ventral



female metasoma: apex, dorsal

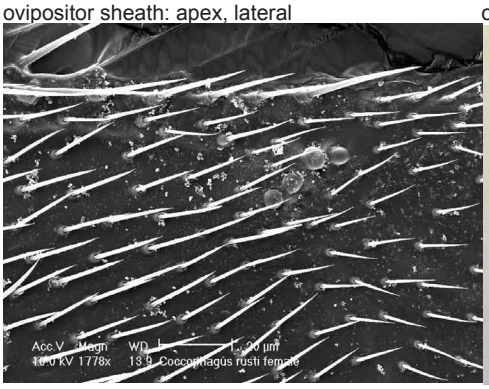
male metasoma: lateral

male metasoma: ventral



mouthparts, posterior

ovipositor sheath: apex, lateral

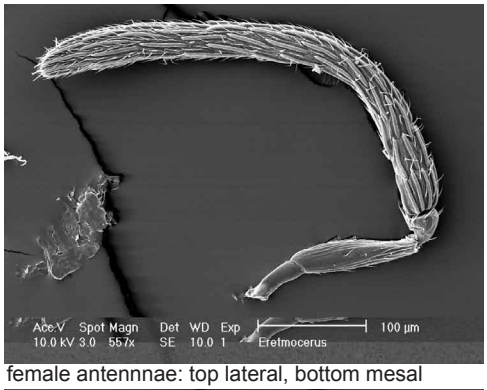


ovipositor: apex, lateral

fore wing: stigma, dorsal

ovipositor

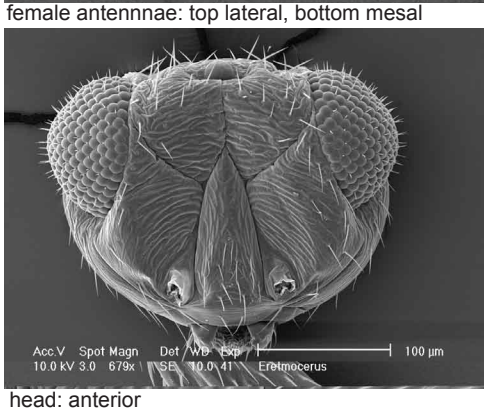
***Eretmocerus* sp.** Chalcidoidea: Aphelinidae: Eretmocerinae



female habitus: lateral

male habitus: lateral

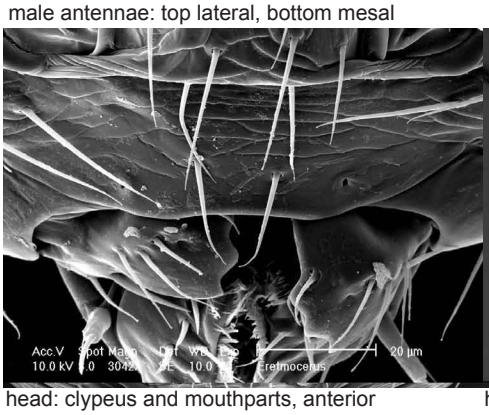
female antennnae: top lateral, bottom mesal

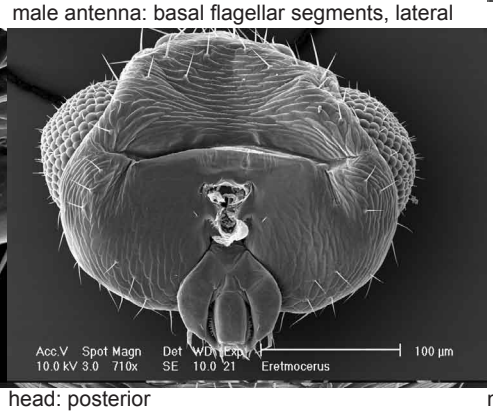


male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

head: anterior





head: clypeus and mouthparts, anterior

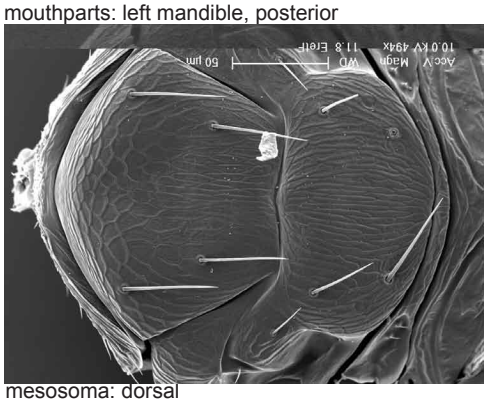
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

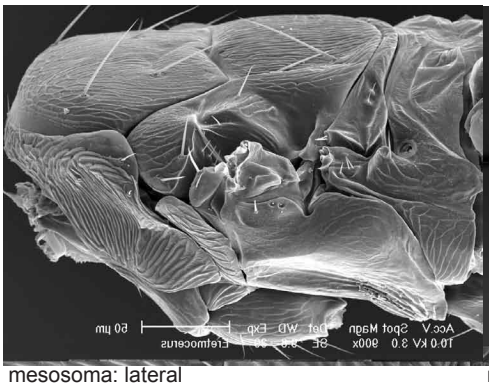


mouthparts: labium

mouthparts: maxilla

mesosoma: dorsal

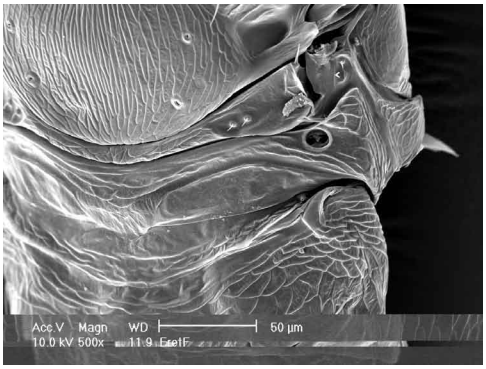
***Eretmocerus* sp.** Chalcidoidea: Aphelinidae: Eretmocerinae



mesosoma: lateral

mesosoma: ventral

mesosoma: anterior



mesosoma: posterior

left fore wing: dorsal

fore wing

hind wing

left hind wing: hamuli, dorsal

fore legs: top posterior, bottom anterior

left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior

hind legs: top posterior, bottom anterior

hind leg: tarsal claw

female metasoma: lateral

female metasoma: ventral

***Eretmocerus* sp.** Chalcidoidea: Aphelinidae: Eretmocerinae

female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral

female metasoma: base, dorsal

female metasoma: apex, lateral

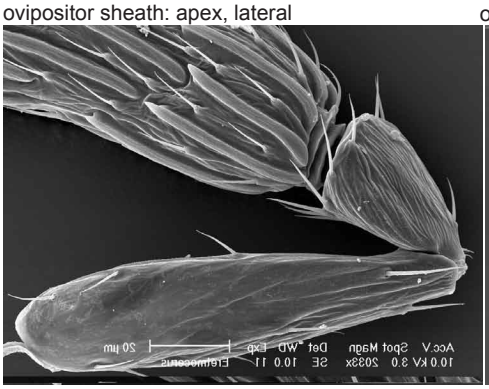
female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

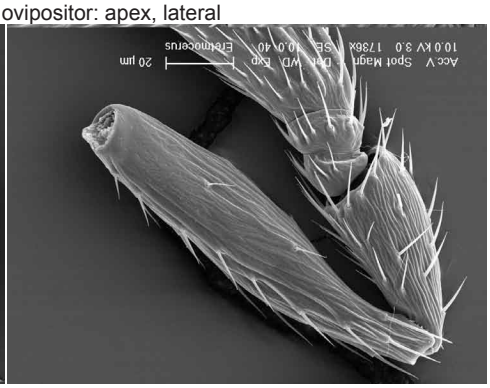
male metasoma: ventral

ovipositor sheath: apex, lateral



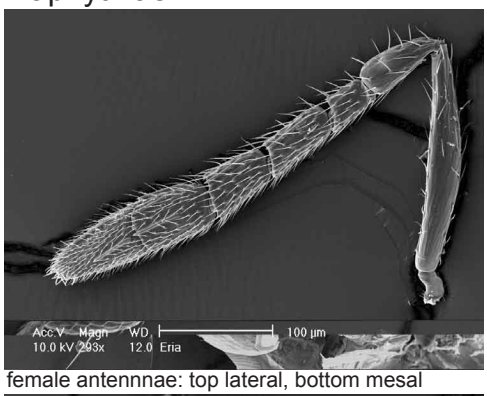
antenna, female: basal

ovipositor: apex, lateral



antenna, female: basal

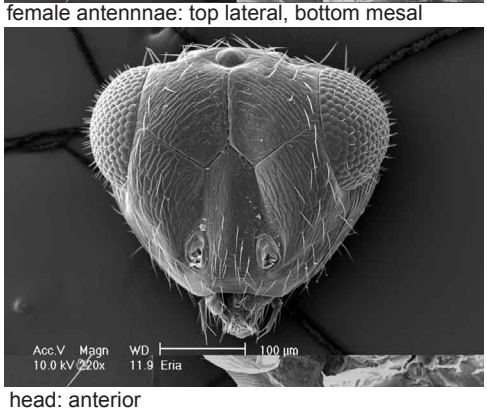
***Eriaphytis* sp.** Chalcidoidea: Aphelinidae: Eriaphytinae



female habitus: lateral

male habitus: lateral

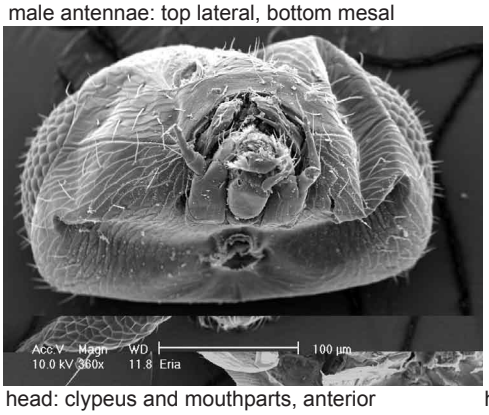
female antennnae: top lateral, bottom mesal



male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

head: anterior



head: clypeus and mouthparts, anterior

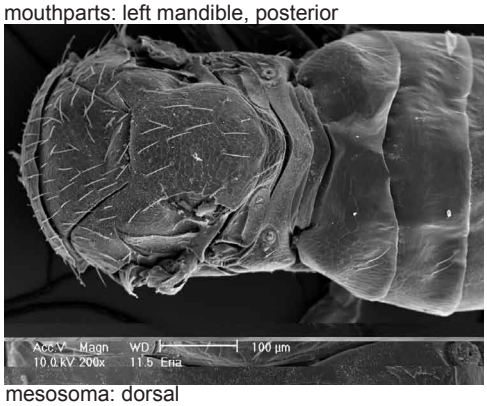
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

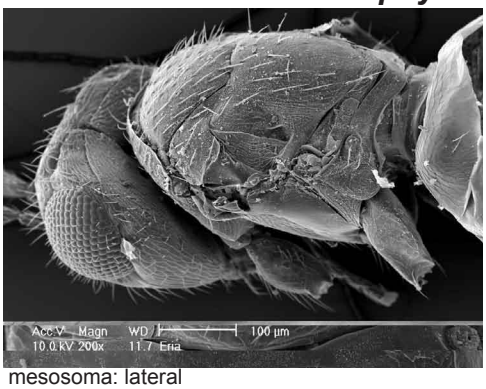


mouthparts: labium

mouthparts: maxilla

mesosoma: dorsal

***Eriaphytis* sp.** Chalcidoidea: Aphelinidae: Eriaphytinae

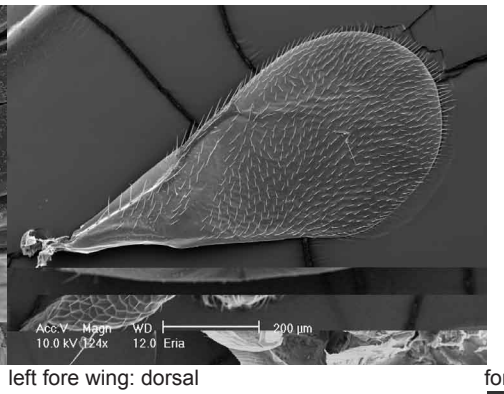


mesosoma: lateral

mesosoma: ventral

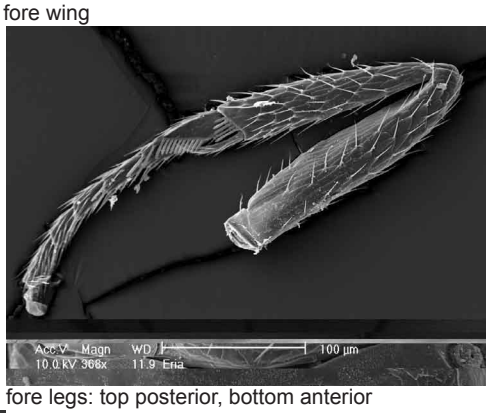
mesosoma: anterior

mesosoma: posterior



left fore wing: dorsal

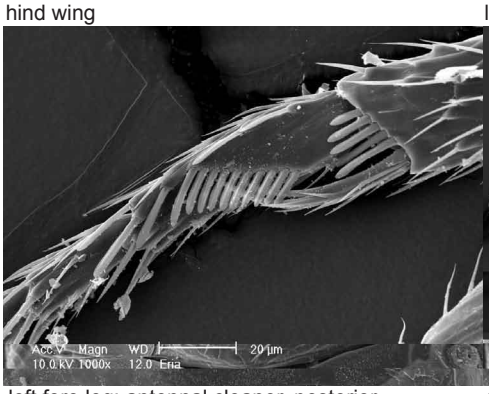
fore wing



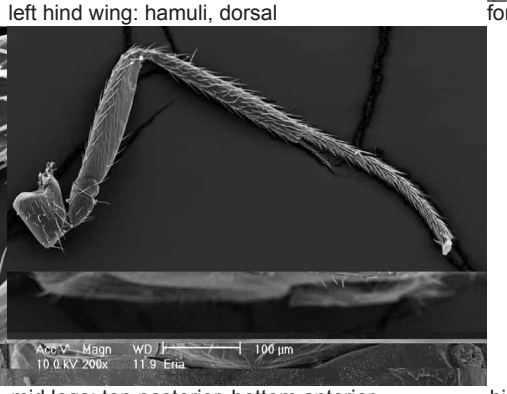
hind wing

left hind wing: hamuli, dorsal

fore legs: top posterior, bottom anterior

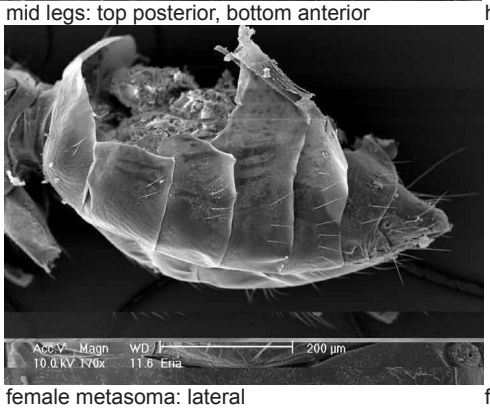


left fore leg: antennal cleaner, posterior



mid legs: top posterior, bottom anterior

hind legs: top posterior, bottom anterior



hind leg: tarsal claw

female metasoma: lateral

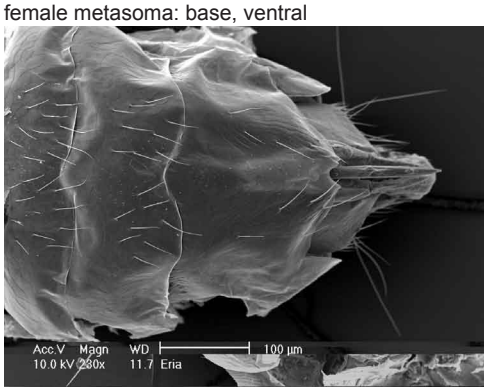
female metasoma: ventral

***Eriaphytis* sp.** Chalcidoidea: Aphelinidae: Eriaphytinae

female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral



female metasoma: base, dorsal

female metasoma: apex, lateral

female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

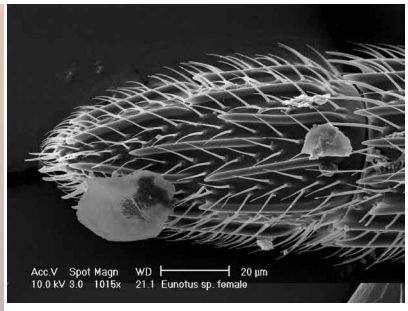
ovipositor sheath: apex, lateral

ovipositor: apex, lateral

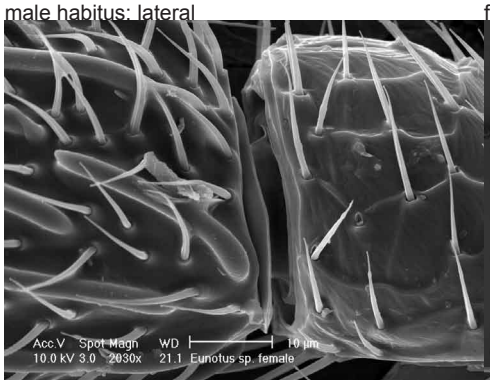
***Eunotus* sp.** Chalcidoidea: Pteromalidae: Eunotinae

female habitus: lateral

male habitus: lateral

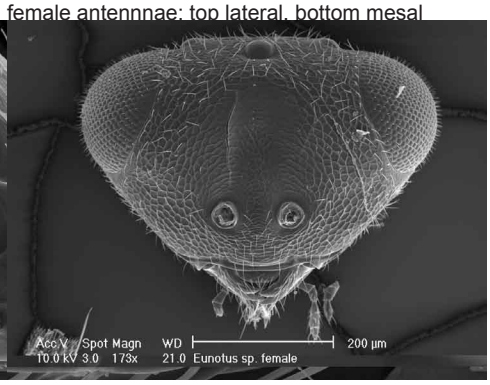


female antennnae: top lateral, bottom mesal

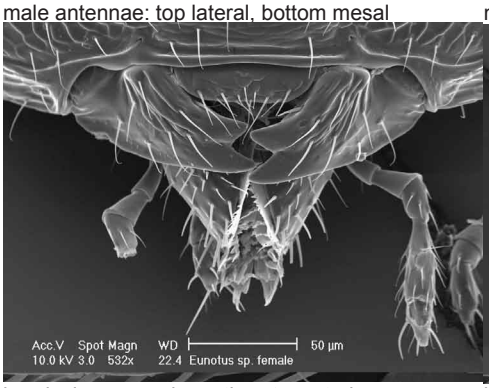


male antennae: top lateral, bottom mesal

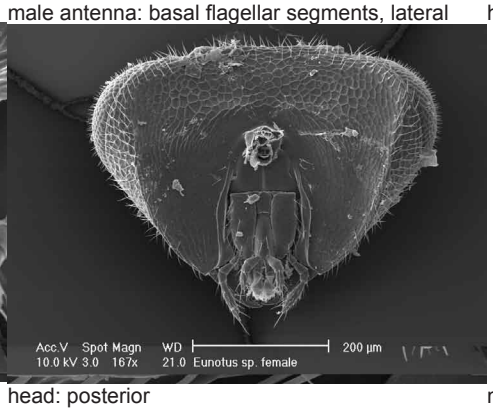
male antenna: basal flagellar segments, lateral



head: anterior



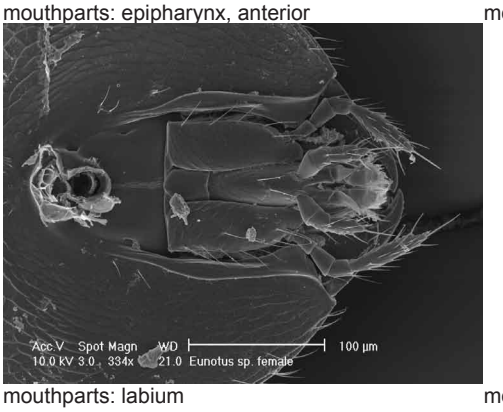
head: clypeus and mouthparts, anterior



head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

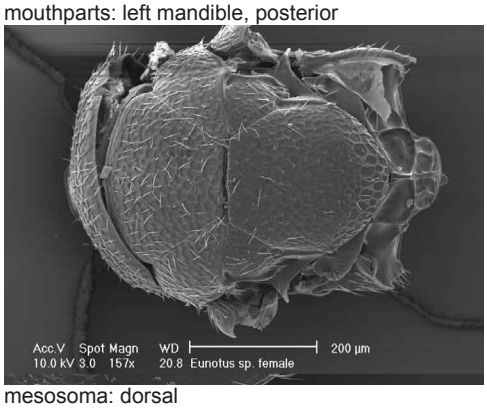


mouthparts: labium

mouthparts: right mandible, anterior

mouthparts: maxilla

mouthparts: left mandible, posterior



mesosoma: dorsal

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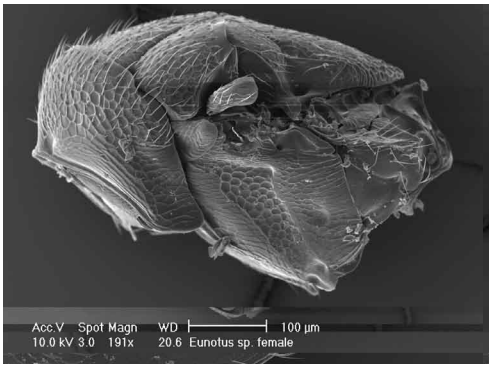
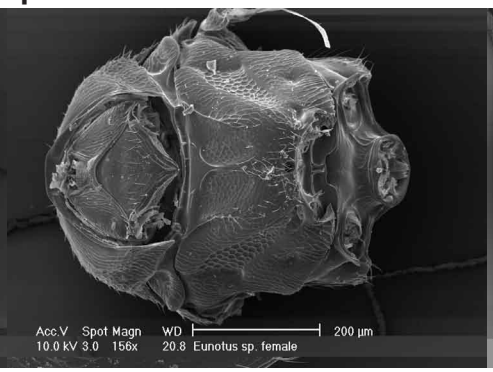
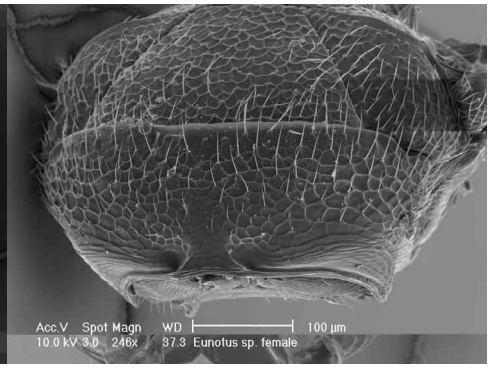
Eunotus sp. Chalcidoidea: Pteromalidae: Eunotinae



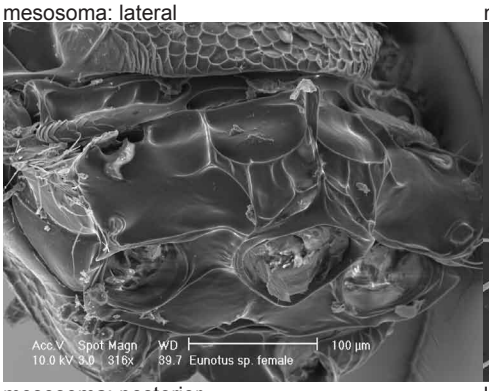
mesosoma: lateral



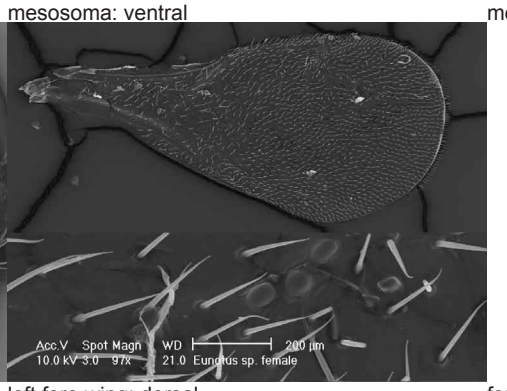
mesosoma: ventral



mesosoma: anterior

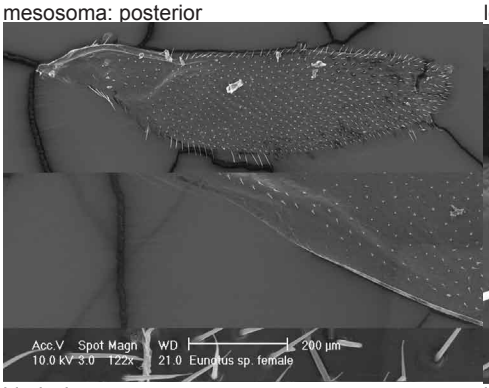


mesosoma: posterior

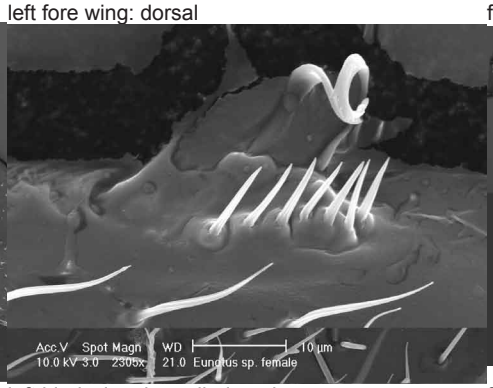


left fore wing: dorsal

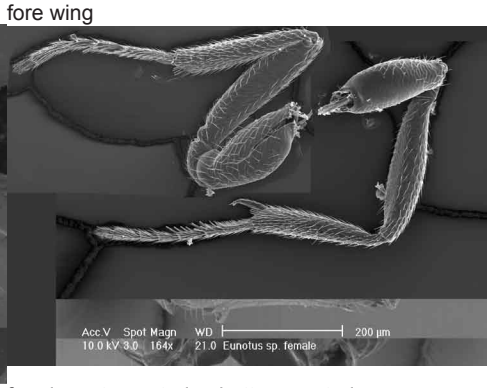
fore wing



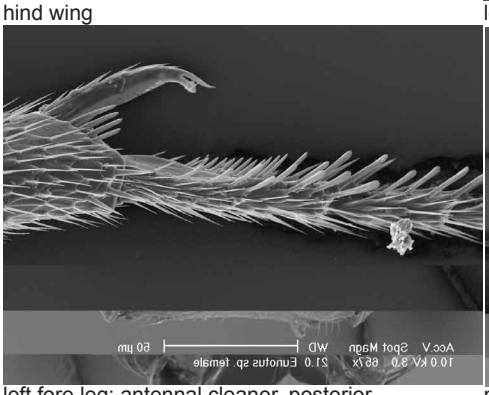
hind wing



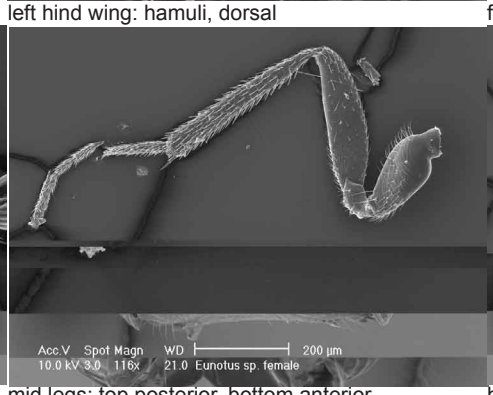
left hind wing: hamuli, dorsal



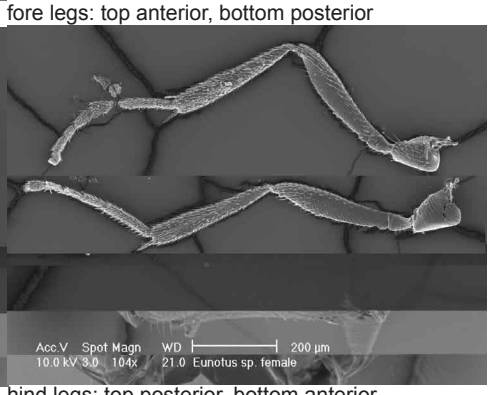
fore legs: top anterior, bottom posterior



left fore leg: antennal cleaner, posterior



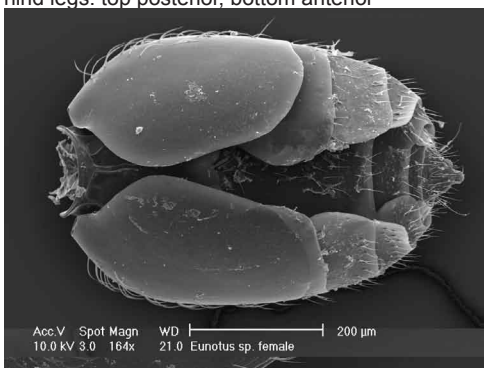
mid legs: top posterior, bottom anterior



hind legs: top posterior, bottom anterior

hind leg: tarsal claw

female metasoma: lateral



female metasoma: ventral

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***Eunotus* sp.** Chalcidoidea: Pteromalidae: Eunotinae

female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral

female metasoma: base, dorsal

female metasoma: apex, lateral

female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

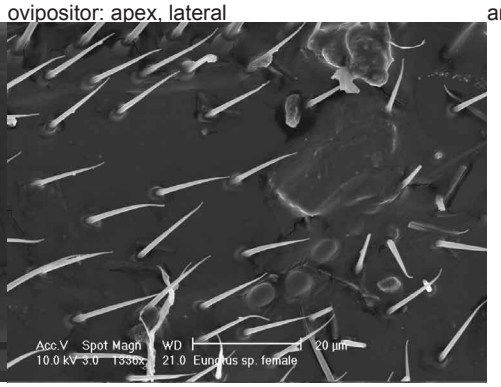
male metasoma: ventral

antenna, female: apex

ovipositor sheath: apex, lateral

mesosoma, ventral

ovipositor: apex, lateral



fore wings: stigma, dorsal

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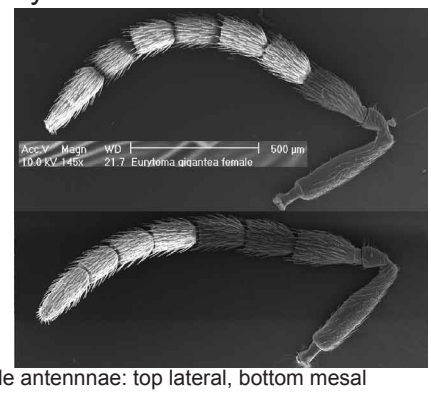
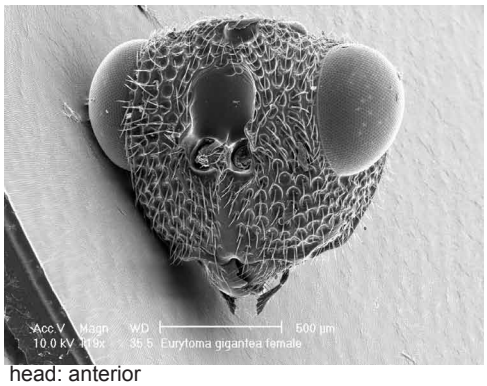
Eurytoma gigantea Chalcidoidea: Eurytomidae: Eurytominae



female habitus: lateral

male habitus: lateral

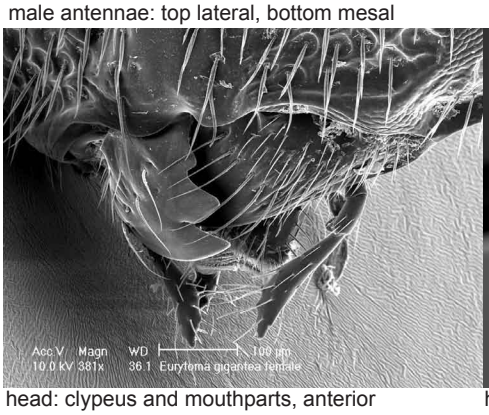
female antennnae: top lateral, bottom mesal

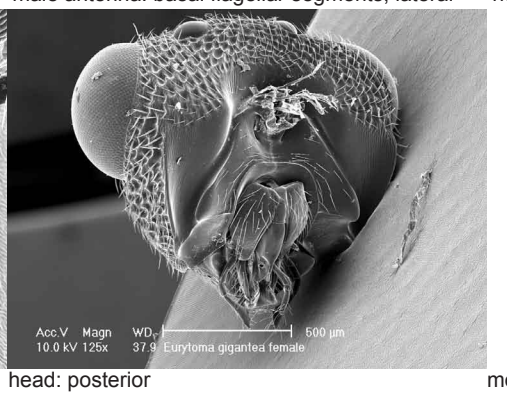


male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

head: anterior





head: clypeus and mouthparts, anterior

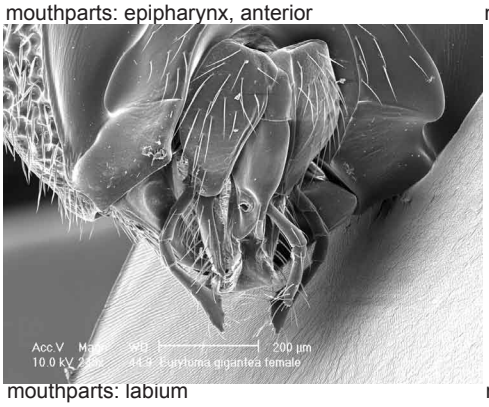
head: posterior

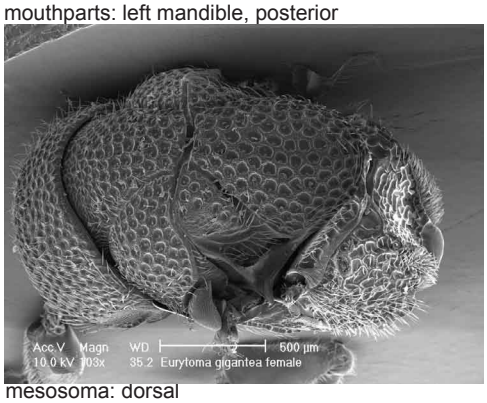
mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior



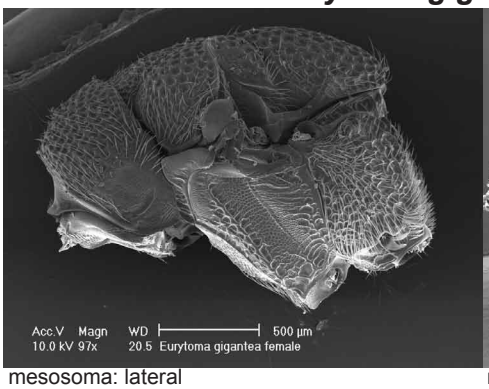


mouthparts: labium

mouthparts: maxilla

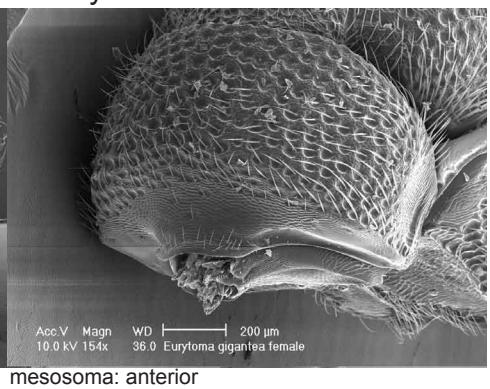
mesosoma: dorsal

Eurytoma gigantea Chalcidoidea: Eurytomidae: Eurytominae



mesosoma: lateral

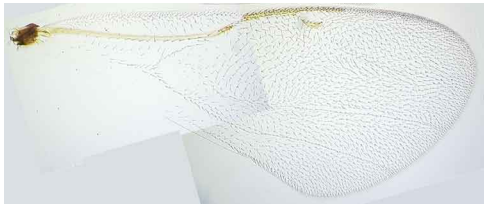
mesosoma: ventral



mesosoma: anterior

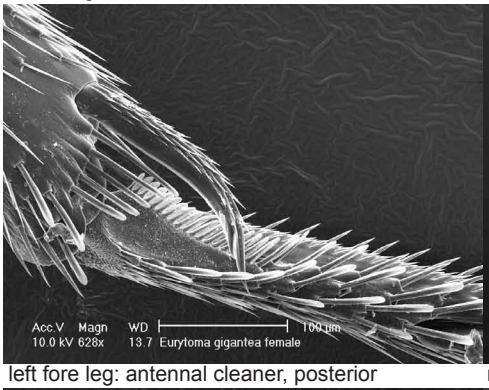
mesosoma: posterior

left fore wing: dorsal

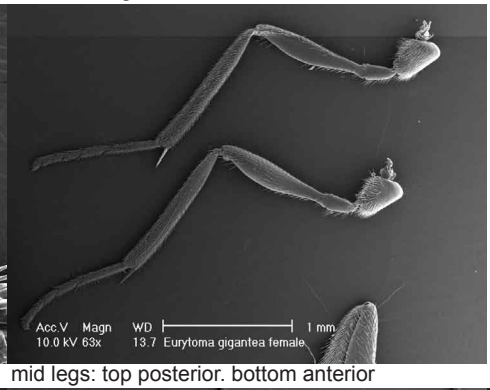


fore wing

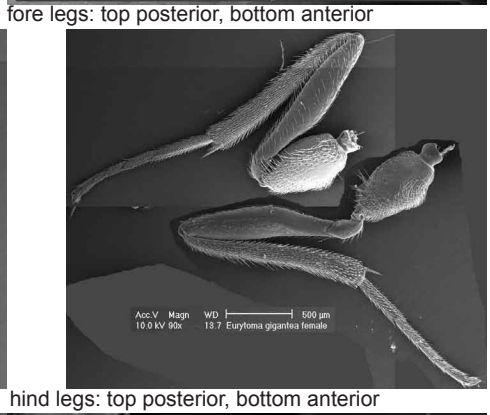
hind wing



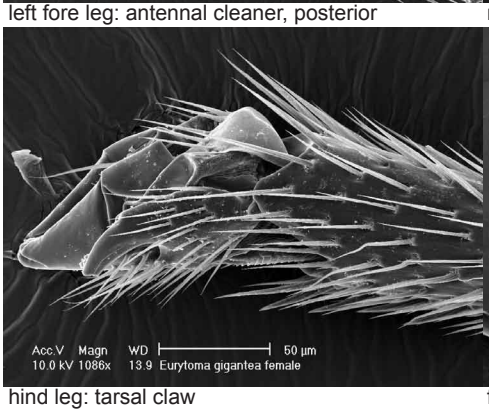
left hind wing: hamuli, dorsal



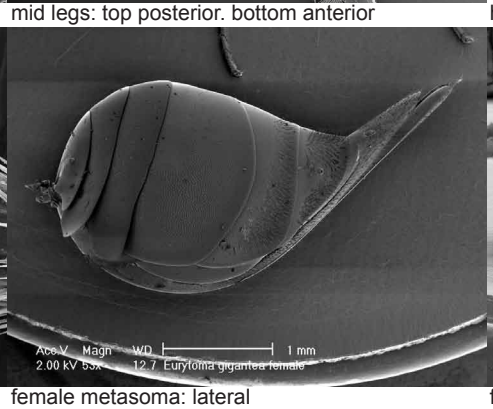
fore legs: top posterior, bottom anterior



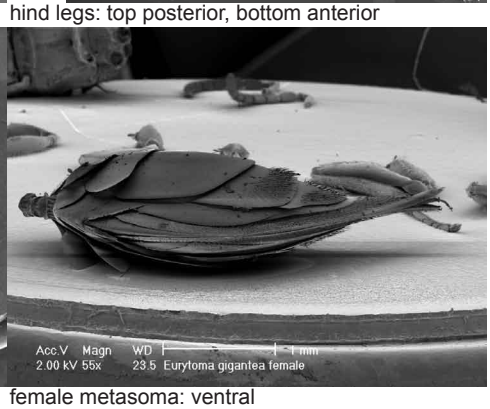
left fore leg: antennal cleaner, posterior



mid legs: top posterior. bottom anterior



hind legs: top posterior, bottom anterior

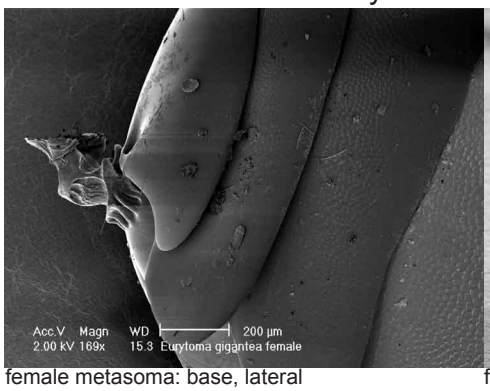


hind leg: tarsal claw

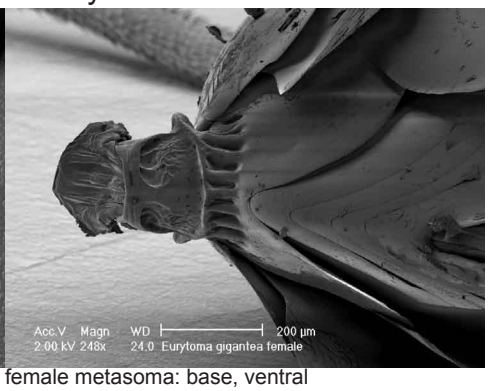
female metasoma: lateral

female metasoma: ventral

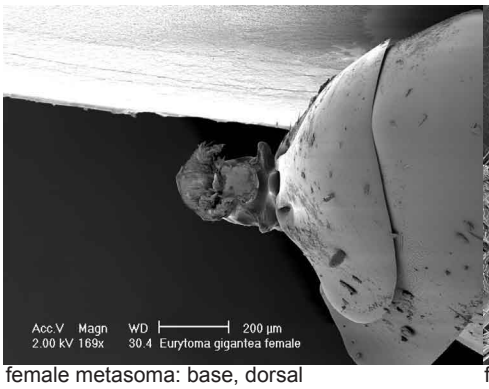
Eurytoma gigantea Chalcidoidea: Eurytomidae: Eurytominae



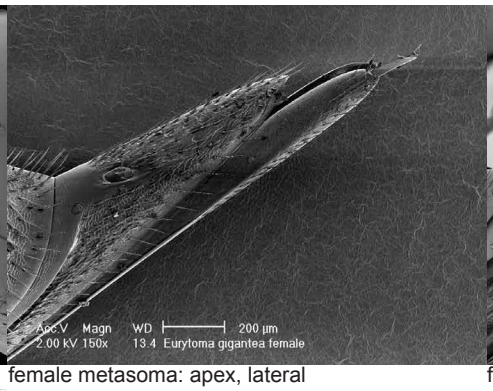
female metasoma: dorsal



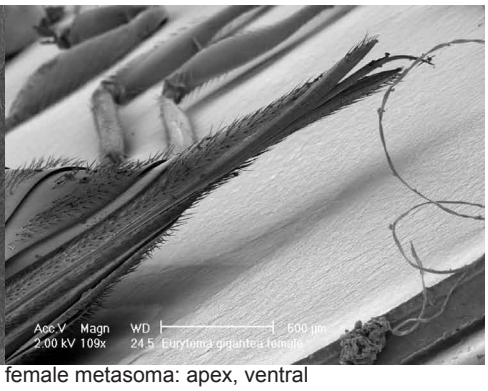
female metasoma: base, lateral



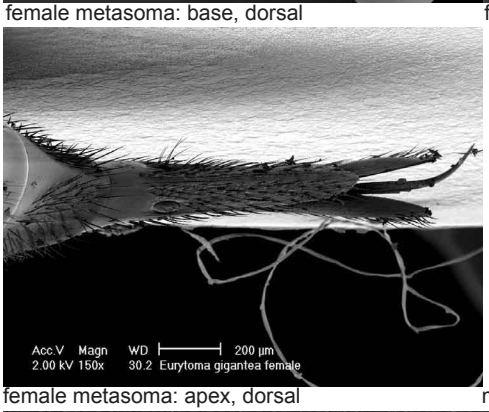
female metasoma: base, ventral



female metasoma: base, dorsal



female metasoma: apex, lateral

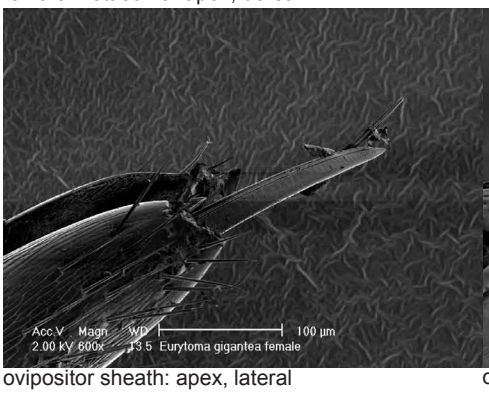


female metasoma: apex, ventral

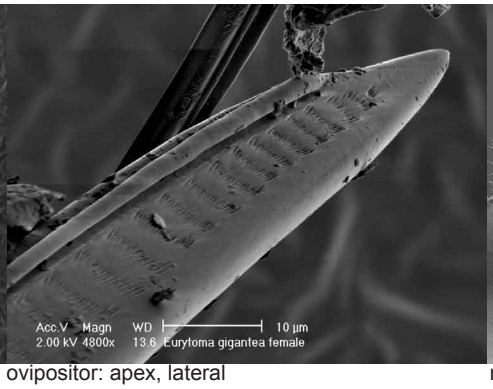
female metasoma: apex, dorsal

male metasoma: lateral

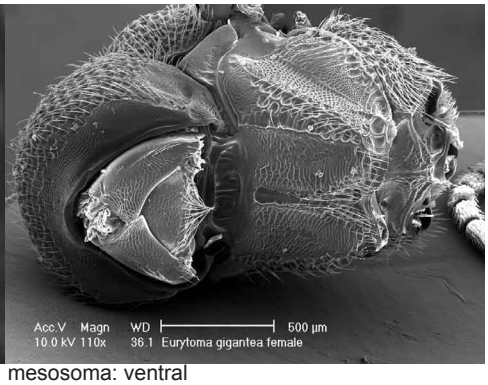
male metasoma: ventral



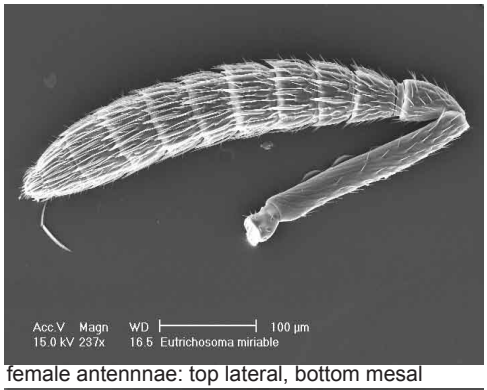
ovipositor sheath: apex, lateral



ovipositor: apex, lateral



mesosoma: ventral



female habitus: lateral

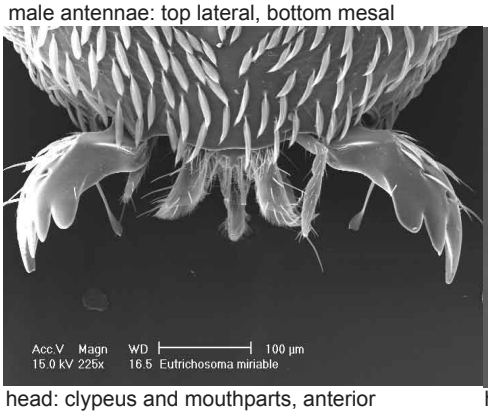
male habitus: lateral

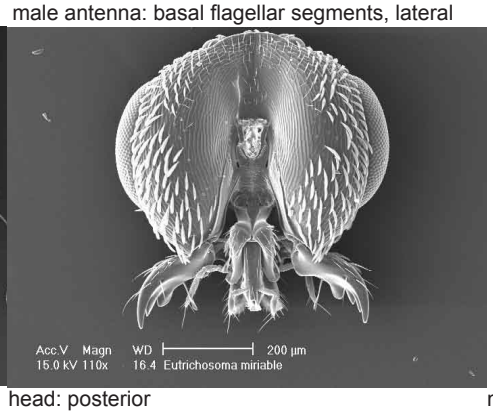
female antennnae: top lateral, bottom mesal

male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

head: anterior





head: clypeus and mouthparts, anterior

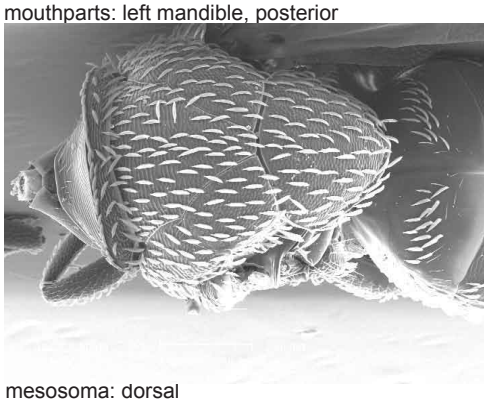
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior



mouthparts: labium

mouthparts: maxilla

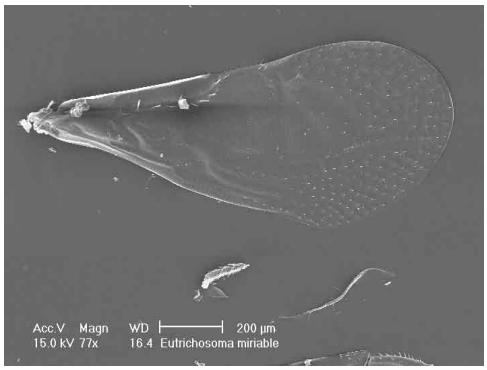
mesosoma: dorsal

Eutrichosoma mirabile Chalcidoidea: Pteromalidae: Eutrichosomatinae

mesosoma: lateral

mesosoma: ventral

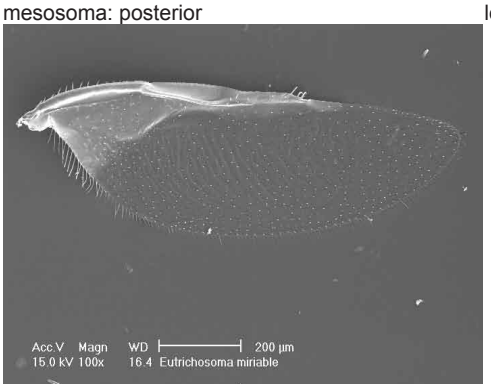
mesosoma: anterior



mesosoma: posterior

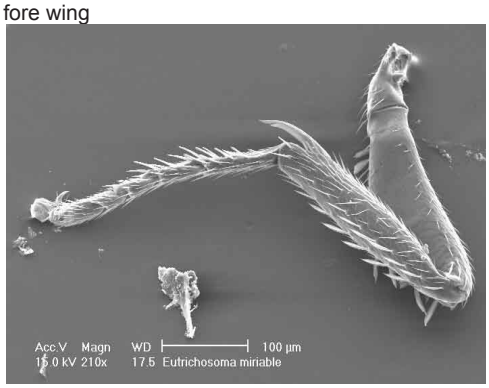
left fore wing: dorsal

fore wing



hind wing

left hind wing: hamuli, dorsal

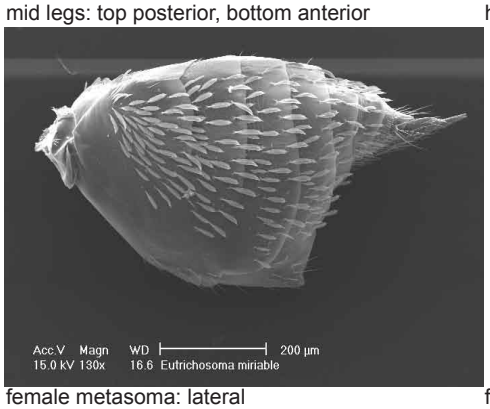


fore legs: top posterior, bottom anterior

left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior

hind legs: top posterior, bottom anterior

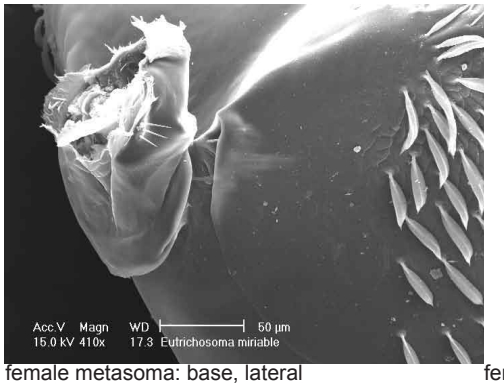


hind leg: tarsal claw

female metasoma: lateral

female metasoma: ventral

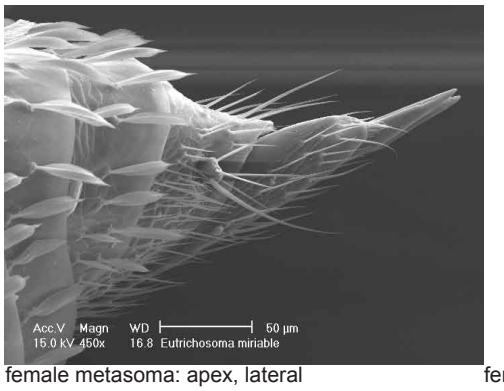
Eutrichosoma mirabile Chalcidoidea: Pteromalidae: Eutrichosomatinae



female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral



female metasoma: base, dorsal

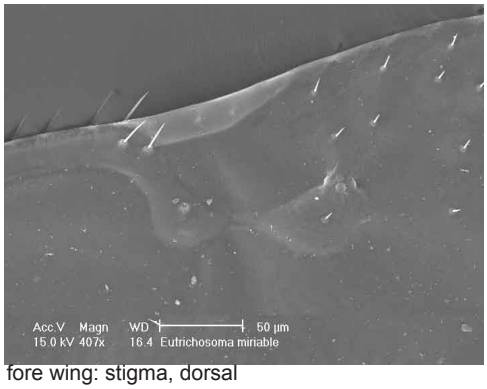
female metasoma: apex, lateral

female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral



ovipositor sheath: apex, lateral

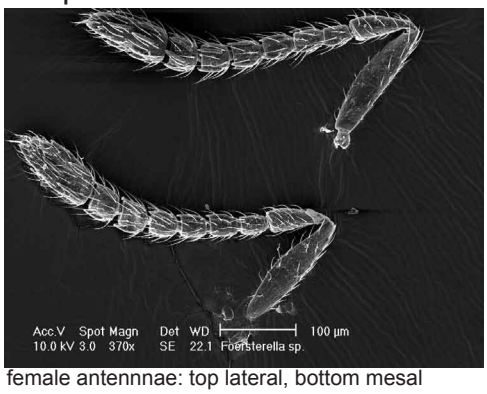
ovipositor: apex, lateral

fore wing: stigma, dorsal

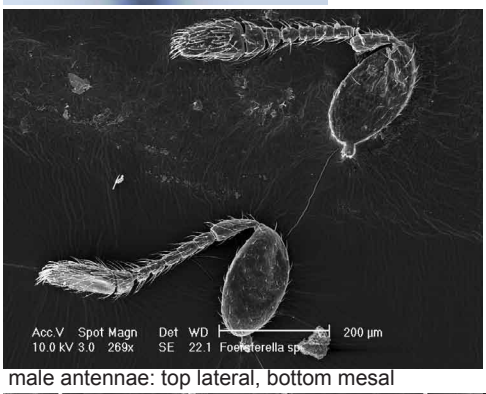
Foersterella reptans Chalcidoidea: Tetracampidae

female habitus: lateral

male habitus: lateral

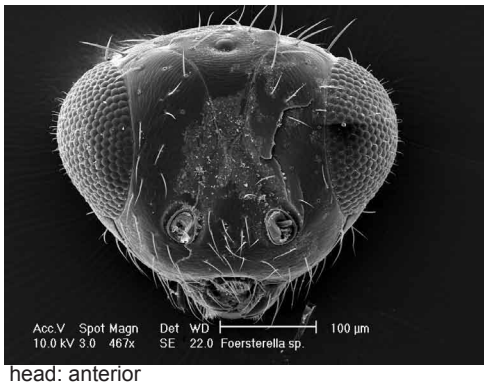


female antennnae: top lateral, bottom mesal

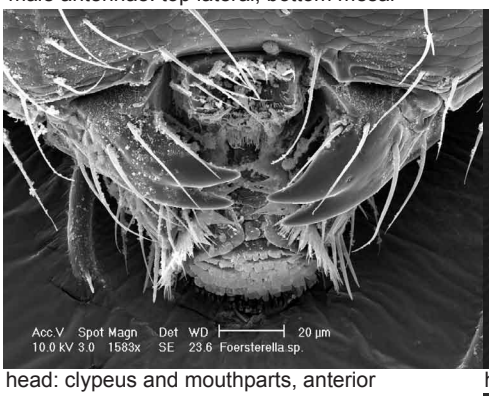


male antennae: top lateral, bottom mesal

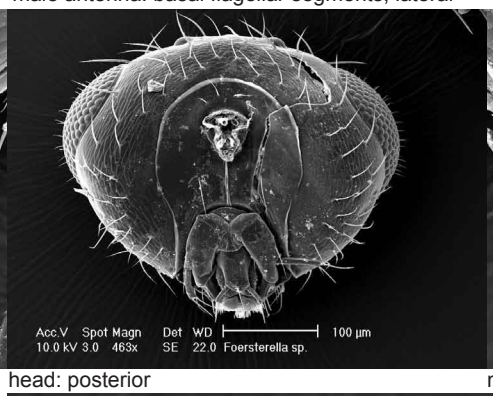
male antenna: basal flagellar segments, lateral



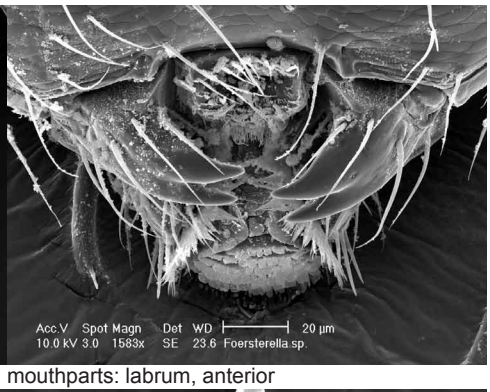
head: anterior



head: clypeus and mouthparts, anterior

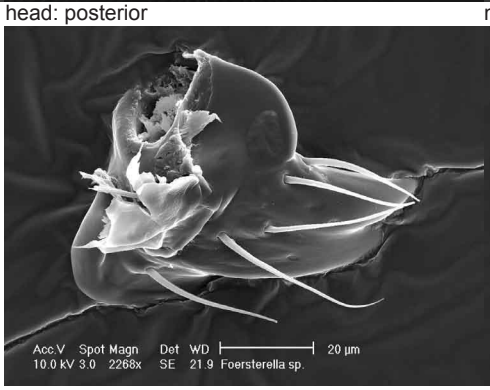


head: posterior

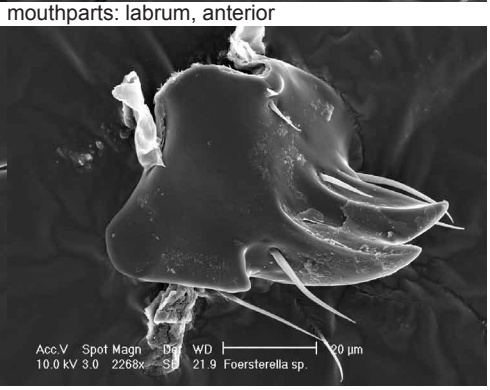


mouthparts: labrum, anterior

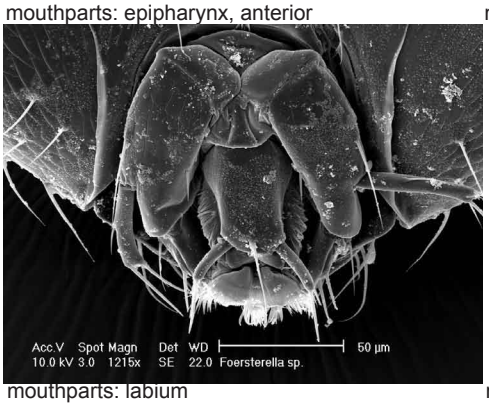
mouthparts: epipharynx, anterior



mouthparts: right mandible, anterior

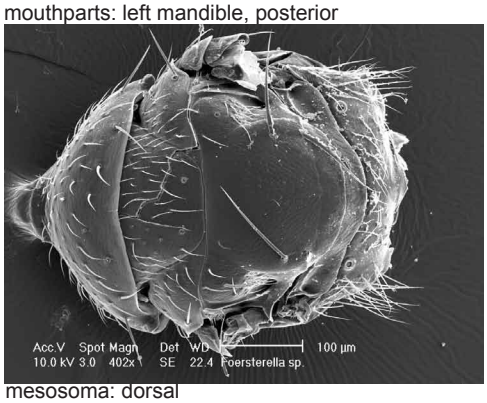


mouthparts: left mandible, posterior



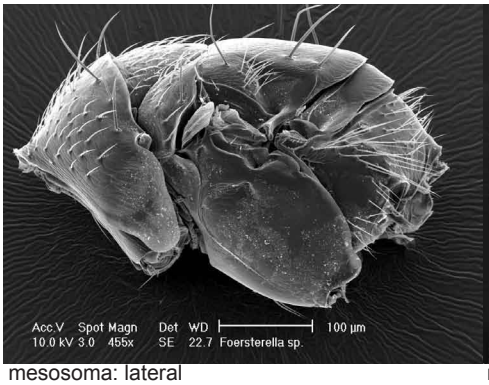
mouthparts: labium

mouthparts: maxilla

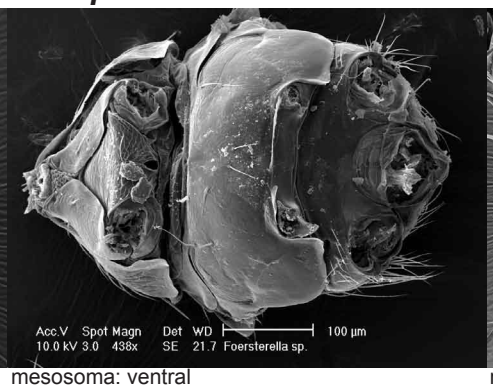


mesosoma: dorsal

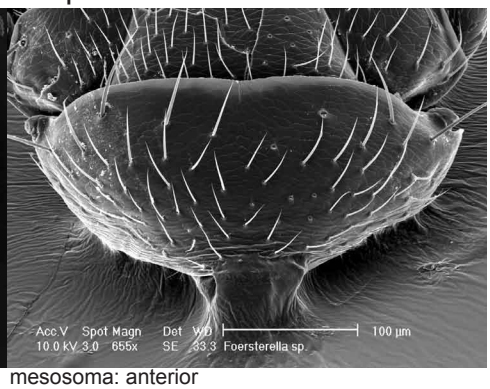
Foersterella reptans Chalcidoidea: Tetracampidae



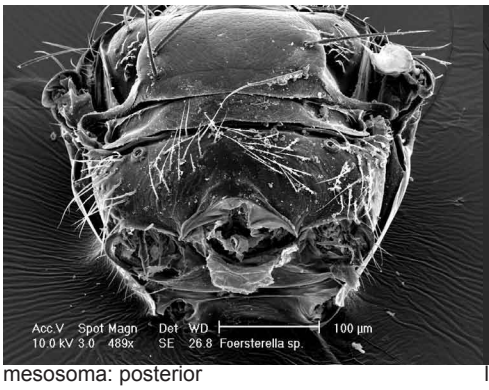
mesosoma: lateral



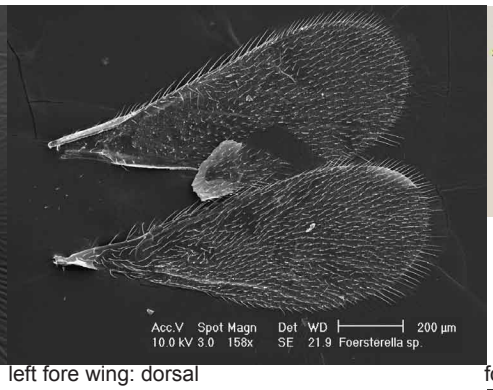
mesosoma: ventral



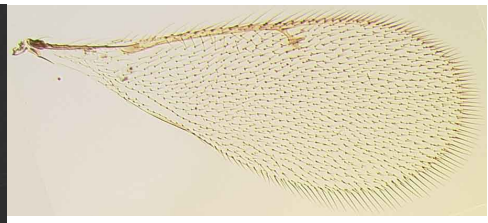
mesosoma: anterior



mesosoma: posterior

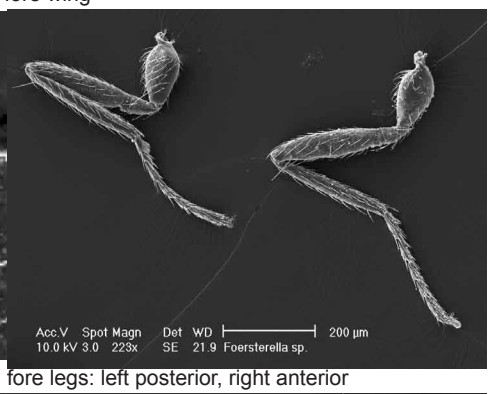


left fore wing: dorsal

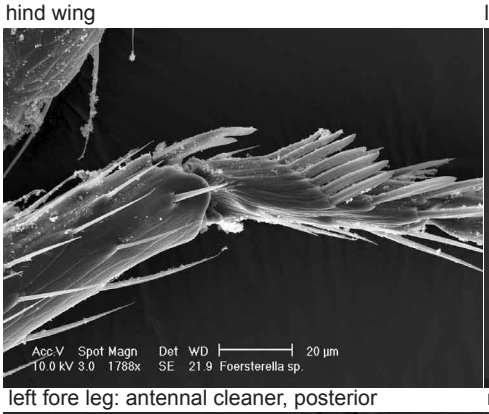

fore wing

hind wing

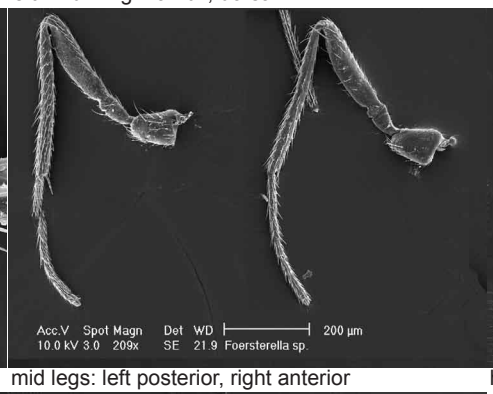
left hind wing: hamuli, dorsal



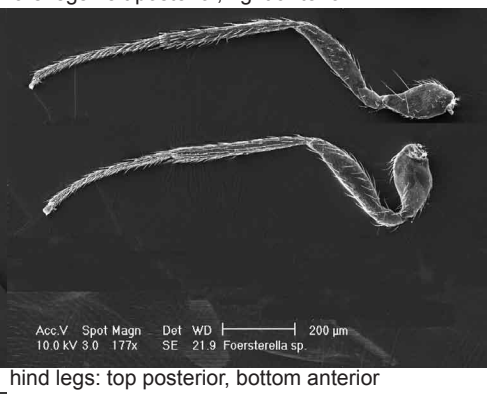
fore legs: left posterior, right anterior



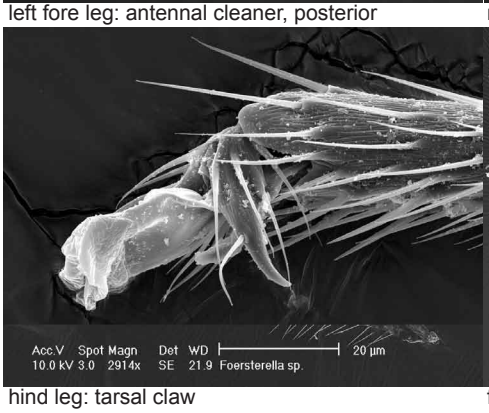
left fore leg: antennal cleaner, posterior



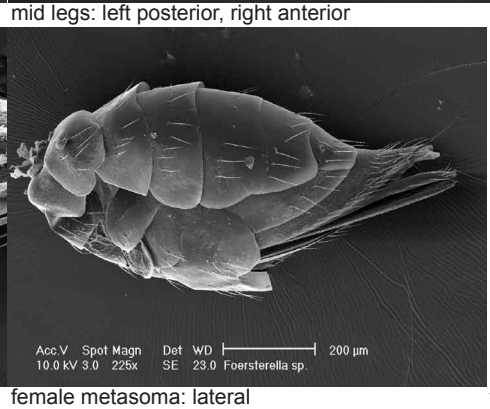
mid legs: left posterior, right anterior



hind legs: top posterior, bottom anterior



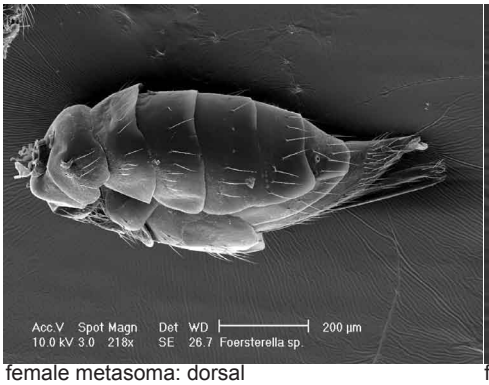
hind leg: tarsal claw



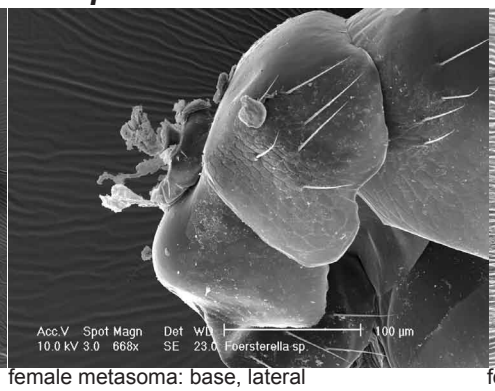
female metasoma: lateral

female metasoma: ventral

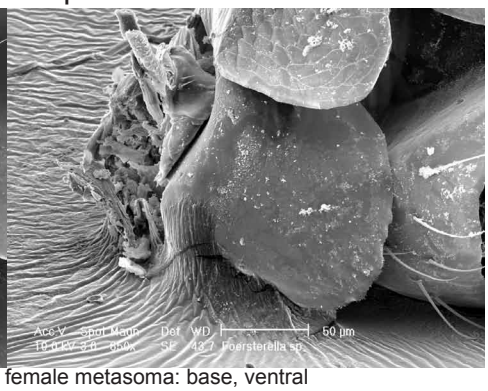
Foersterella reptans Chalcidoidea: Tetracampidae



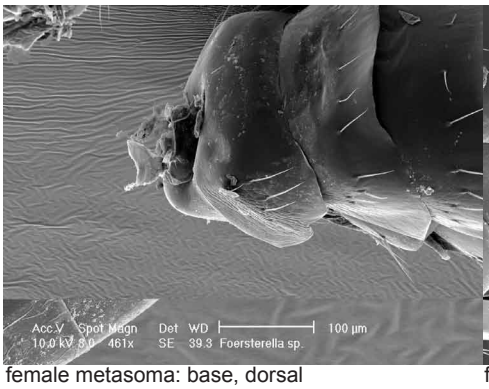
female metasoma: dorsal



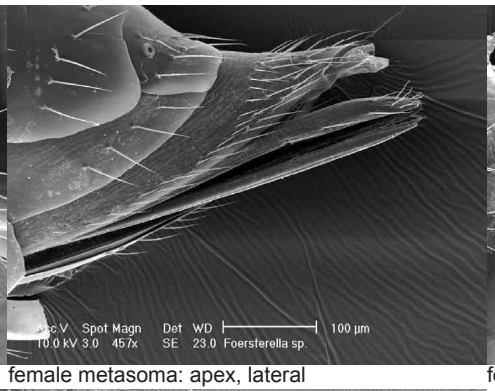
female metasoma: base, lateral



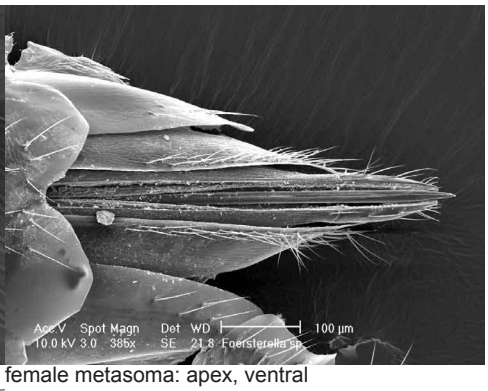
female metasoma: base, ventral



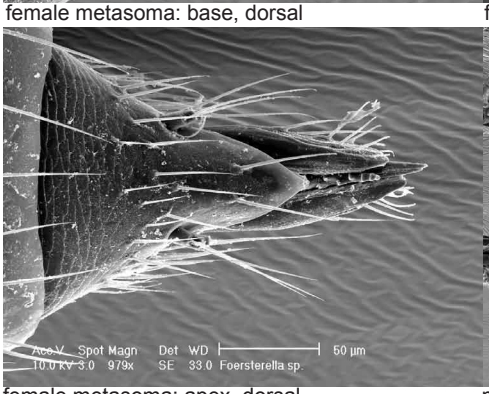
female metasoma: base, dorsal



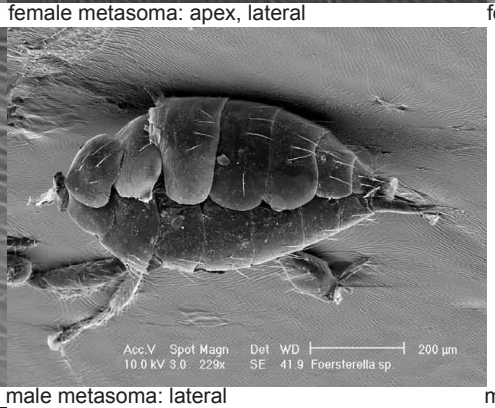
female metasoma: apex, lateral



female metasoma: apex, ventral

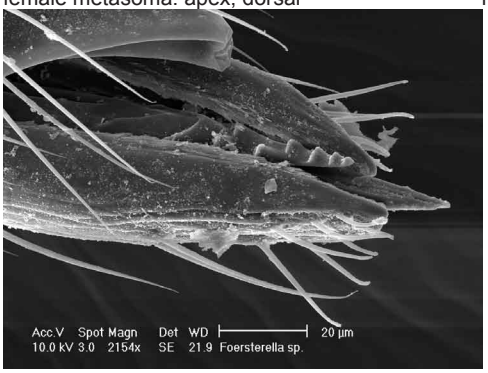


female metasoma: apex, dorsal



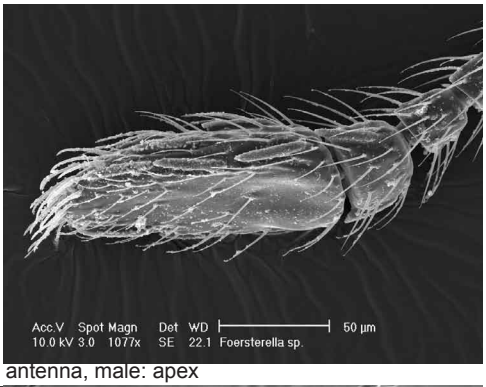
male metasoma: lateral

male metasoma: ventral

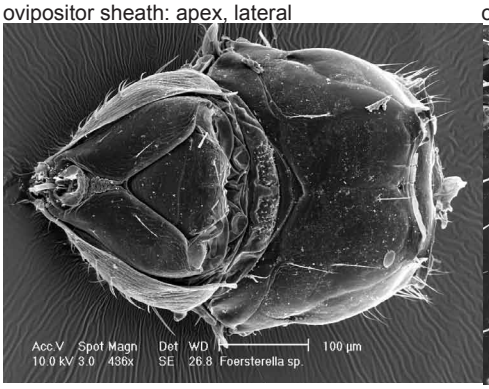


ovipositor sheath: apex, lateral

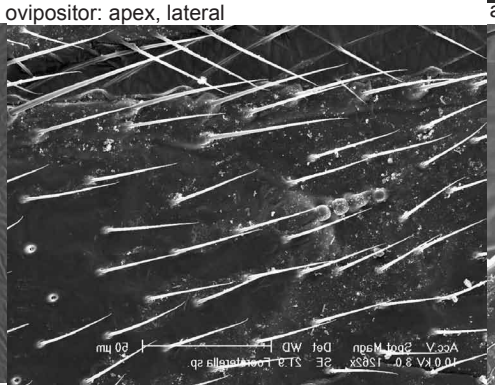
ovipositor: apex, lateral

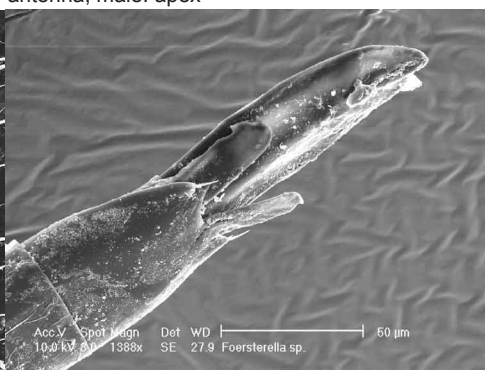


antenna, male: apex



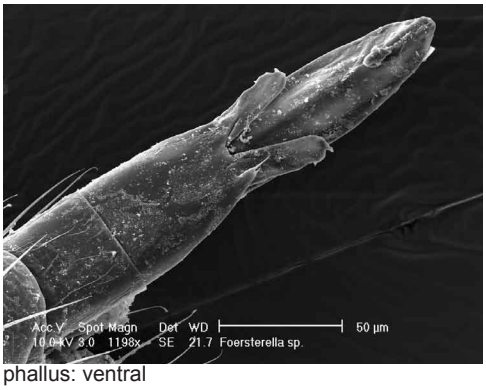
mesosoma: ventral


fore wing: stigma, dorsal



phallus, lateral

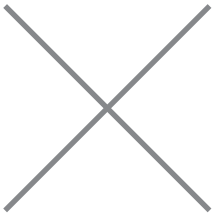
Foersterella reptans Chalcidoidea: Tetracampidae



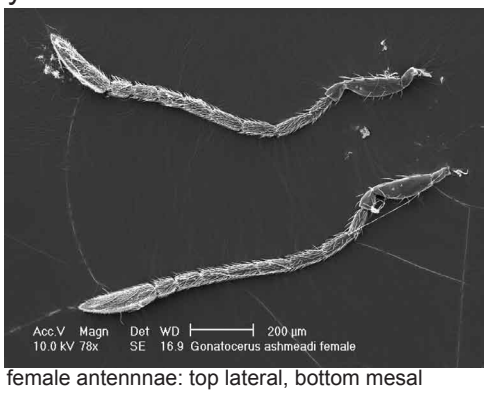
phallus: ventral

Gonatocerus ashmeadi Chalcidoidea: Mymaridae

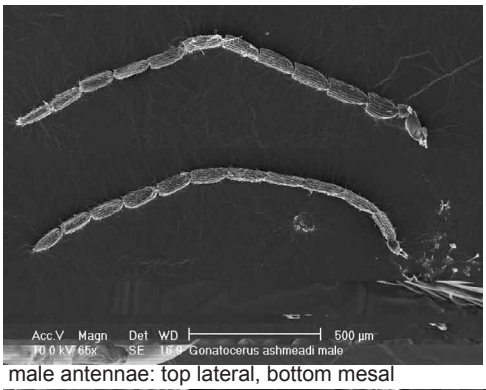
female habitus: lateral



male habitus: lateral

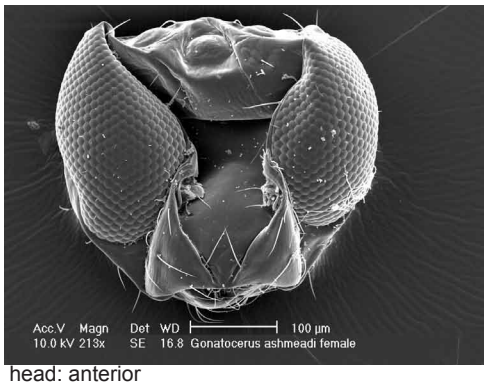


female antennnae: top lateral, bottom mesal

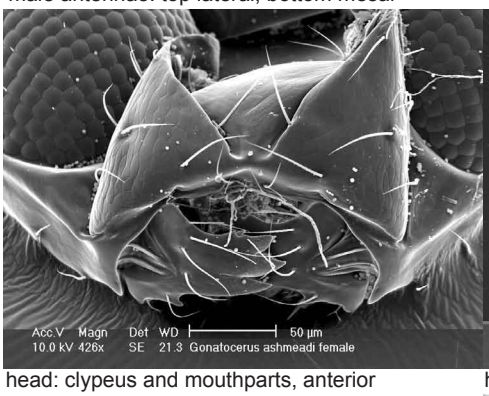


male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral



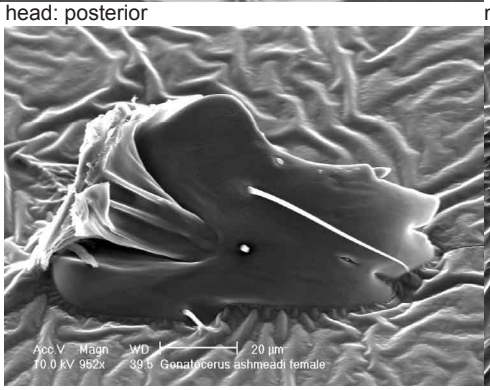
head: anterior



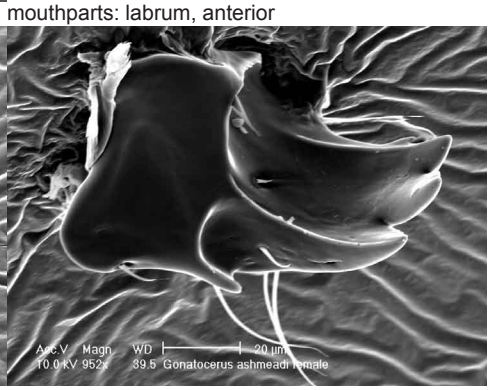
head: clypeus and mouthparts, anterior

head: posterior

mouthparts: labrum, anterior

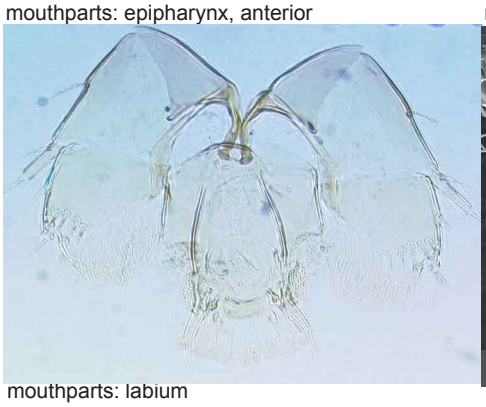


mouthparts: right mandible, anterior

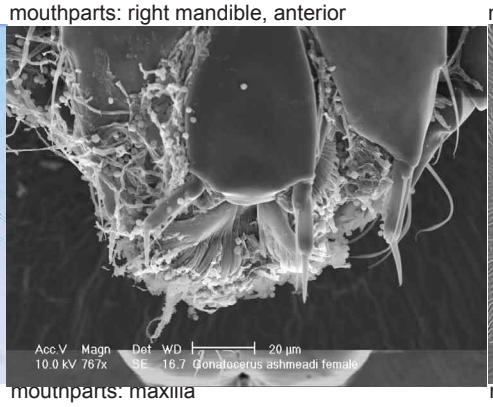


mouthparts: left mandible, posterior

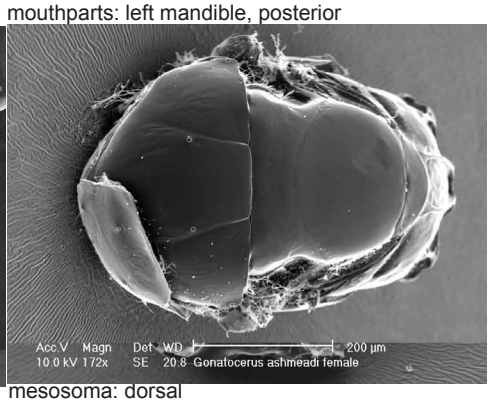
mouthparts: epipharynx, anterior



mouthparts: labium

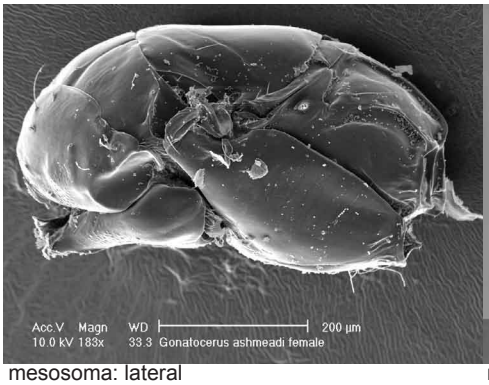


mouthparts: maxilla



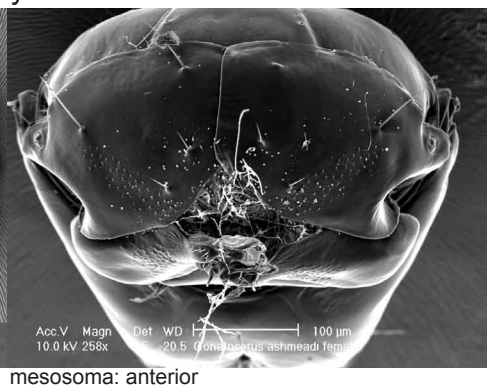
mesosoma: dorsal

Gonatocerus ashmeadi Chalcidoidea: Mymaridae



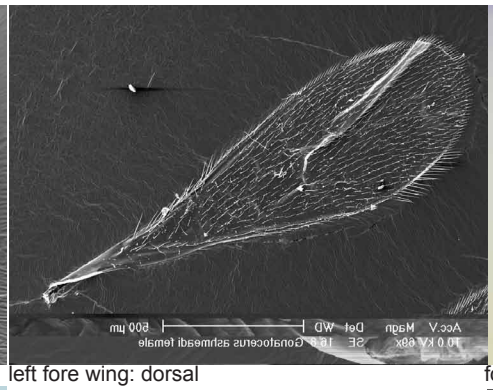
mesosoma: lateral

mesosoma: ventral

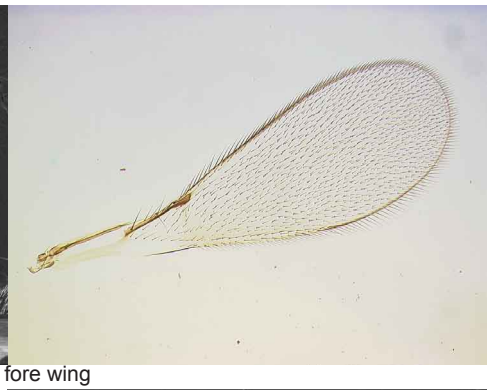


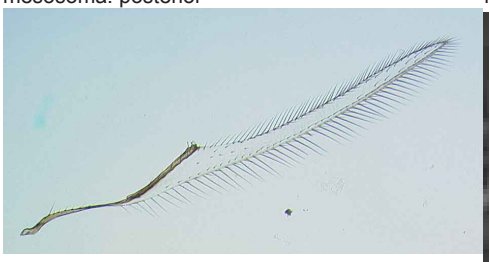
mesosoma: anterior

mesosoma: posterior



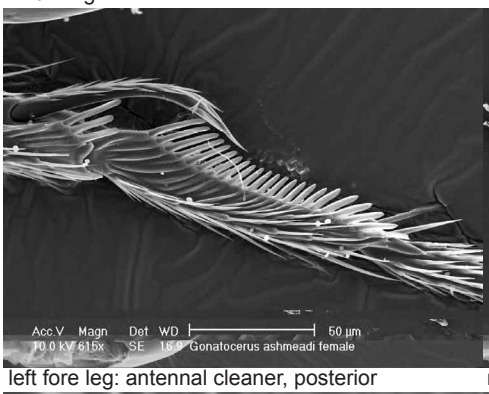
left fore wing: dorsal


fore wing

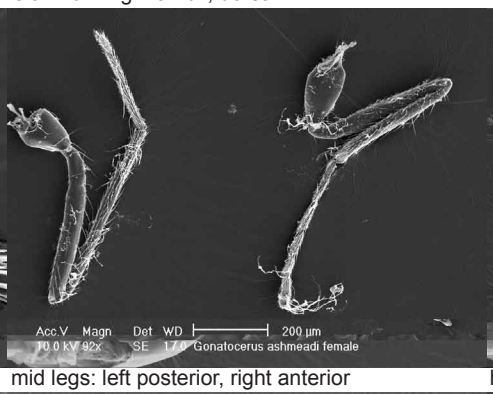

hind wing

left hind wing: hamuli, dorsal

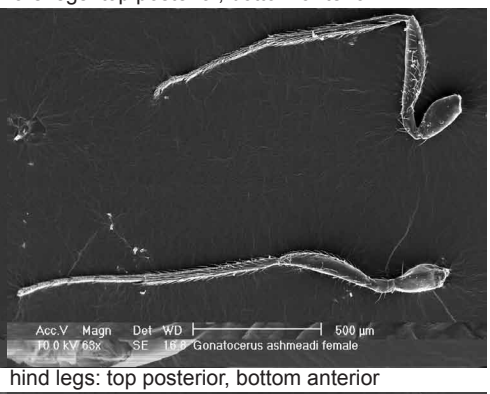
fore legs: top posterior, bottom anterior



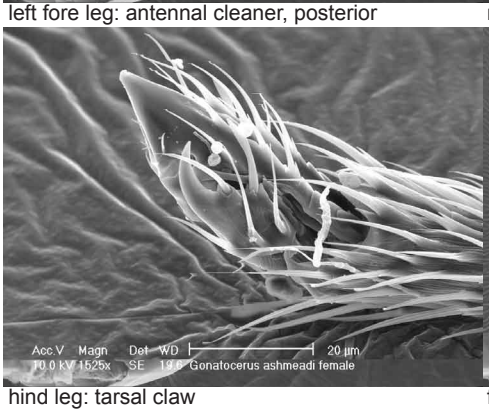
left fore leg: antennal cleaner, posterior



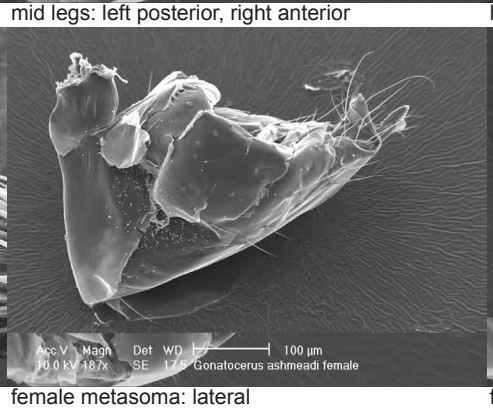
mid legs: left posterior, right anterior



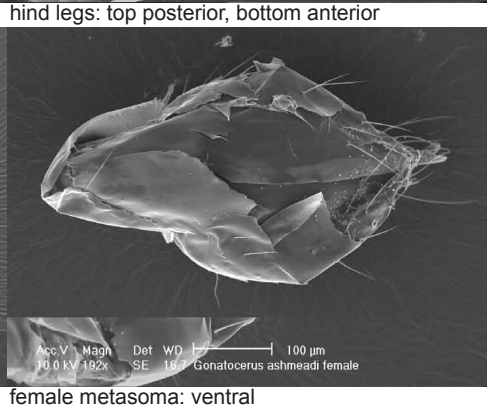
hind legs: top posterior, bottom anterior



hind leg: tarsal claw

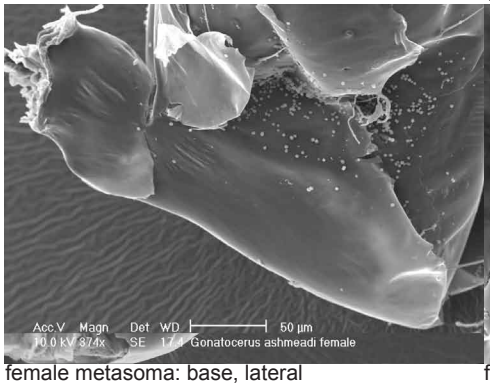


female metasoma: lateral

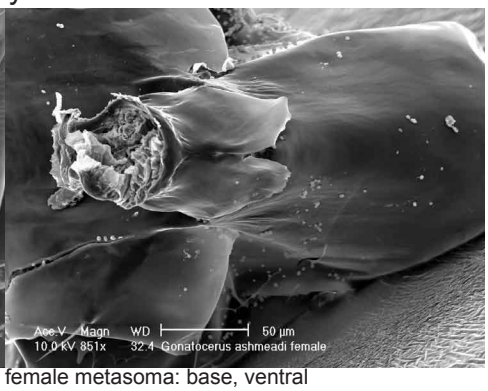


female metasoma: ventral

Gonatocerus ashmeadi Chalcidoidea: Mymaridae

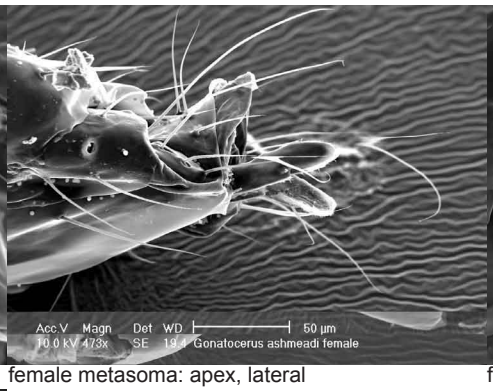


female metasoma: dorsal

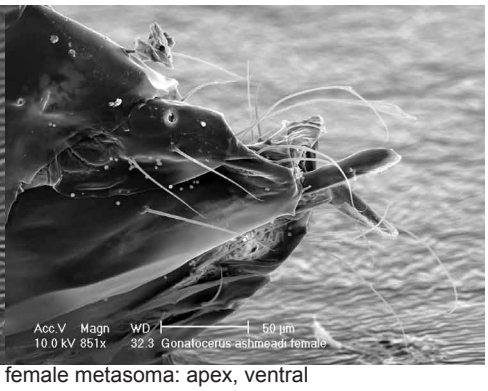


female metasoma: base, lateral

female metasoma: base, ventral

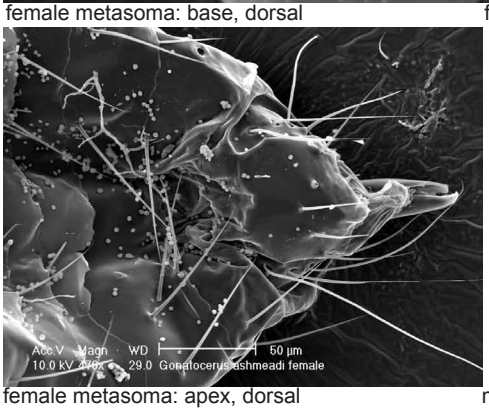


female metasoma: base, dorsal



female metasoma: apex, lateral

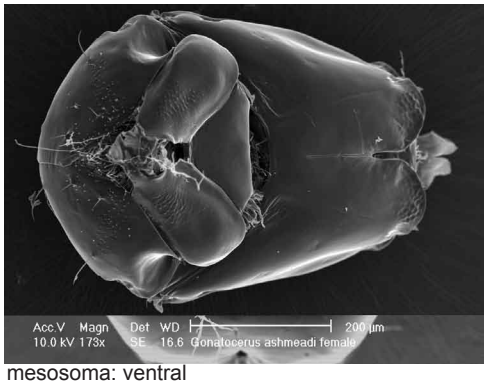
female metasoma: apex, ventral



female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

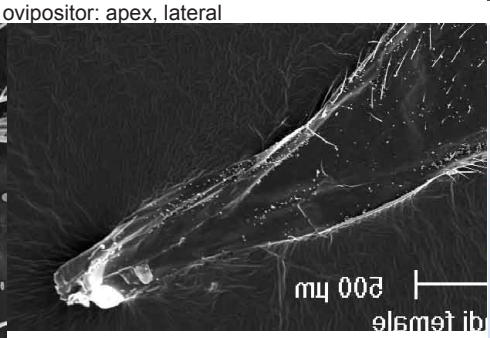


ovipositor sheath: apex, lateral

ovipositor: apex, lateral

mesosoma: ventral

fore wing: stigma, dorsal



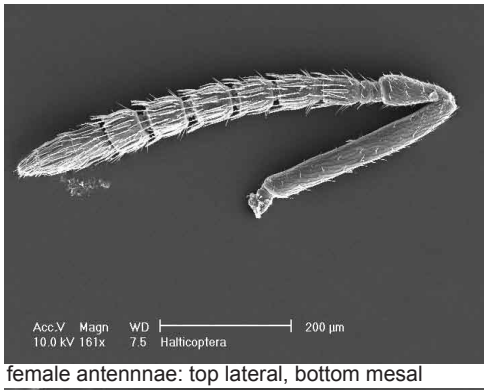
fore wing: base, ventral

ovipositor

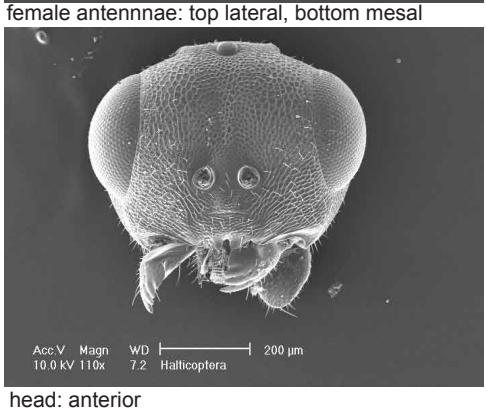
***Halticoptera* sp.** Chalcidoidea: Pteromalidae: Pteromalinae

female habitus: lateral

male habitus: lateral



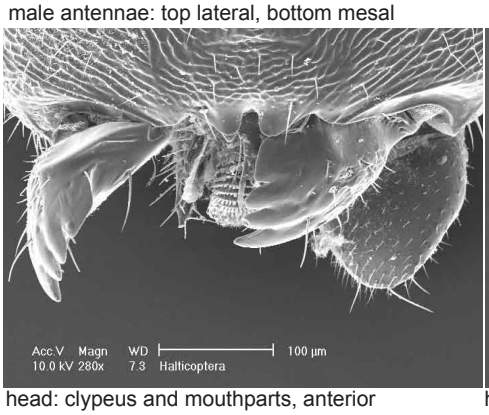
female antennnae: top lateral, bottom mesal

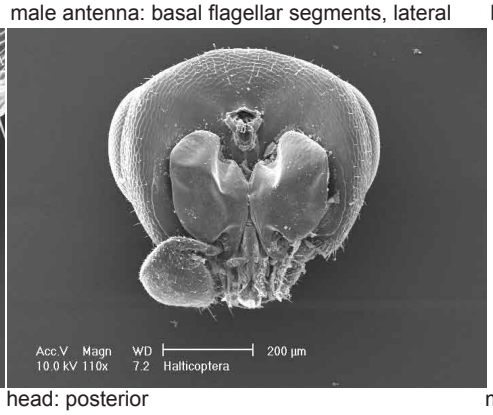


male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

head: anterior





head: clypeus and mouthparts, anterior

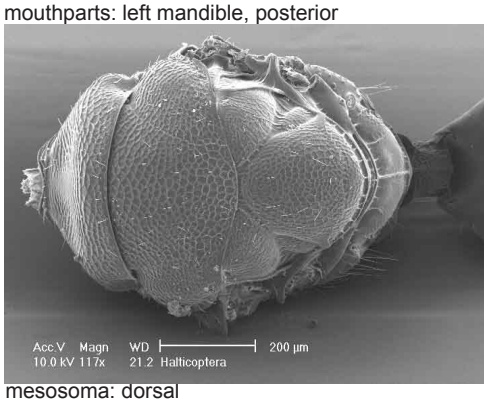
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior



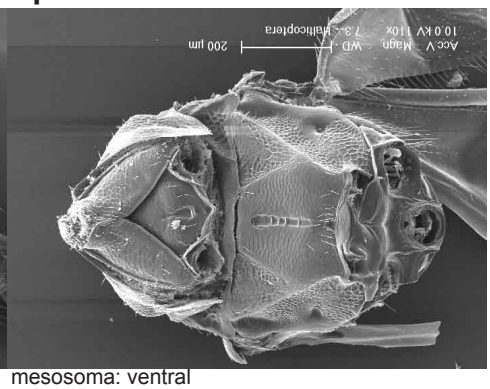
mouthparts: labium

mouthparts: maxilla

mesosoma: dorsal

***Halticoptera* sp.** Chalcidoidea: Pteromalidae: Pteromalinae

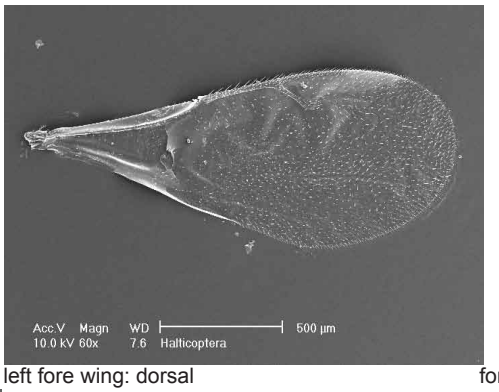
mesosoma: lateral



mesosoma: ventral

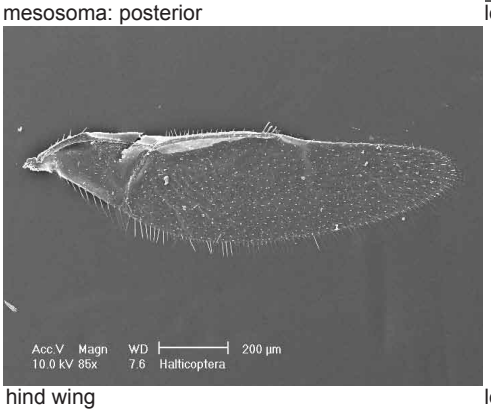
mesosoma: anterior

mesosoma: posterior



left fore wing: dorsal

fore wing



hind wing

left hind wing: hamuli, dorsal

fore legs: top posterior, bottom anterior

left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior

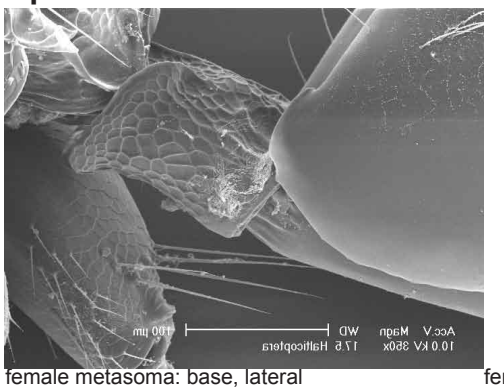
hind legs: top posterior, bottom anterior

hind leg: tarsal claw

female metasoma: lateral

female metasoma: ventral

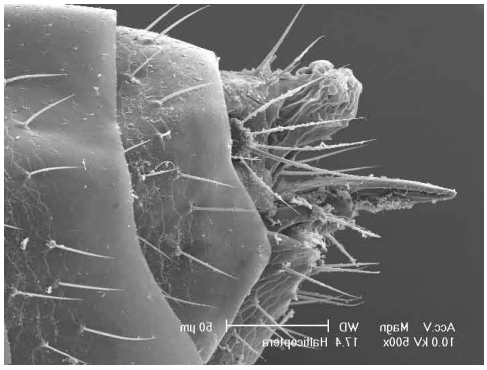
***Halticoptera* sp.** Chalcidoidea: Pteromalidae: Pteromalinae



female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral



female metasoma: base, dorsal

female metasoma: apex, lateral

female metasoma: apex, ventral

female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

ovipositor sheath: apex, lateral

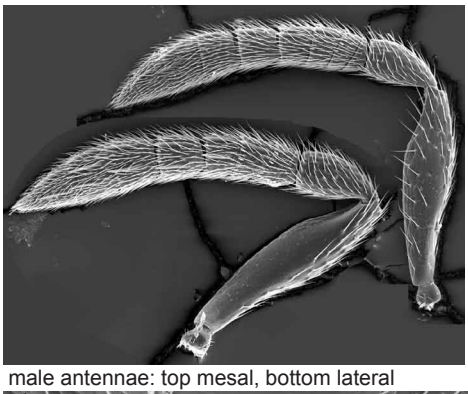
ovipositor: apex, lateral

Idioporus affinis Chalcidoidea: Pteromalidae: Eunotinae

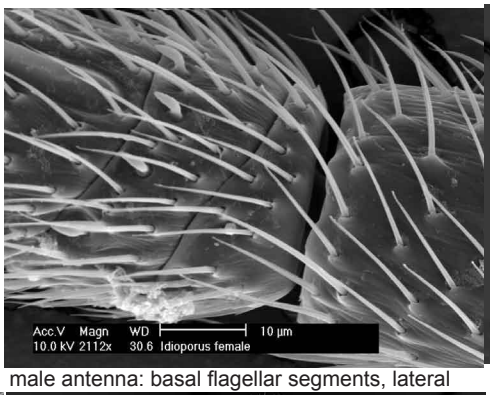
female habitus: lateral

male habitus: lateral

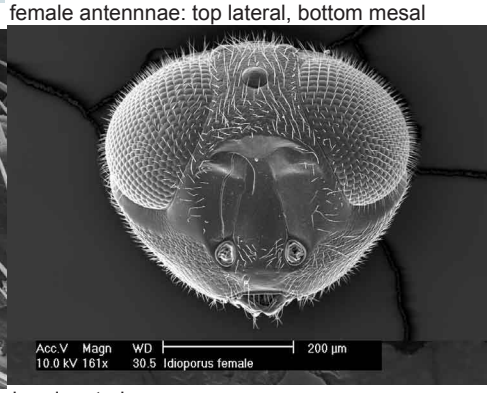
female antennnae: top lateral, bottom mesal



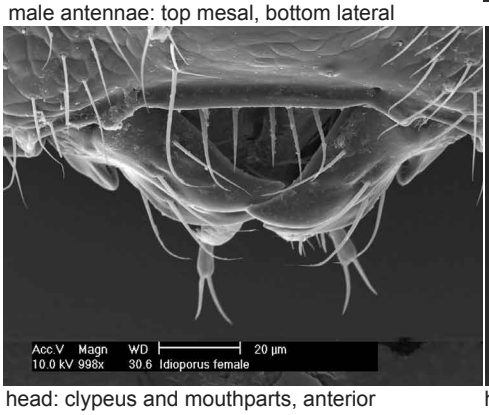
male antennae: top mesal, bottom lateral



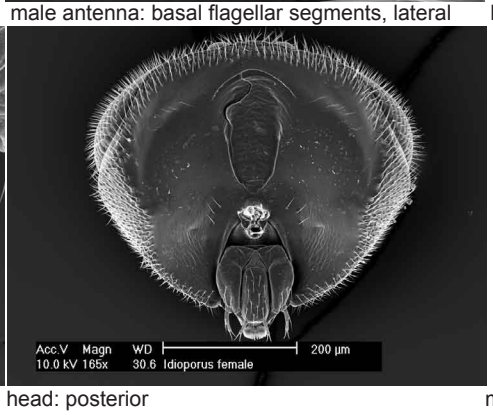
male antenna: basal flagellar segments, lateral



head: anterior



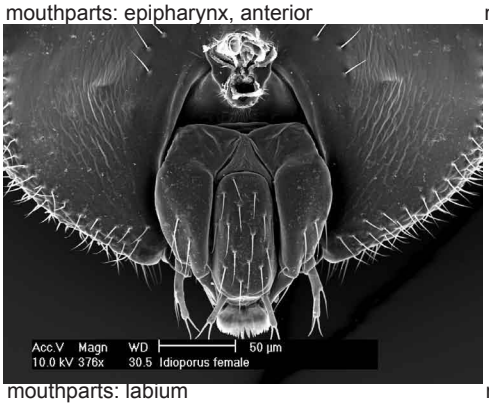
head: clypeus and mouthparts, anterior



head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

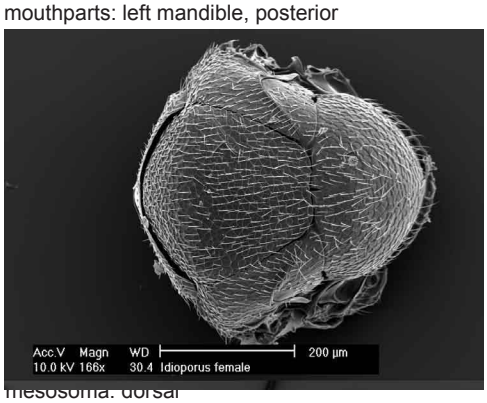


mouthparts: labium

mouthparts: right mandible, anterior

mouthparts: maxilla

mouthparts: left mandible, posterior

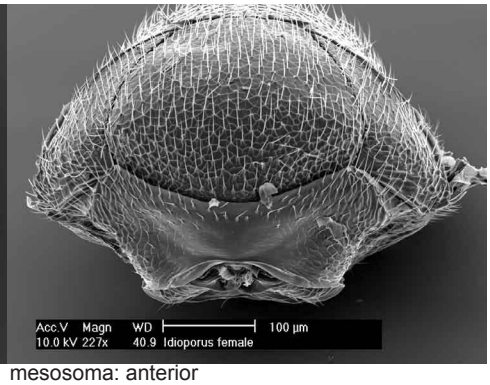


mesosoma: dorsal

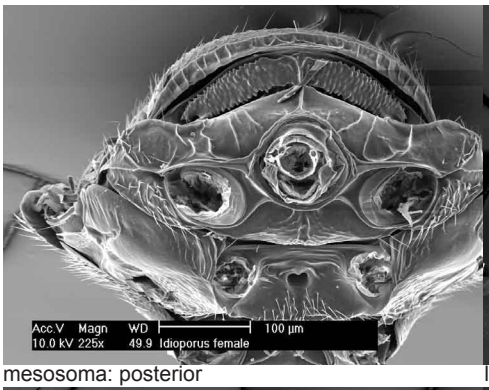
Idioporus affinis Chalcidoidea: Pteromalidae: Eunotinae

mesosoma: lateral

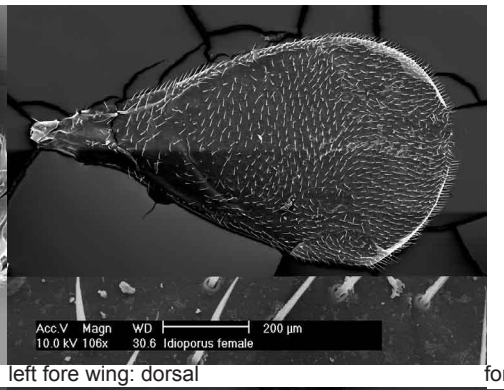
mesosoma: ventral



mesosoma: anterior

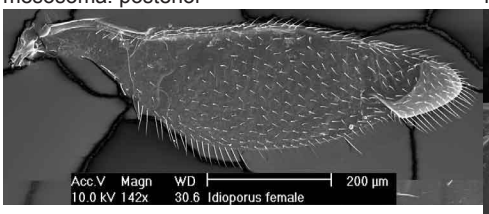


mesosoma: posterior

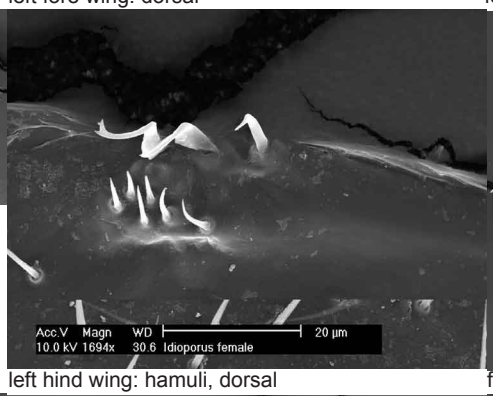


left fore wing: dorsal

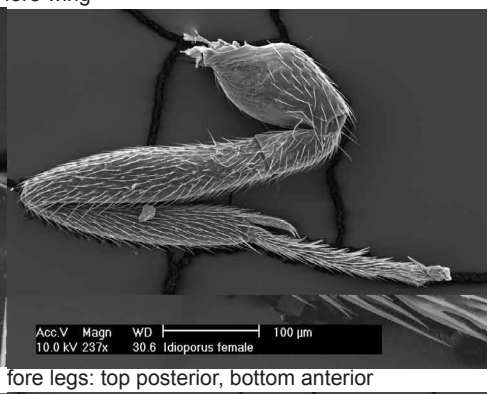
fore wing



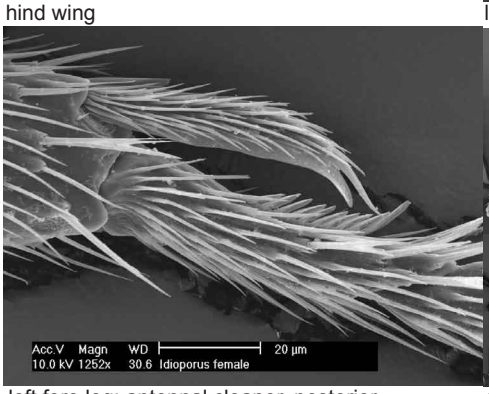
hind wing



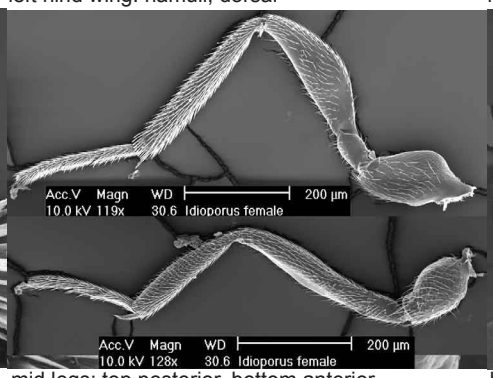
left hind wing: hamuli, dorsal



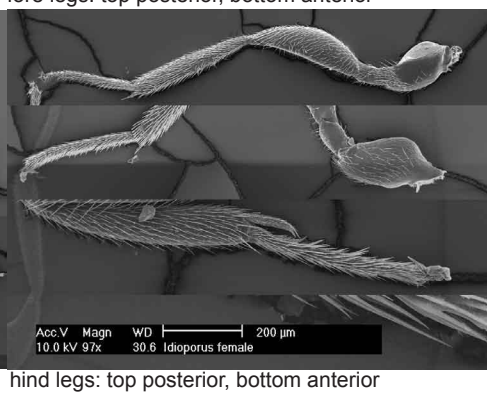
fore legs: top posterior, bottom anterior



left fore leg: antennal cleaner, posterior



mid legs: top posterior, bottom anterior



hind legs: top posterior, bottom anterior

hind leg: tarsal claw

female metasoma: lateral

female metasoma: ventral

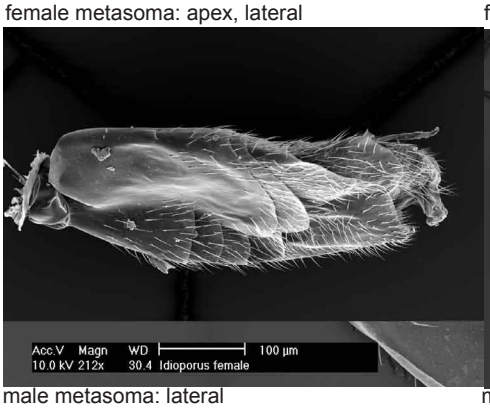
female metasoma: dorsal

female metasoma: base, lateral

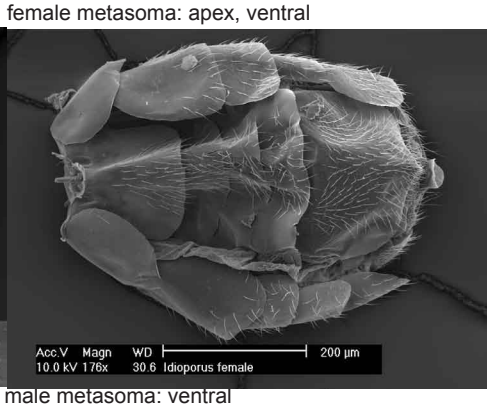
female metasoma: base, ventral

female metasoma: base, dorsal

female metasoma: apex, lateral



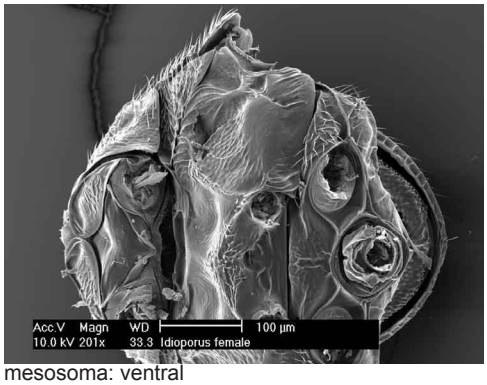
female metasoma: apex, ventral



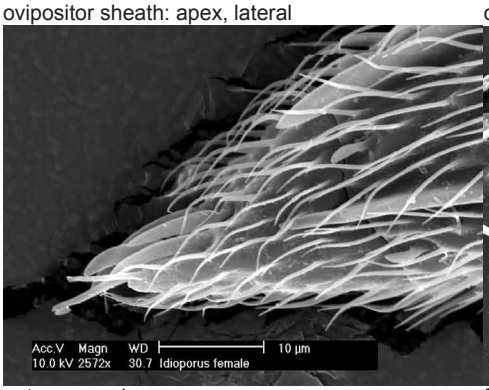
female metasoma: apex, dorsal

male metasoma: lateral

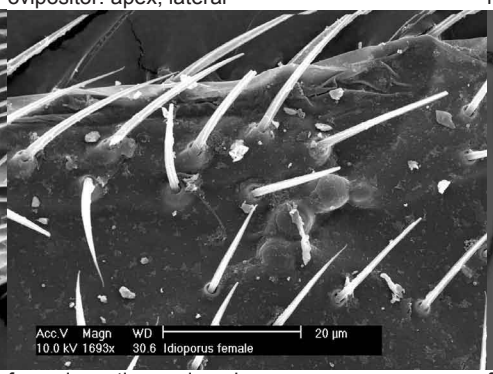
male metasoma: ventral



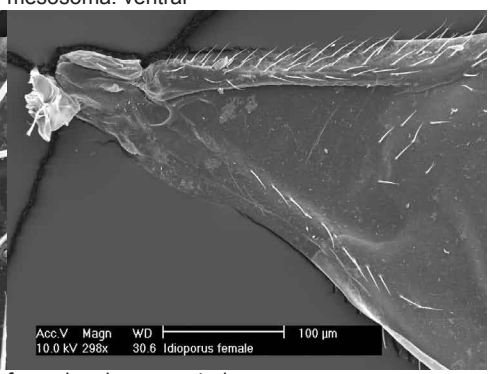
ovipositor sheath: apex, lateral



ovipositor: apex, lateral



mesosoma: ventral

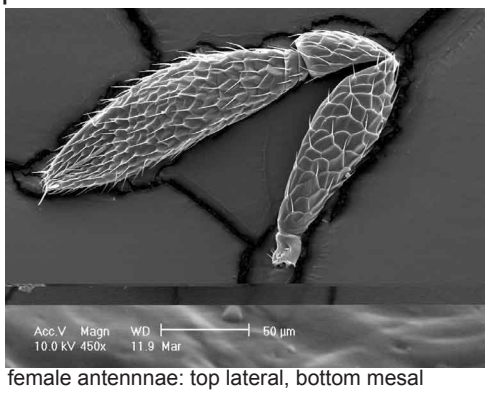


antenna, male: apex

fore wing: stigma, dorsal

fore wing: base, ventral

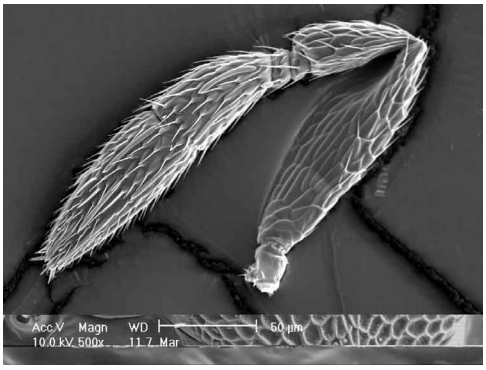
***Marietta* sp.** Chalcidoidea: Aphelinidae: Aphelininae



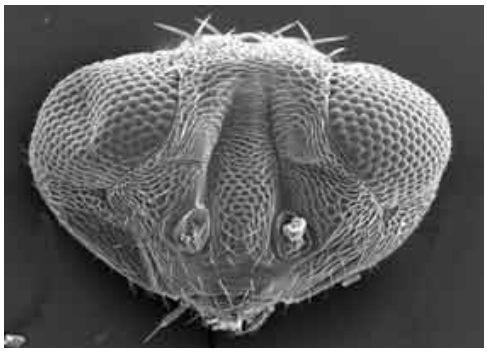
female habitus: lateral

male habitus: lateral

female antennnae: top lateral, bottom mesal

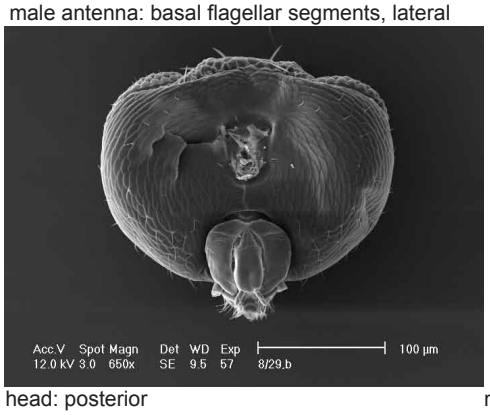


male antennae: top lateral, bottom mesal



head: anterior

male antenna: basal flagellar segments, lateral



head: clypeus and mouthparts, anterior

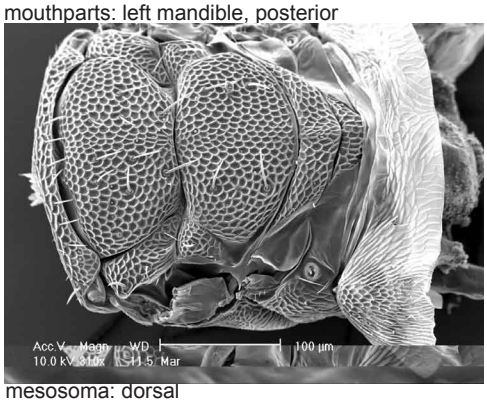
head: posterior

mouthparts: labrum, anterior

mouthparts: epipharynx, anterior

mouthparts: right mandible, anterior

mouthparts: left mandible, posterior

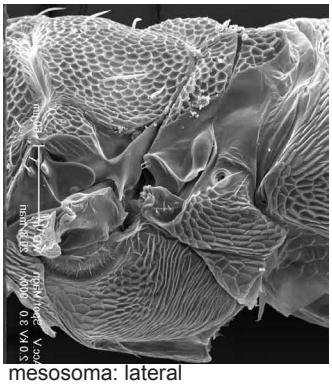


mouthparts: labium

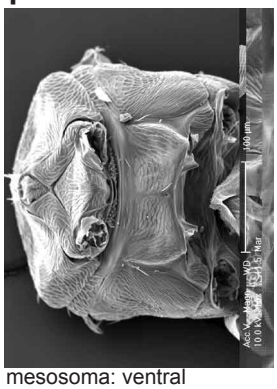
mouthparts: maxilla

mesosoma: dorsal

***Marietta* sp.** Chalcidoidea: Aphelinidae: Aphelininae

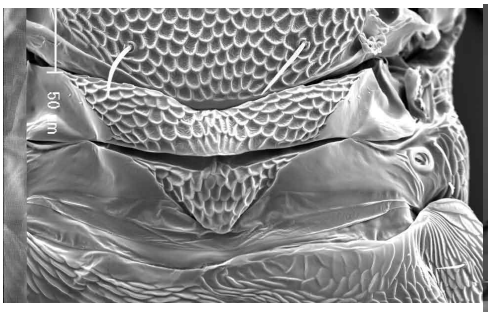


mesosoma: lateral

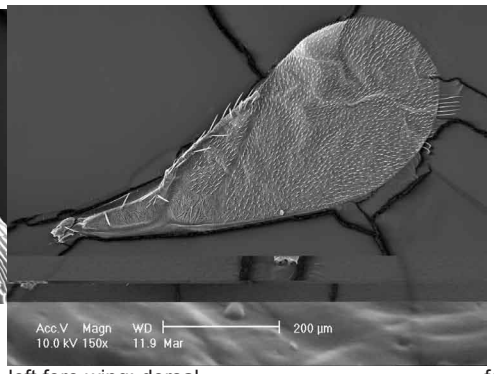


mesosoma: ventral

mesosoma: anterior

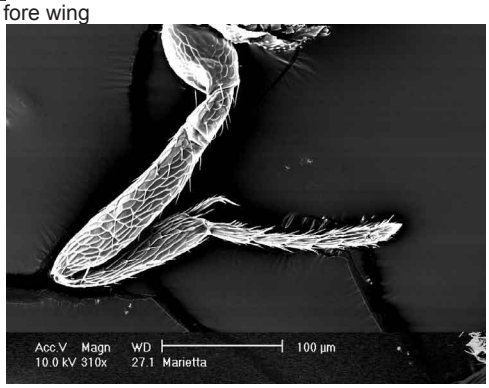


mesosoma: posterior



left fore wing: dorsal

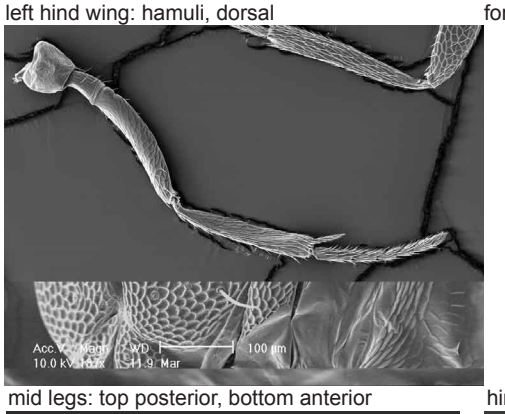
fore wing



hind wing

left hind wing: hamuli, dorsal

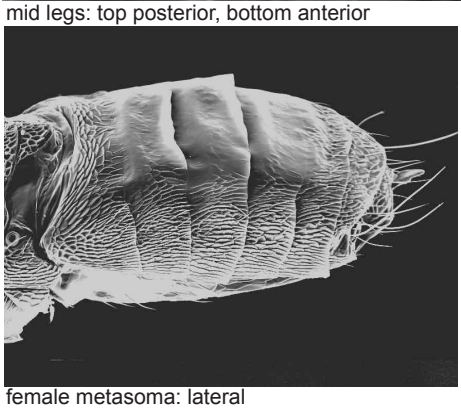
fore legs: top posterior, bottom anterior



left fore leg: antennal cleaner, posterior

mid legs: top posterior, bottom anterior

hind legs: top posterior, bottom anterior

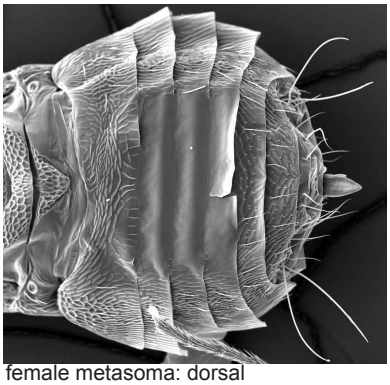


hind leg: tarsal claw

female metasoma: lateral

female metasoma: ventral

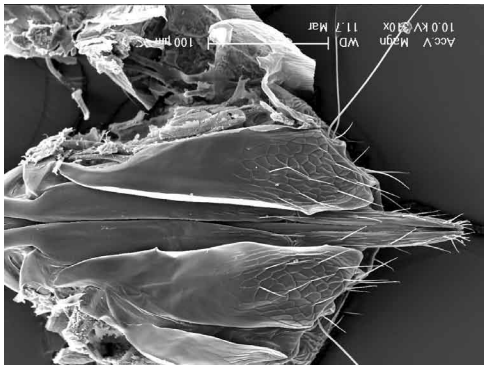
***Marietta* sp.** Chalcidoidea: Aphelinidae: Aphelininae



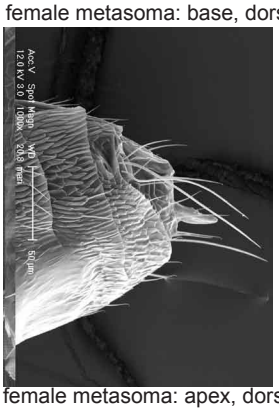
female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral



female metasoma: base, dorsal



female metasoma: apex, lateral

female metasoma: apex, ventral

female metasoma: apex, dorsal

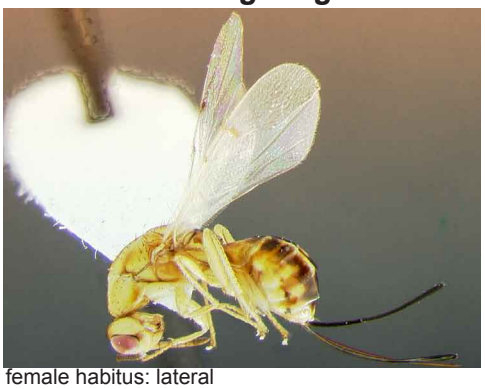
male metasoma: lateral

male metasoma: ventral

ovipositor sheath: apex, lateral

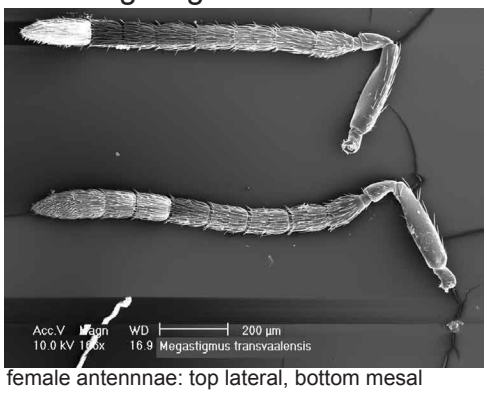
ovipositor: apex, lateral

Megastigmus transvaalensis Chalcidoidea: Torymidae: Megastigminae

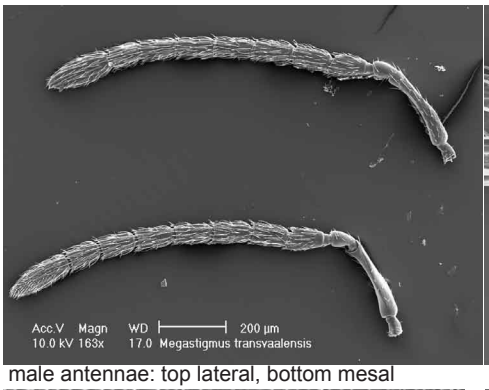


female habitus: lateral

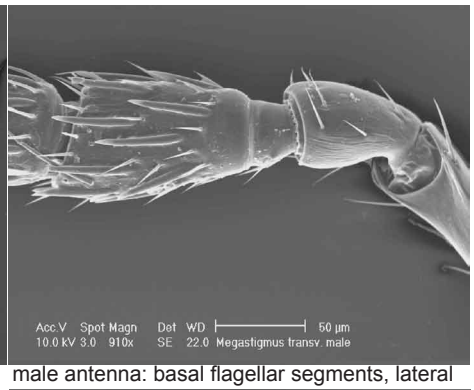
male habitus: lateral



female antennnae: top lateral, bottom mesal

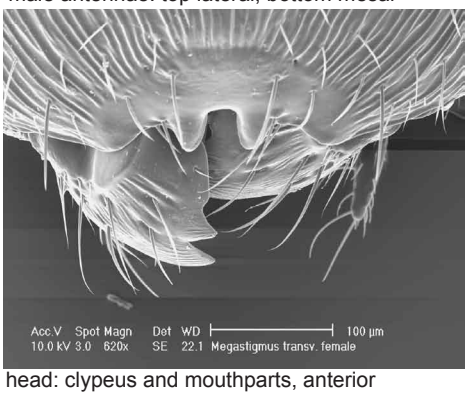


male antennae: top lateral, bottom mesal



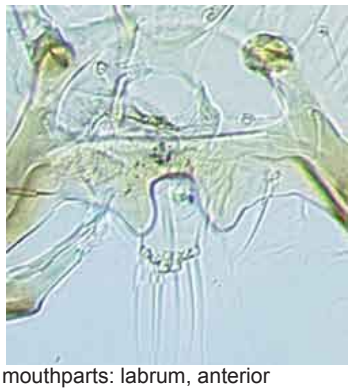
male antenna: basal flagellar segments, lateral

head: anterior



head: clypeus and mouthparts, anterior

head: posterior

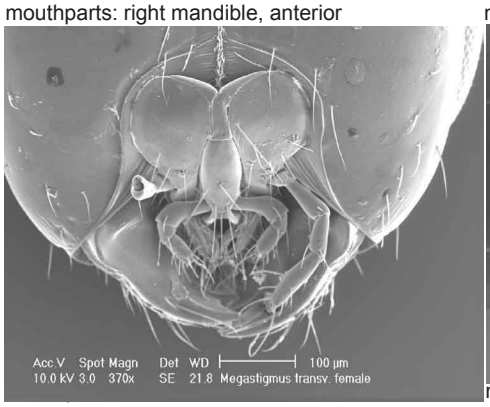


mouthparts: labrum, anterior

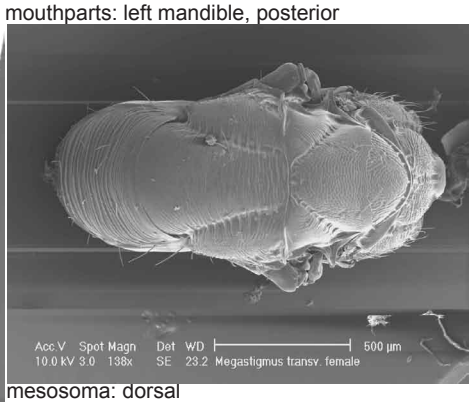
mouthparts: epipharynx, anterior

mouthparts: labium

mouthparts: right mandible, anterior

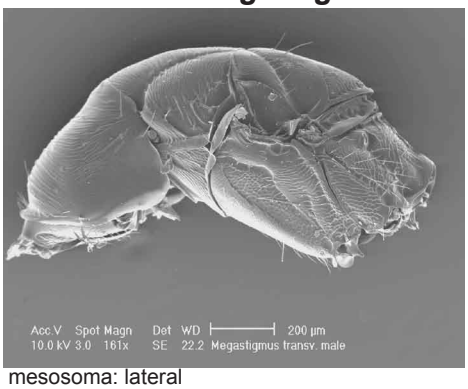


mouthparts: left mandible, posterior

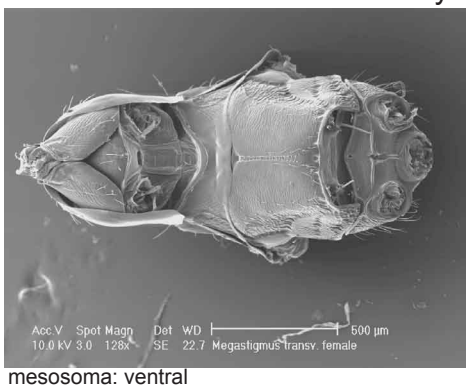


mesosoma: dorsal

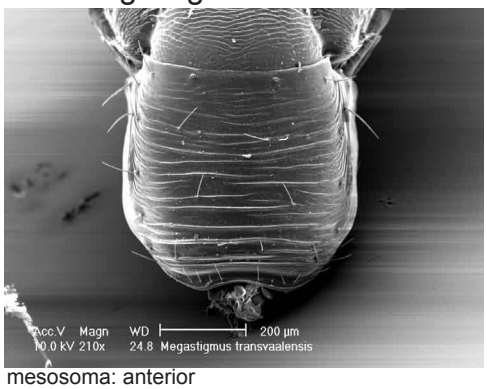
Megastigmus transvaalensis Chalcidoidea: Torymidae: Megastigminae



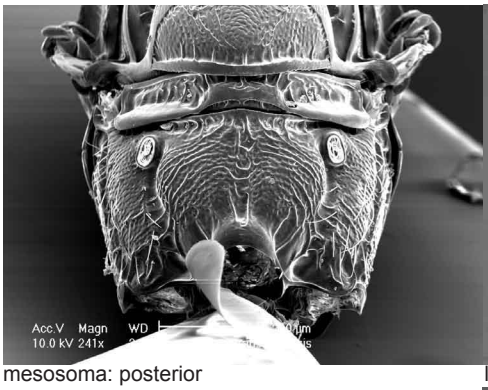
mesosoma: lateral



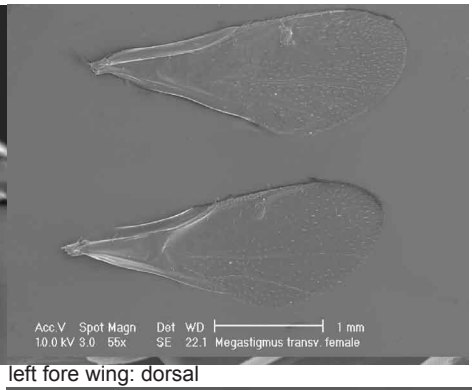
mesosoma: ventral



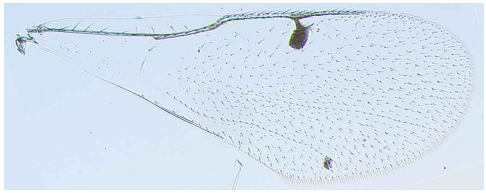
mesosoma: anterior

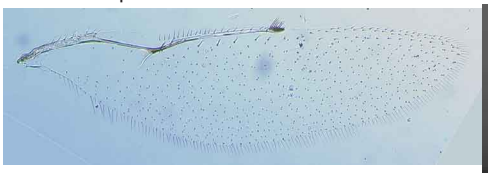


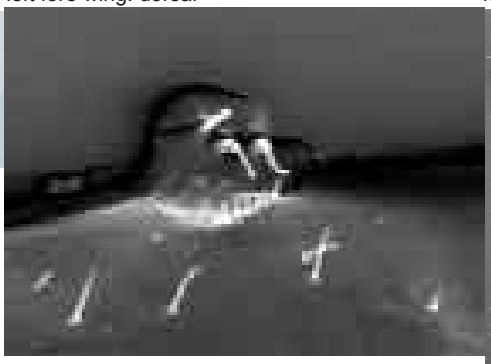
mesosoma: posterior

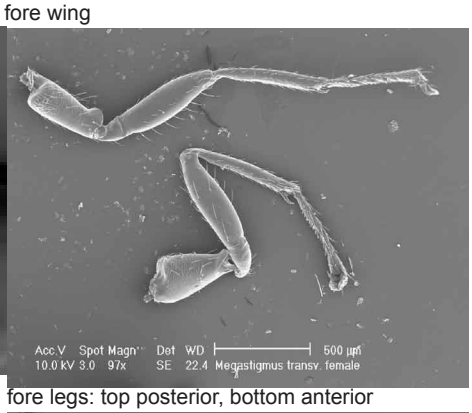


left fore wing: dorsal

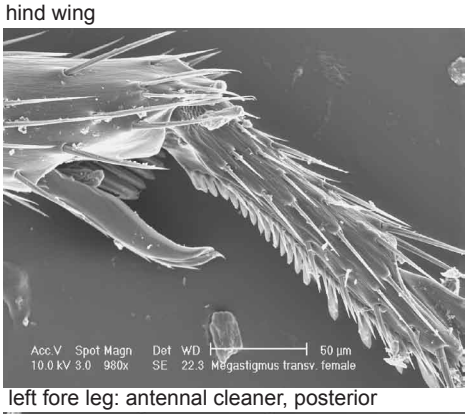

fore wing


hind wing

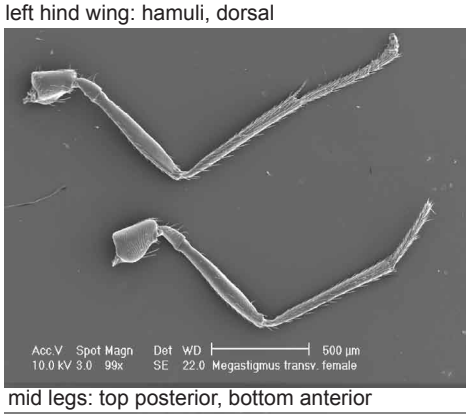

left hind wing: hamuli, dorsal



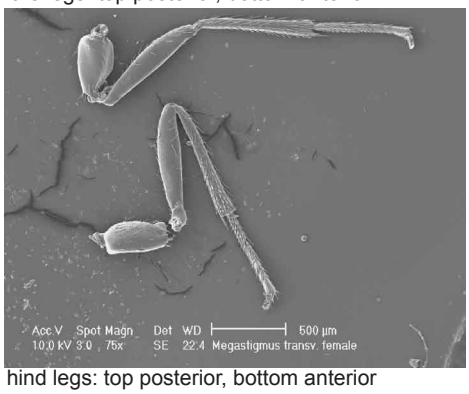
fore legs: top posterior, bottom anterior



left fore leg: antennal cleaner, posterior

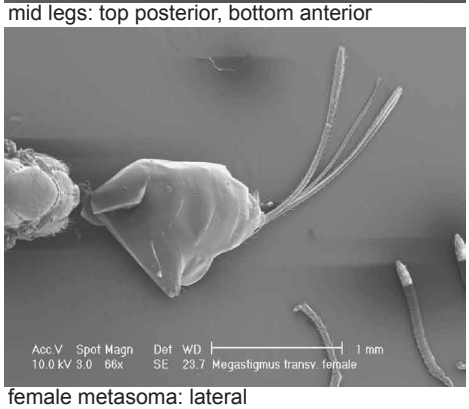


mid legs: top posterior, bottom anterior



hind legs: top posterior, bottom anterior

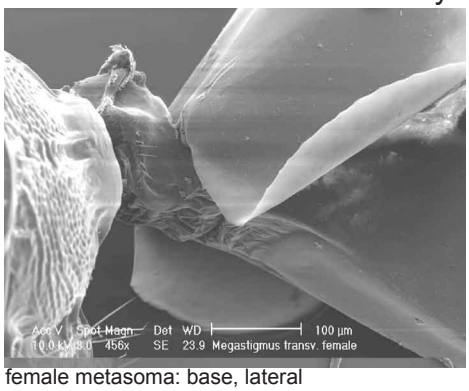
hind leg: tarsal claw



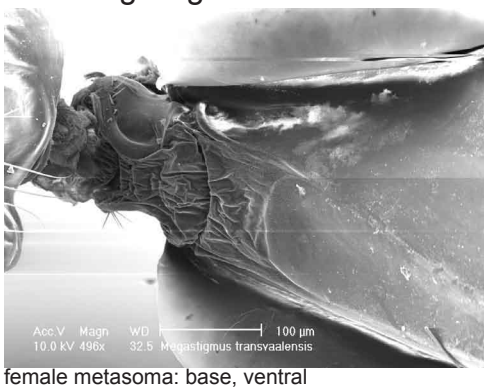
female metasoma: lateral

female metasoma: ventral

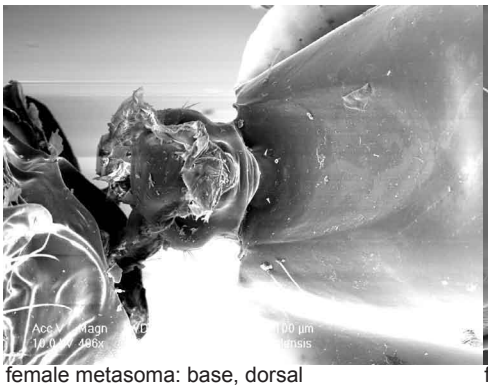
Megastigmus transvaalensis Chalcidoidea: Torymidae: Megastigminae



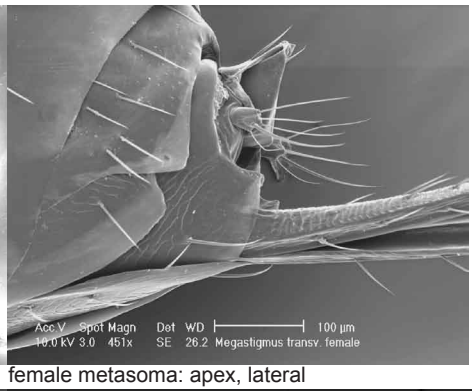
female metasoma: dorsal



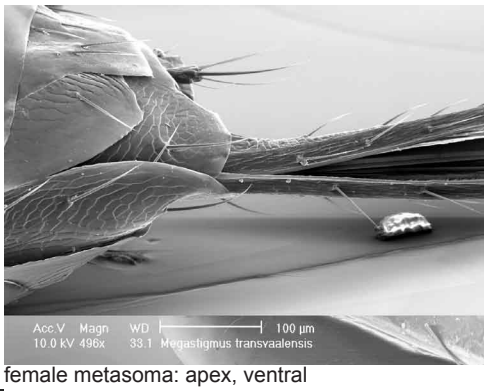
female metasoma: base, lateral



female metasoma: base, ventral

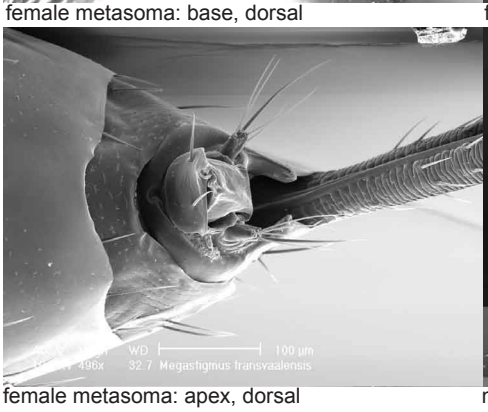


female metasoma: base, dorsal



female metasoma: apex, lateral

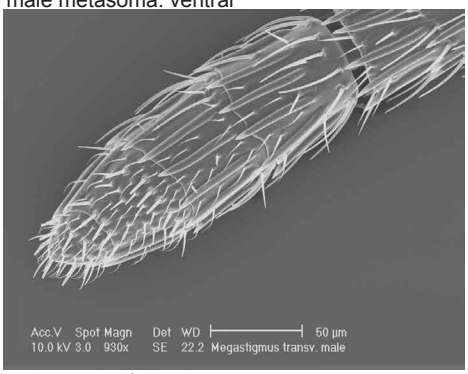
female metasoma: apex, ventral



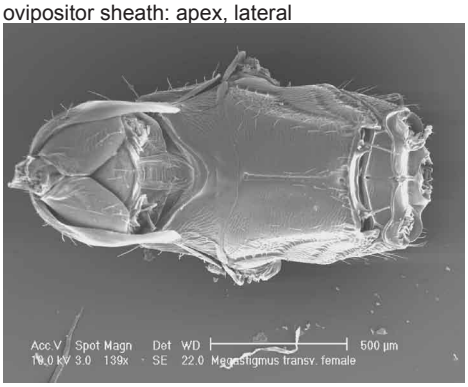
female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral



ovipositor sheath: apex, lateral



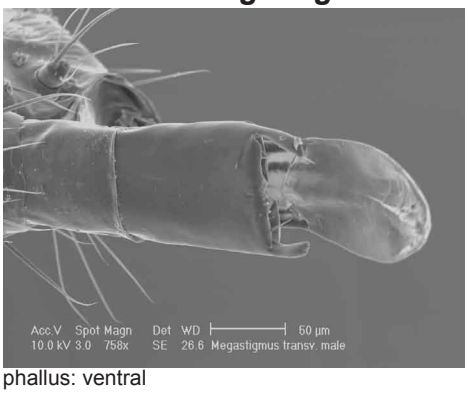
mesosoma: ventral

ovipositor: apex, lateral

fore wing: stigma, dorsal

antenna, male: apex

ovipositor

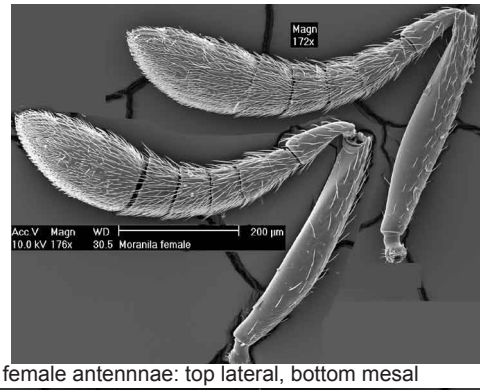


phallus: ventral

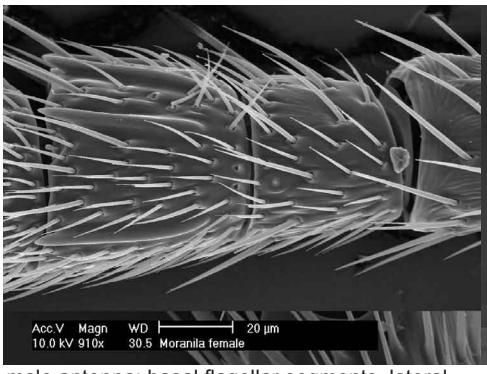
***Moranila* sp.** Chalcidoidea: Pteromalidae: Eunotinae

female habitus: lateral

male habitus: lateral

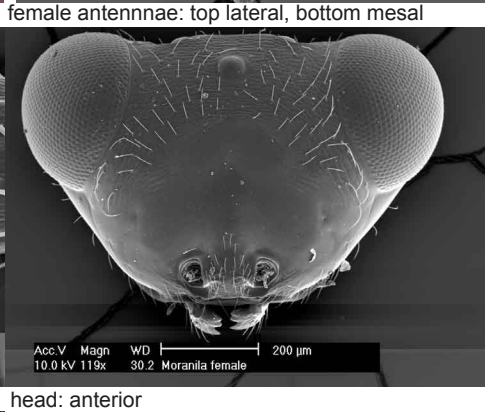


female antennnae: top lateral, bottom mesal

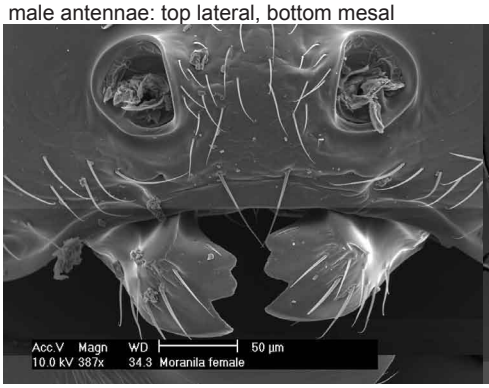


male antennae: top lateral, bottom mesal

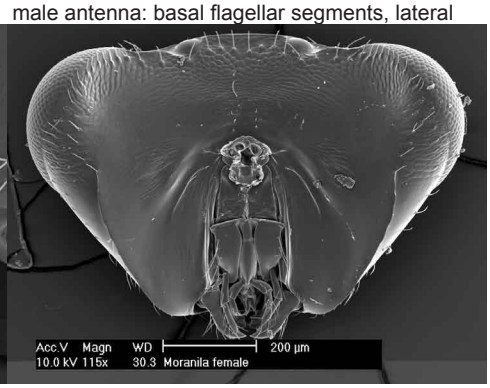
male antenna: basal flagellar segments, lateral



head: anterior



head: clypeus and mouthparts, anterior



head: posterior

mouthparts: labrum, anterior

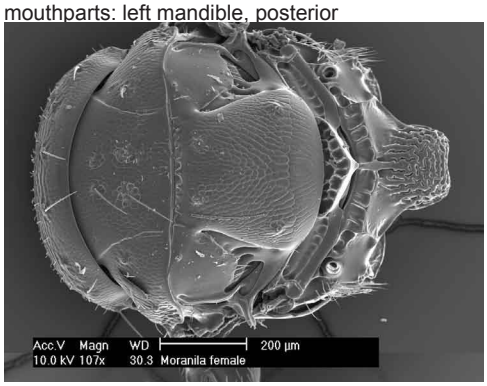
mouthparts: epipharynx, anterior

mouthparts: labium

mouthparts: right mandible, anterior

mouthparts: maxilla

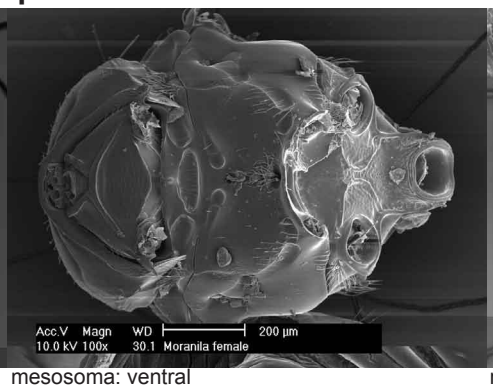
mouthparts: left mandible, posterior



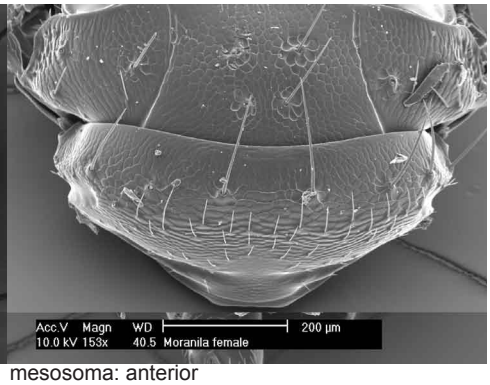
mesosoma: dorsal

***Moranila* sp.** Chalcidoidea: Pteromalidae: Eunotinae

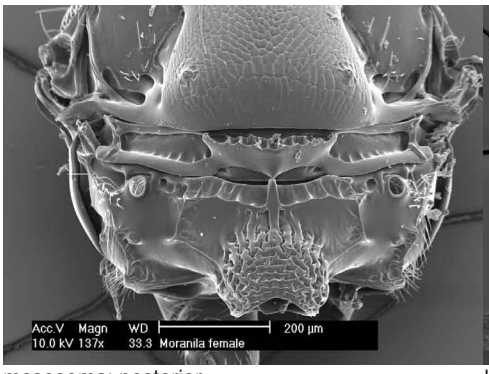
mesosoma: lateral



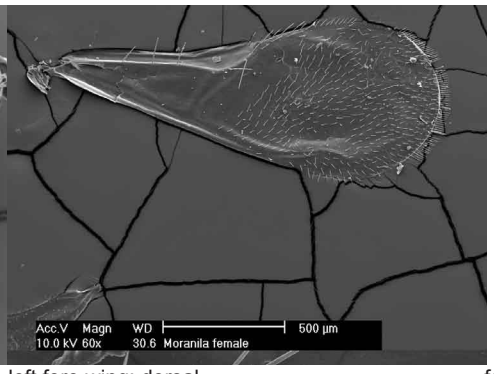
mesosoma: ventral



mesosoma: anterior

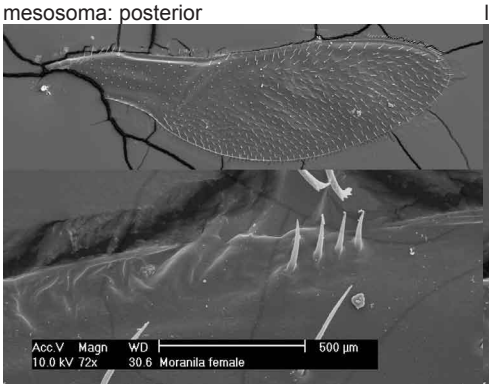


mesosoma: posterior



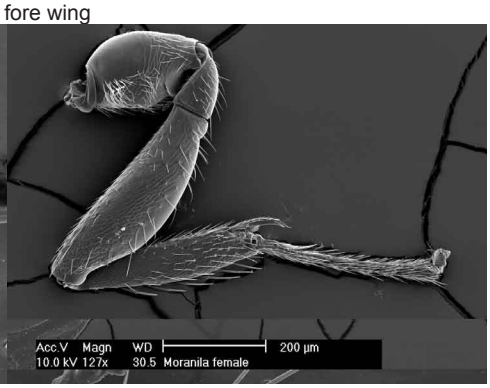
left fore wing: dorsal

fore wing

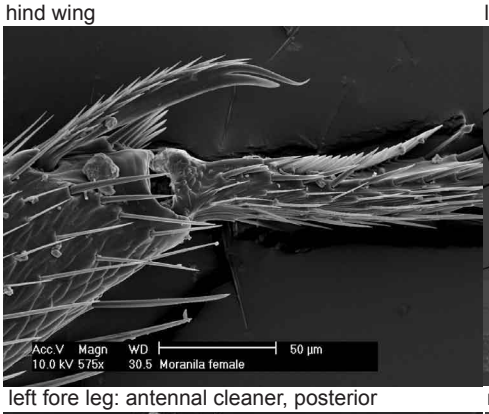


hind wing

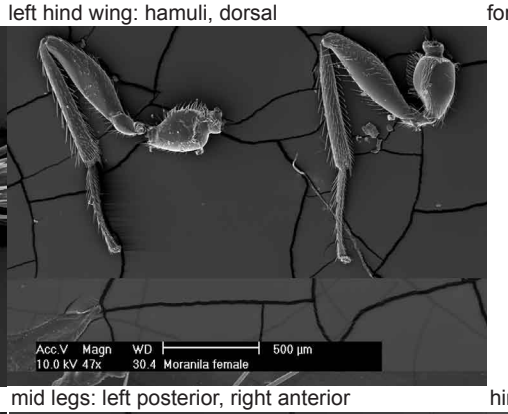
left hind wing: hamuli, dorsal



fore legs: top posterior, bottom anterior

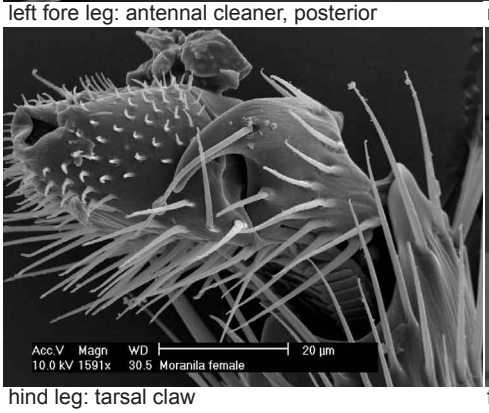


left fore leg: antennal cleaner, posterior

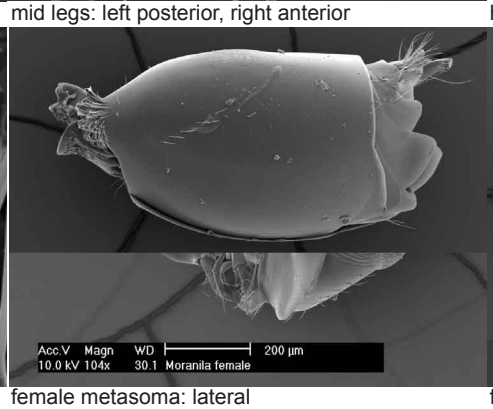


mid legs: left posterior, right anterior

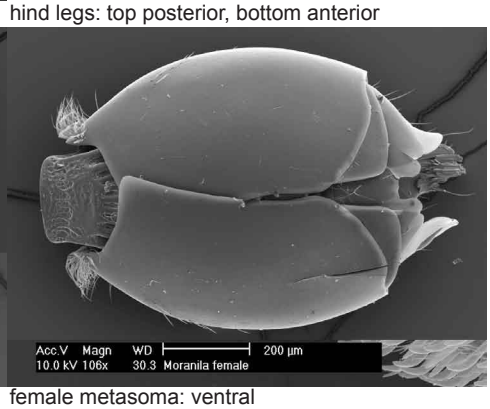
hind legs: top posterior, bottom anterior



hind leg: tarsal claw

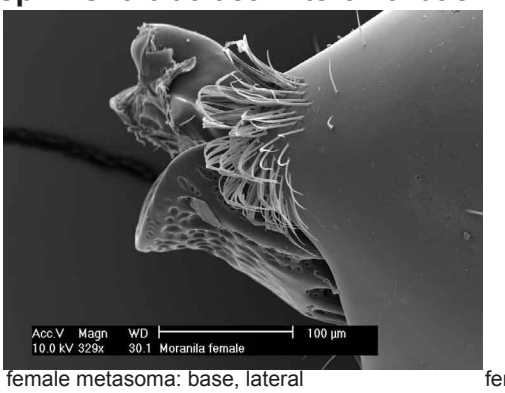


female metasoma: lateral



female metasoma: ventral

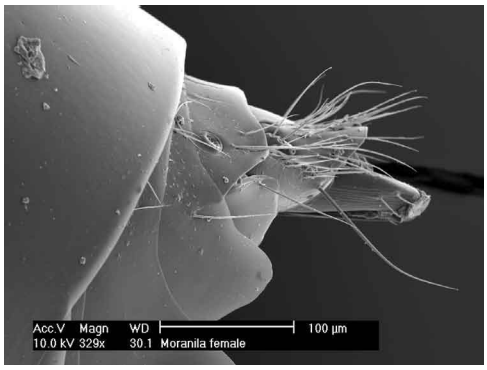
***Moranila* sp.** Chalcidoidea: Pteromalidae: Eunotinae



female metasoma: dorsal

female metasoma: base, lateral

female metasoma: base, ventral



female metasoma: base, dorsal

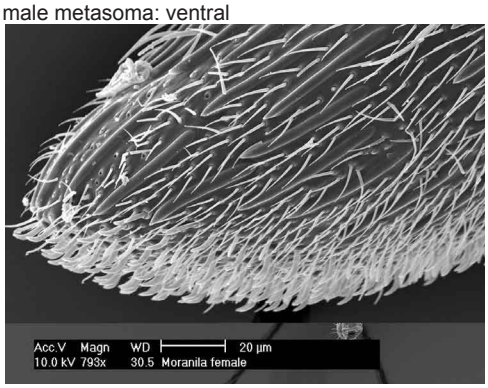
female metasoma: apex, lateral

female metasoma: apex, ventral

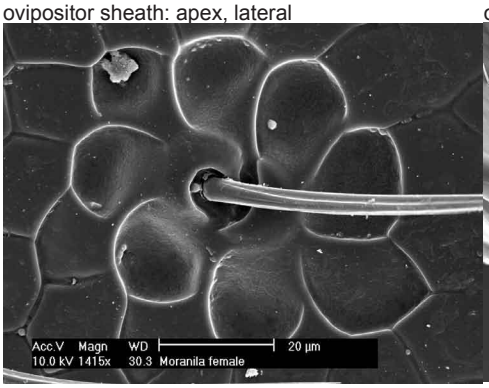
female metasoma: apex, dorsal

male metasoma: lateral

male metasoma: ventral

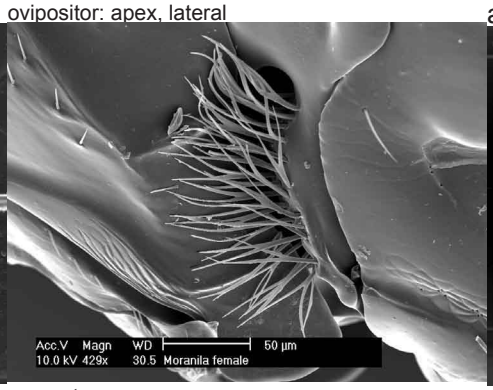


ovipositor sheath: apex, lateral



mesosomal seta

ovipositor: apex, lateral

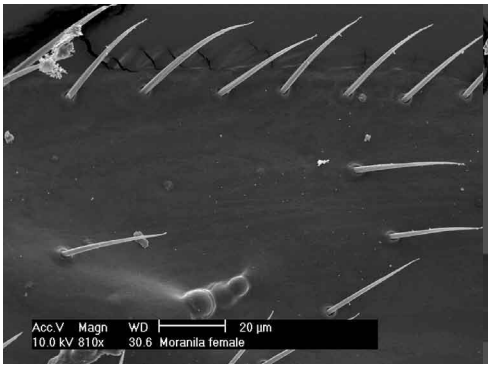


prepectus

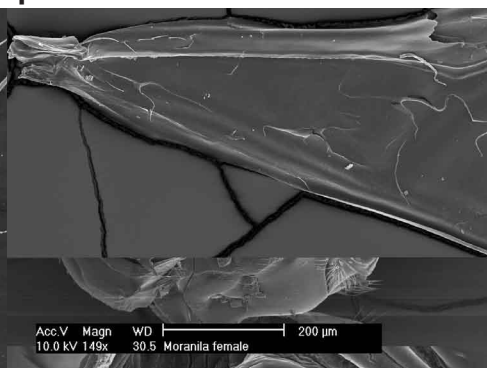
antenna, female: apex

mesosoma, ventral

***Moranila* sp.** Chalcidoidea: Pteromalidae: Eunotinae



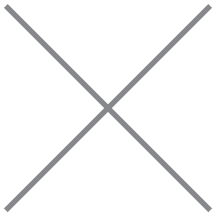
fore wing: stigma, dorsal



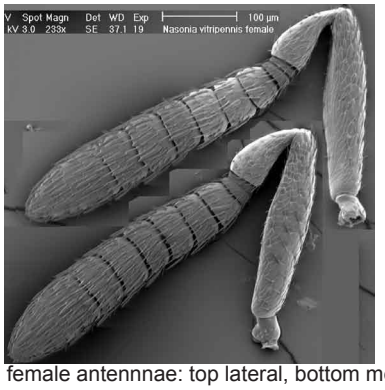
fore wing: base, ventral

Nasonia vitripennis Chalcidoidea: Pteromalidae: Pteromalinae

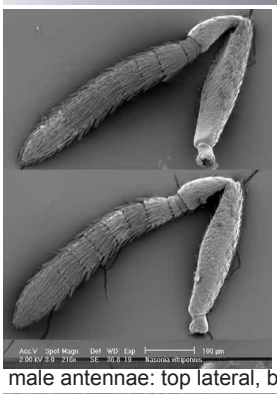
female habitus: lateral



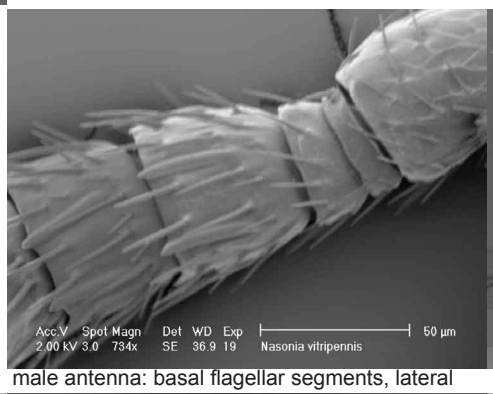
male habitus: lateral



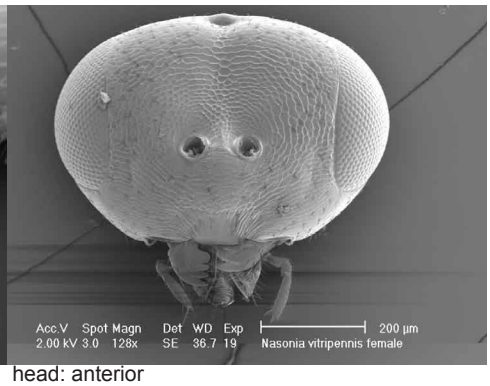
female antennnae: top lateral, bottom mesal



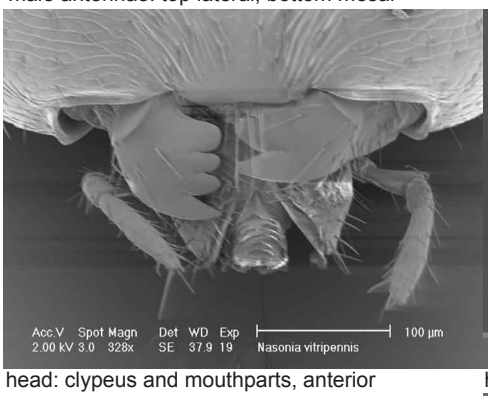
male antennae: top lateral, bottom mesal



male antenna: basal flagellar segments, lateral

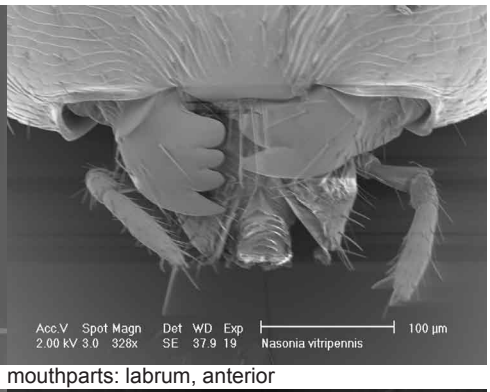


head: anterior



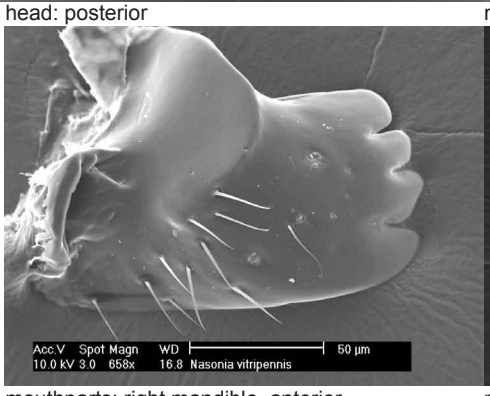
head: clypeus and mouthparts, anterior

head: posterior

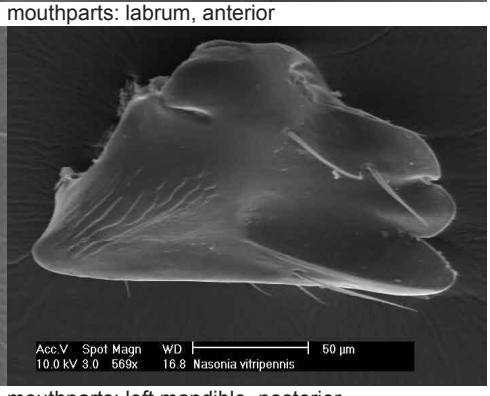


mouthparts: labrum, anterior

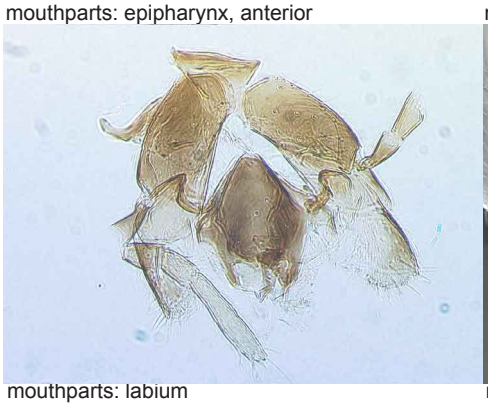
mouthparts: epipharynx, anterior



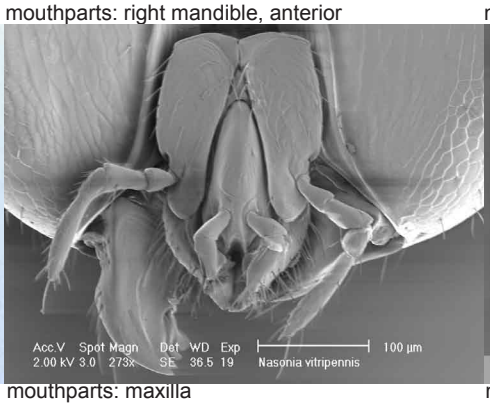
mouthparts: right mandible, anterior



mouthparts: left mandible, posterior



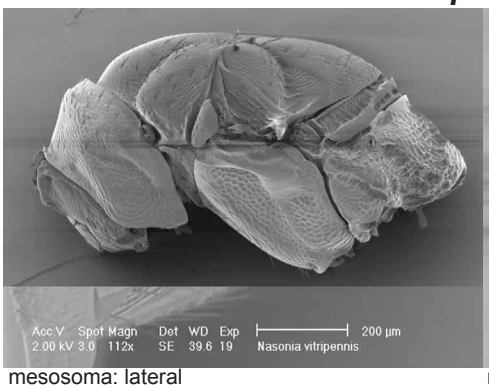
mouthparts: labium



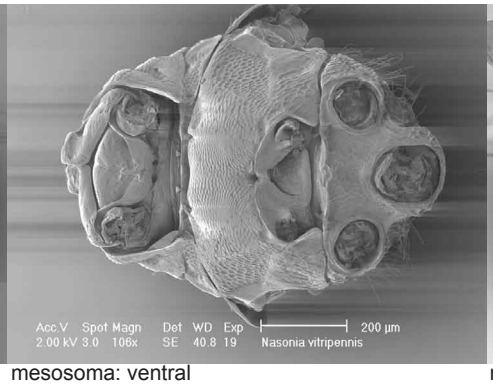
mouthparts: maxilla

mesosoma: dorsal

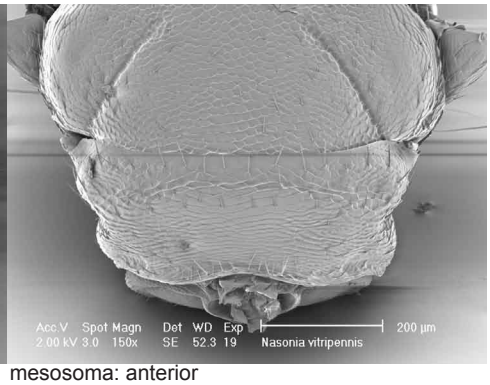
Nasonia vitripennis Chalcidoidea: Pteromalidae: Pteromalinae



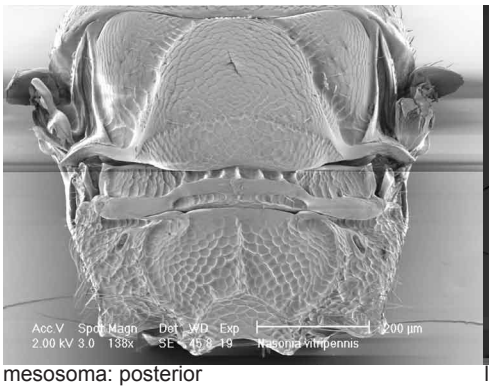
mesosoma: lateral



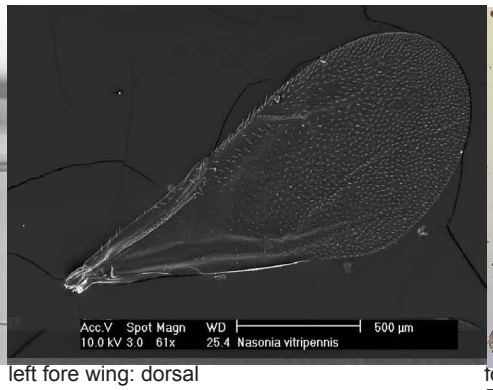
mesosoma: ventral



mesosoma: anterior



mesosoma: posterior



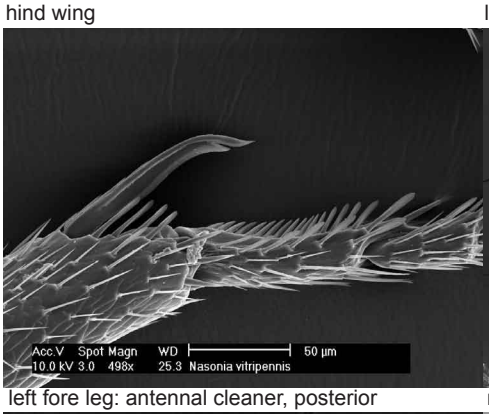
left fore wing: dorsal

fore wing

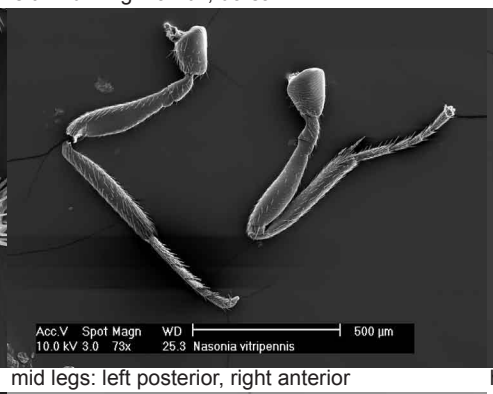
hind wing

left hind wing: hamuli, dorsal

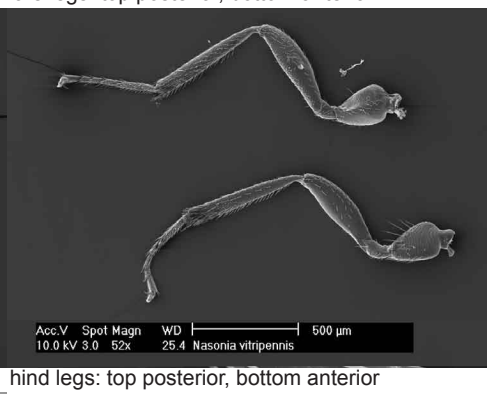
fore legs: top posterior, bottom anterior



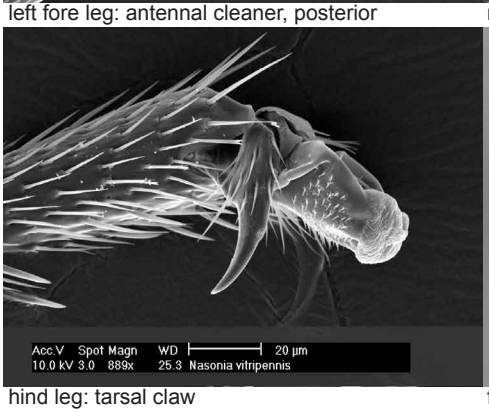
left fore leg: antennal cleaner, posterior



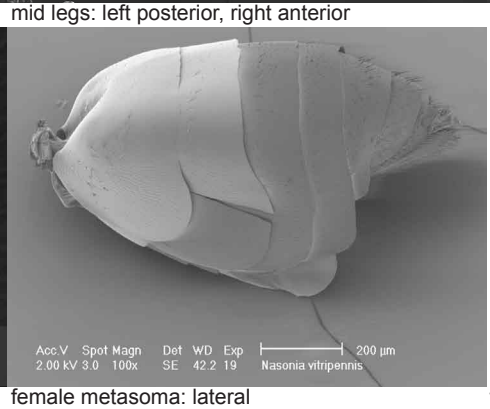
mid legs: left posterior, right anterior



hind legs: top posterior, bottom anterior



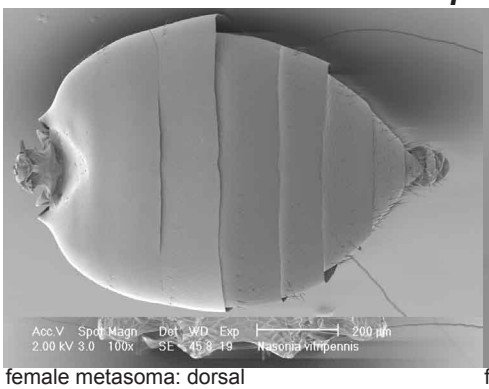
hind leg: tarsal claw



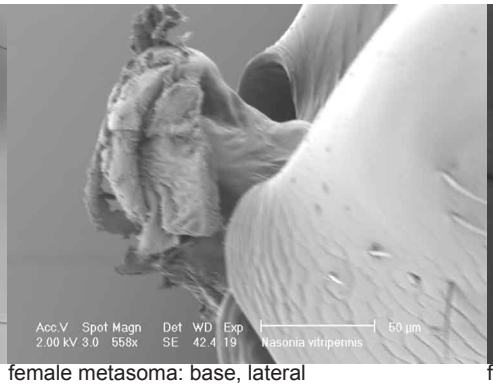
female metasoma: lateral

female metasoma: ventral

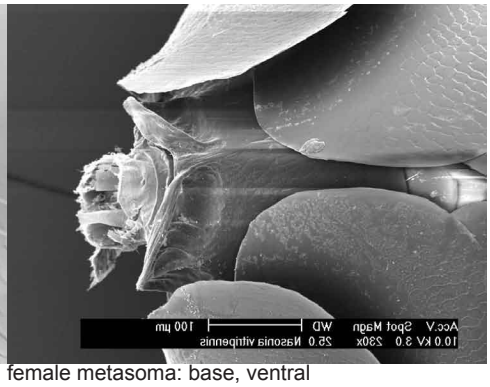
Nasonia vitripennis Chalcidoidea: Pteromalidae: Pteromalinae



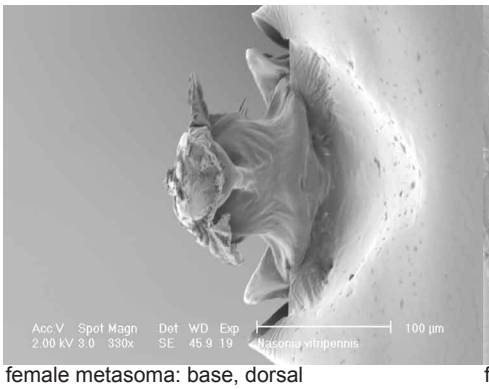
female metasoma: dorsal



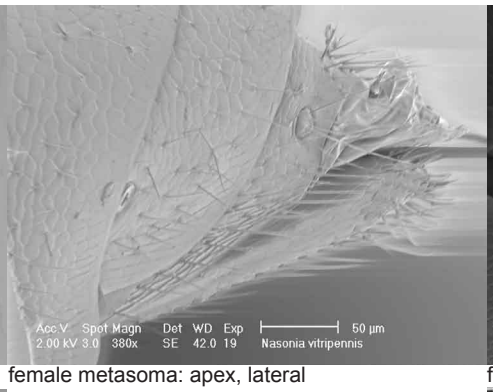
female metasoma: base, lateral



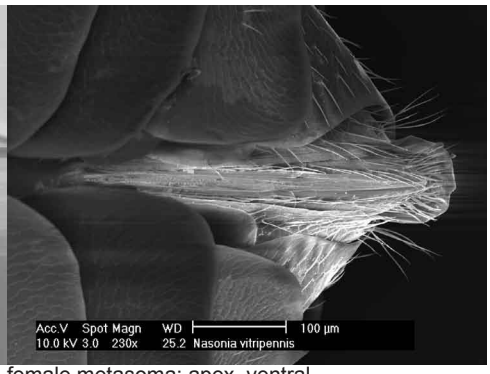
female metasoma: base, ventral



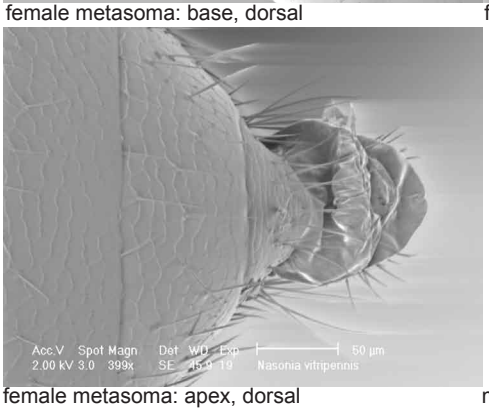
female metasoma: base, dorsal



female metasoma: apex, lateral

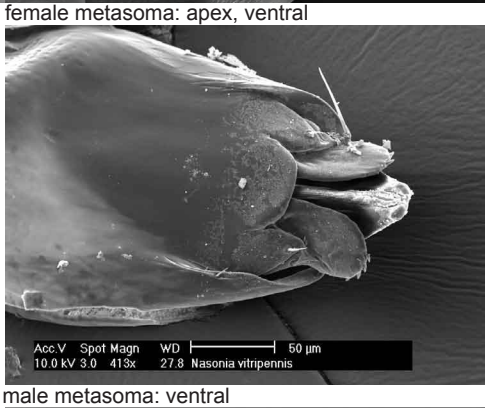


female metasoma: apex, ventral

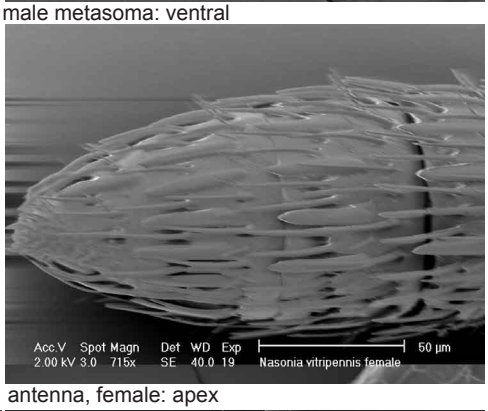


female metasoma: apex, dorsal

male metasoma: lateral

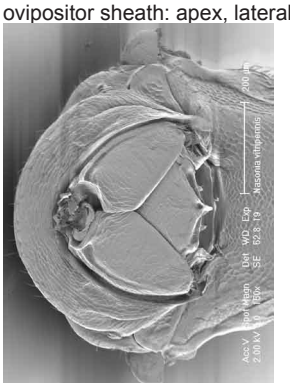


male metasoma: ventral

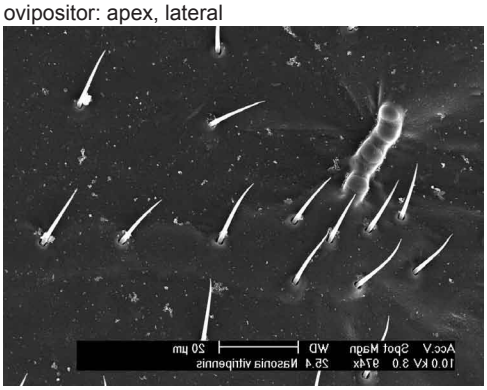


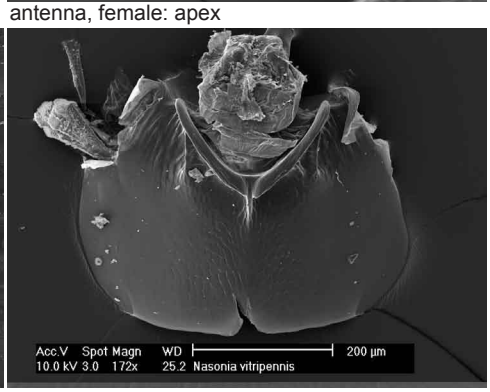
antenna, female: apex

ovipositor sheath: apex, lateral


mesosoma: ventral

ovipositor: apex, lateral


fore wing: stigma, dorsal



petiole and 3st, anterior

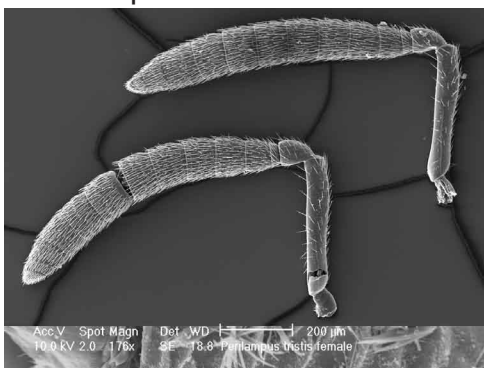
Nasonia vitripennis Chalcidoidea: Pteromalidae: Pteromalinae

ovipositor

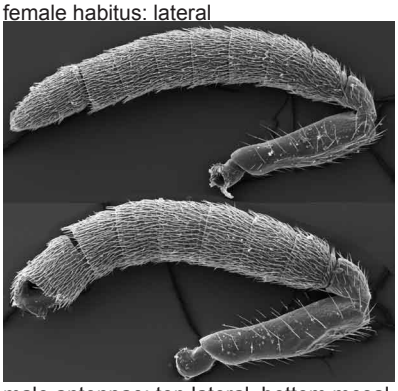
Perilampus tristis Chalcidoidea: Perilampidae: Perilampinae

female habitus: lateral

male habitus: lateral

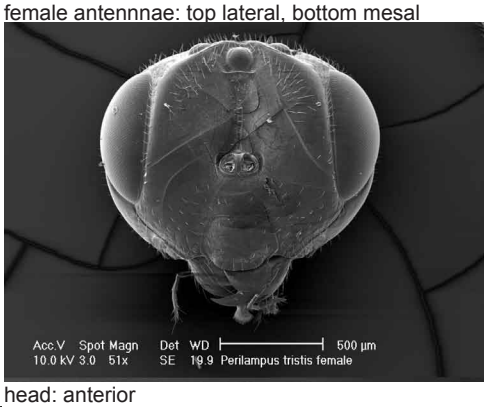


female antennnae: top lateral, bottom mesal

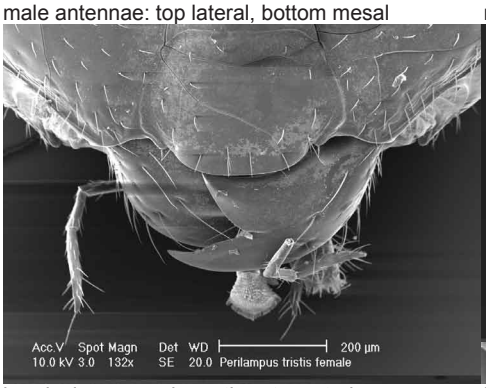


male antennae: top lateral, bottom mesal

male antenna: basal flagellar segments, lateral

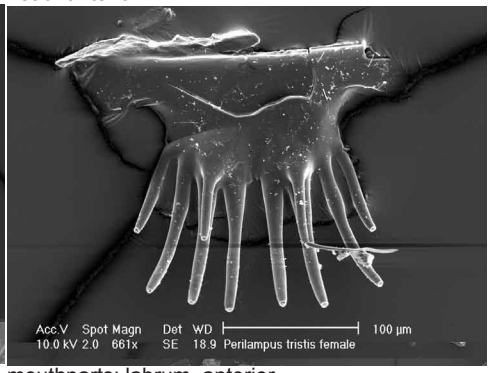


head: anterior

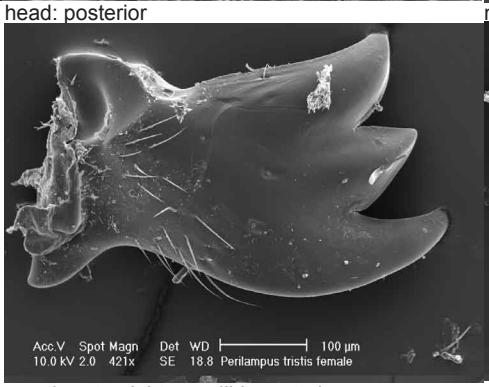


head: clypeus and mouthparts, anterior

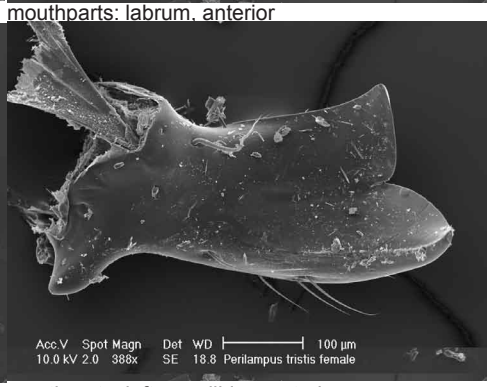
head: posterior



mouthparts: labrum, anterior

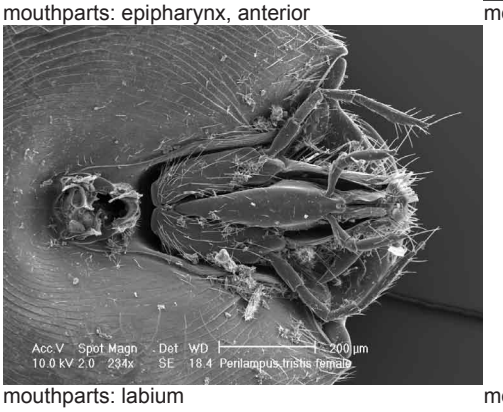


mouthparts: right mandible, anterior



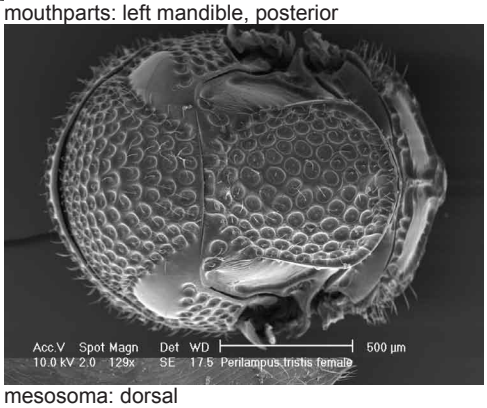
mouthparts: left mandible, posterior

mouthparts: epipharynx, anterior



mouthparts: labium

mouthparts: maxilla



mesosoma: dorsal

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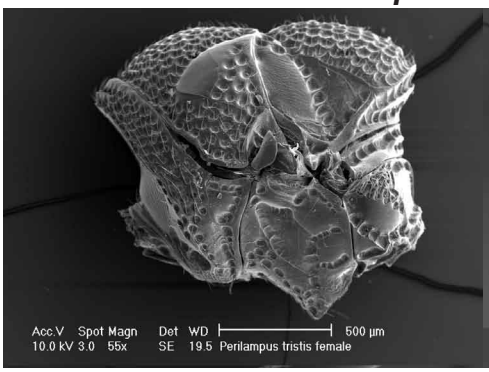
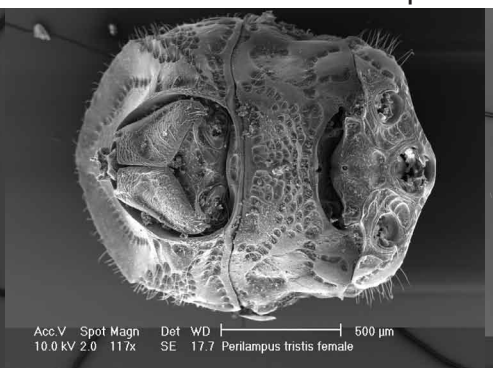
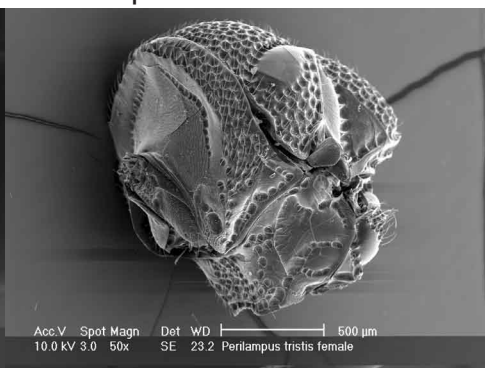
Perilampus tristis Chalcidoidea: Perilampidae: Perilampinae



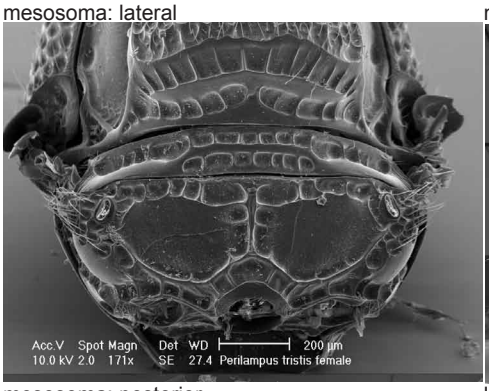
mesosoma: lateral



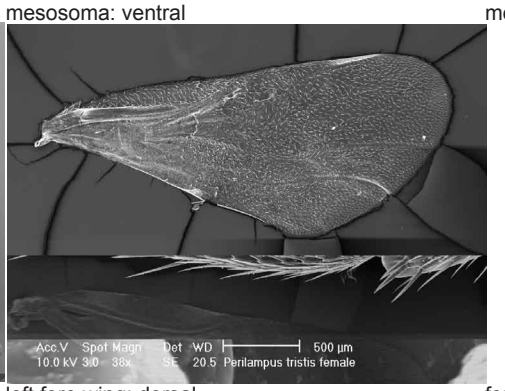
mesosoma: ventral



mesosoma: anterior

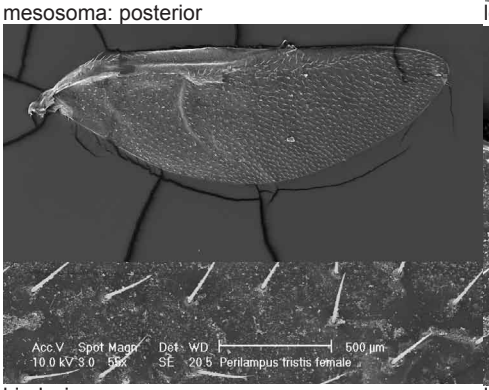


mesosoma: posterior

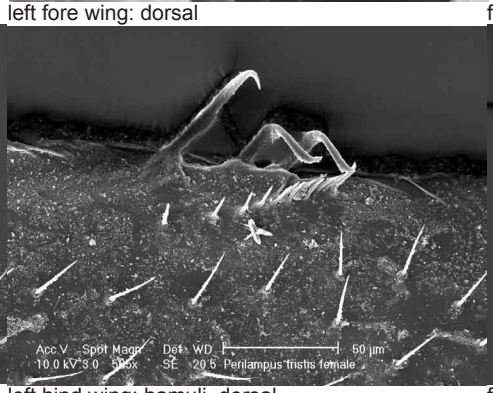


left fore wing: dorsal

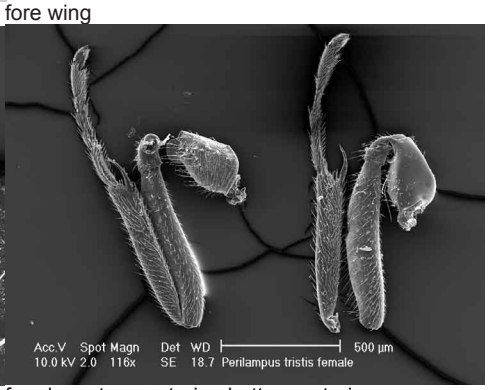
fore wing



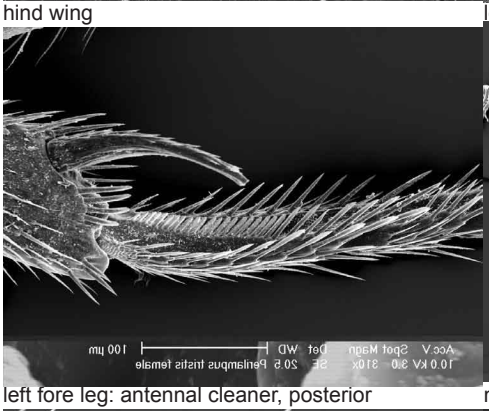
hind wing



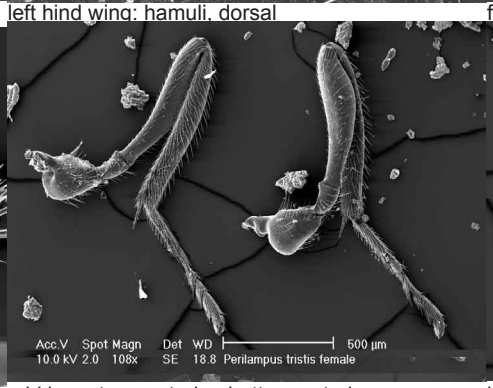
left hind wing: hamuli, dorsal



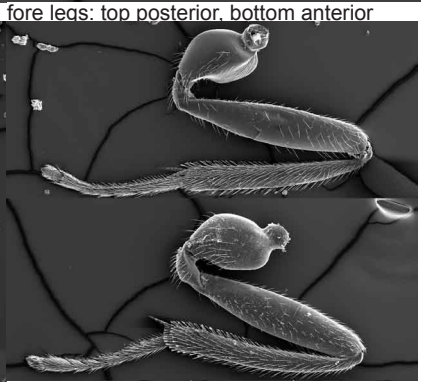
fore legs: top posterior, bottom anterior



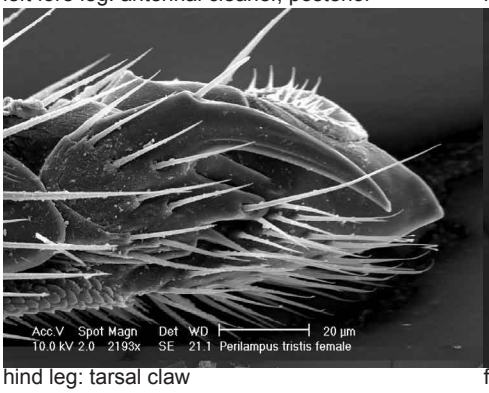
left fore leg: antennal cleaner, posterior



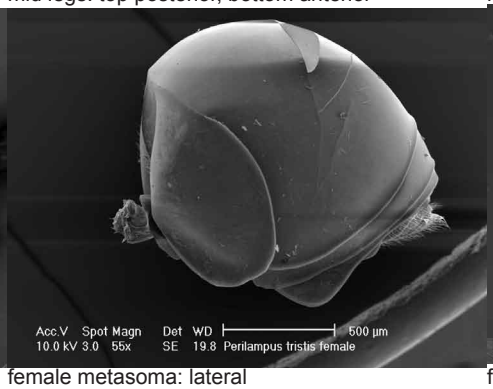
mid legs: top posterior, bottom anterior



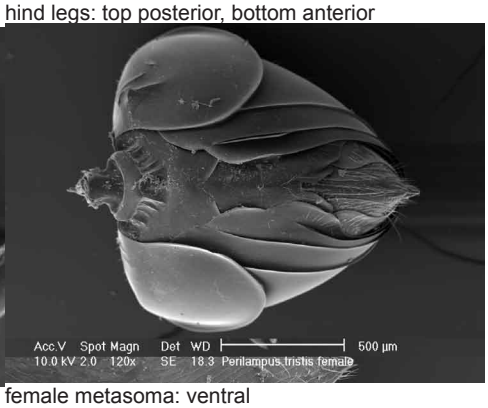
hind legs: top posterior, bottom anterior



hind leg: tarsal claw



female metasoma: lateral



female metasoma: ventral

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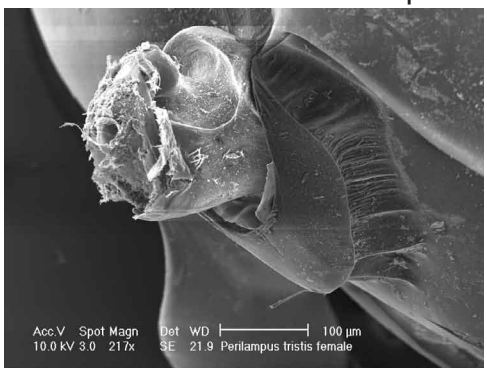
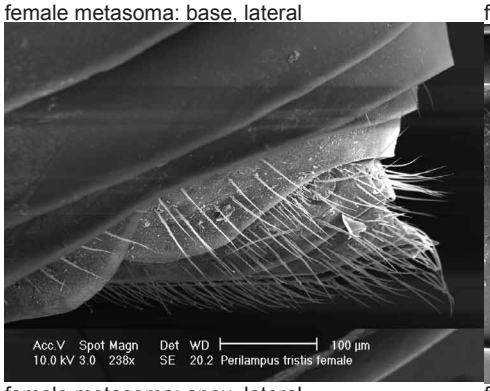
Perilampus tristis Chalcidoidea: Perilampidae: Perilampinae

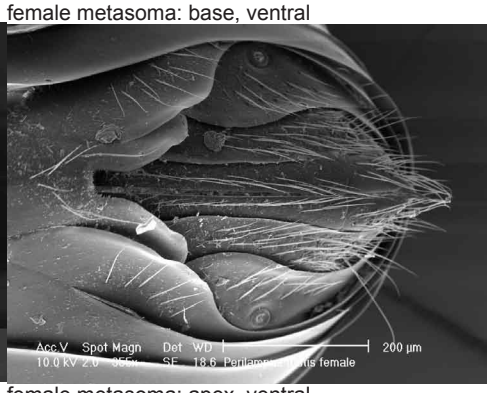


female metasoma: dorsal

female metasoma: base, lateral

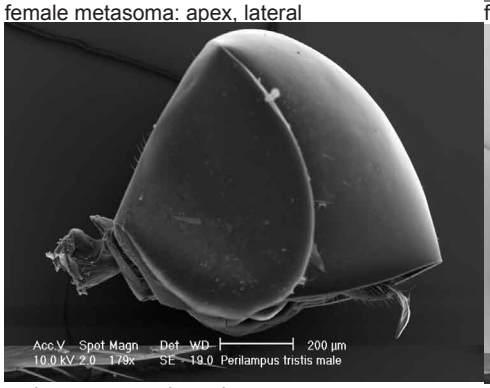


female metasoma: base, ventral



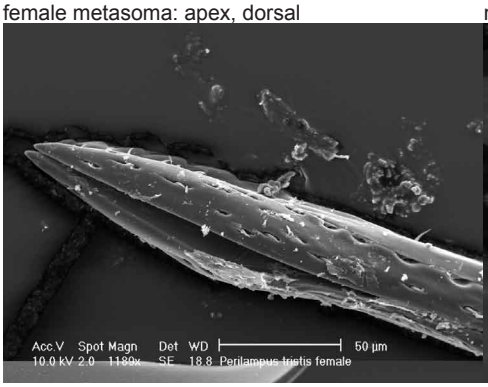
female metasoma: base, dorsal

female metasoma: apex, lateral



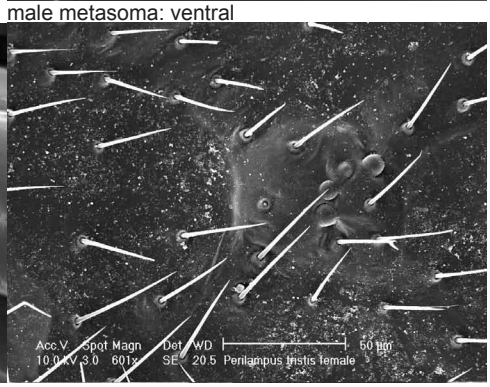
female metasoma: apex, ventral

female metasoma: apex, dorsal

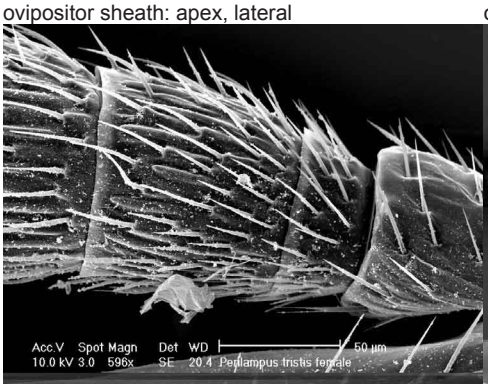


male metasoma: lateral

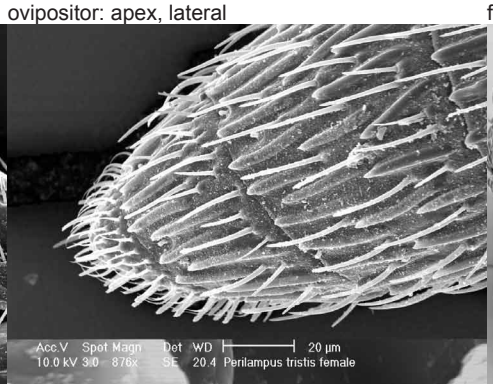
male metasoma: ventral



ovipositor sheath: apex, lateral



ovipositor: apex, lateral



fore wing: stigma, dorsal

antenna, female: base

antenna, female: apex

mesosoma, ventral

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Glossary of Positional and Morphological Terms (Chalcidoidea - Chalcid Wasps)

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abdomen: The last or posteriormost of the three main body regions of an insect. In chalcids, like other apocritan Hymenoptera, the first 'true' abdominal segment (see propodeum) is rigidly attached to the thorax and there is a more or less flexible articulation between this fused segment and the 'apparent abdomen', which in chalcids is usually termed the metasoma or gaster.
acetabular carina: Term sometimes used for the transverse, ventral portion of the epicnemial carina on the mesothoracic venter under or behind the procoxae.
acetabulum: The cavity into which an appendage is articulated.
acicular / aciculate: Needle-like.
acropleural sulcus: The curved line or groove on the mesopleuron that distinguishes the posterior and ventral limits of the acropleuron or subalar area.
acropleuron: Synonym of subalar area, used sometimes for the primitively small dorsal region of the mesopleuron found in most chalcid families and, more commonly, for the derived enlarged region characteristic of Encyrtidae, Tanaostigmatidae, most Eupelmidae and some Aphelinidae.
acuminate: Tapering to a long point.
admarginal cell: Term sometimes used for a longitudinal bare region on the forewing disc immediately behind the marginal vein bounded posteriorly by the first abscissa of the Radial Sector (RS1) setal line.
admarginal setae: Row of differentiated setae on the ventral surface of the forewing behind the marginal vein.
adnotaular setae: One or more rows of differentiated setae on the mesoscutal midlobe adjacent to each notaulus.
adoral depression: See malar depression.
adpetiolar strip: Variously differentiated posteromedian region of the propodeum anterior to the propodeal foramen; sometimes called the adpetiolar triangle.
adpetiolar triangle: See adpetiolar strip.
adpressed: Lying against or along a structure (compare with decumbent and erect).
adstigmal setae: A row of long setae aligned in front of the stigmal vein in some chalcids.
advanced axilla: An axilla that projects distinctly anterior to the base of the scutellum because the transscutal articulation is deeply sinuate.
aedeagal apodeme: Rod-like structure extending anteriorly from each basolateral margin of the aedeagus.
aedeagus: Median lobe of the male genital capsule that is surrounded by the phallobase and through which the sperm duct traverses.
alitrunk: See mesosoma.

anal filament: A membranous extension from behind the anus that covers the ovipositor sheaths dorsally in some females with an exserted ovipositor.
anal sclerite: In some female Eupelmidae, a more or less sclerotized, flap-like sclerite that covers the anus.
anal vein (A) setal line: In Trichogrammatidae, used for a longitudinal setal line near the posterior margin of the wing behind the second branch of cubital vein (CU2) setal line; analogous or homologous with the subcubital setal line of other chalcids.
anapleural suture: Term that has been very rarely used in Agaonidae for the acropleural sulcus and which is not homologous with the true anapleural suture.
anapleurite: Term that has been very rarely used in the Agaonidae for the subalar area/acropleuron.
anelliform: In the shape of a disk, transverse or ring-like.
anellus: (pl. anelli) One or more, usually transverse or ring-like, basal flagellar segments that lack longitudinal sensilla.
anteclypeus: Term sometimes used for a slender depressed or rim-like, smooth apical margin of the clypeus.
antenna: Paired segmental sensory appendage on the head, composed of the scape, pedicel and flagellum.
antennal cleaning organ: Term used for the composite structure of the calcar of the foretibia and the strigil of the foretarsus, through which the antennae are stroked to clean them.
antennal formula: The number of units comprising the three segments of the antenna and the three regions of the flagellum, that is, the scape and pedicel as well as the anelli, funicle, and clava of the flagellum; for example, an antenna with a flagellum having 3 anelli, 5 funicular segments, and 3 claval segments would have an antennal formula of 11353.
anterior: (adv. anteriorly) Toward or at the head (front) end of the body or structure.
anterior alar plate: See preaxilla.
anterior notal wing process: A bilobed projection of the preaxilla with which the first axillary sclerite of the forewing articulates.
anterior ocellus: Middle, unpaired ocellus that normally is anterior to the paired posterior ocelli when three ocelli are present; sometimes called the median ocellus.
anterior scutellum: In Mymaridae, an anterior portion of the scutellum that is differentiated by a transverse line.
anterior tentorial pits: Paired pits sometimes visible on the lower face that are external indications of the anterior tentorial arms and that partially delimit the lateral limit of the clypeus.
antero-: Prefix meaning toward the head or front end of a structure, e.g. anterolateral.
apical / apex: (adv. apically) The point farthest away from the body, at to toward the end of an appendage; synonymous with distal.
apico-: Prefix meaning toward the apex or far end of an appendage, or region or margin of a sclerite farthest away from the transverse midline of the body, e.g. apicolateral.
arcuate: Arched.
arolium: The median pad-like lobe that lies between the tarsal claws of a pretarsus.
aulax: (pl. aulaces) A longitudinal groove along the dorsal length of each first valvula, into which is fitted the rhachis of the second valvulae to form the tongue-and-groove olistheter

interlocking mechanism of the ovipositor stylets.

axilla: (pl. axillae) Usually paired, often triangular regions posterior to the mesoscutum that usually appear as anterolateral regions of the scutellum; the term is usually used for the entire structure but each axilla has both a dorsal surface and a lateral panel of the axilla.

axillar carina: Lateral, carinate margin of the axilla which differentiates the dorsal surface of the axilla from the lateral panel of the axilla.

axillary sclerites: Sclerites at the base of both the fore and hind wings, by which the wings are attached and articulate with the thorax (see also first, second, and third axillary sclerite).

axillula: (pl. axillulae) Lateral, usually more or less vertical subdivision of the scutellum differentiated from the rest of the scutellum by the axillular groove/carina or sublateral groove and from the axilla by the scutoscutellar suture.

axillular groove / carina: In most chalcids except Eulophidae, term used for a longitudinal groove (very rarely a carina) very close to the side of the scutellum that differentiate a lateral, usually more or less vertical scutellar region, the axillula, between the groove/carina and the usually posteriorly sloping axilla (see also sublateral grooves).

basal / base: (adv. basally) The point closest to the body, at to toward the base of an appendage; synonymous with proximal.

basal cell: Basal region of the forewing that is enclosed anteriorly by the submarginal vein, posteriorly by the cubital fold or cubital setal line, if present, and depending on the setal pattern either the basal fold or basal setal line or linea calva apically.

basal fold: Convex fold in the forewing, sometimes with a line of setae (see basal setal line), that is directed posterobasally from the parastigma and which forms the apex of the basal cell; sometimes called the basal vein if pigmented.

basal setal line: Row of setae on the upper surface of the forewing that is directed posterobasally from the parastigma and that forms the apex of the basal cell (see basal fold).

basal vein: See basal fold.

basitarsal comb: A row of flattened setae on the basitarsus that along with the calcar forms part of an antennal cleaning organ; in most chalcids the basitarsal comb consists of a longitudinal row of obliquely directed setae along the ventral margin of the basitarsus, though in some chalcids the row is very short and obliquely angled.

basitarsal notch: A ventral emargination of the basitarsus of the front leg of most chalcids that have a curved foretibial spur, along which is aligned the basitarsal comb, and which together form the strigil.

basitarsus: Basal (first) segment of the tarsus.

baso-: Prefix meaning toward the base (part closest to the body) of an appendage, or region or margin of a sclerite closest to the transverse midline of the body, e.g. basolateral.

bifid: See bifurcate.

bifurcate: Partly divided into two parts (cleft, forked).

branched antenna: See pectinate antenna.

broken submarginal vein: A submarginal vein that appears to be 'broken' because the base of the parastigma narrows and is separated slightly from the rest of the submarginal vein.

buccal cavity: See mouth cavity.

calcar: Term used for a curved, bifurcate or otherwise modified tibial spur of the front leg, which together with a strigil forms an antennal cleaning organ.

callar furrow: In Eupelmidae, a transverse furrow along the anterolateral margin of the propodeum anterior to each spiracle.
callar region: In female Eupelmidae, paired regions of the propodeum lateral to the plical furrows or the region lateral to each spiracle if there are no plical furrows and the callar regions and plical region are not differentiated.
callus: The area of the propodeum lateral to each spiracle or postspiracular sulcus, which is often convex and at least partly setose.
campanulate: Bell-shaped.
capitate: Knob-like or button-like.
capitate peg sensillum: Mushroom-shaped sensory structure on the flagellum, particularly the clava; sometimes called the sensilla ampullacea.
cardo: (pl. cardines) Basal section of the maxilla, by which the maxilla is attached to the head capsule.
carina: A ridge or small keel on a sclerite.
caudad: Toward the posterior or rear end.
cephalad: Toward the anterior or front (head) end.
cercal bristles: Term sometimes used for the long setae on the cercus.
cercal plate: Term sometimes used for the type of cercus that looks like a flat disc from which several long setae project.
cercus: (pl. cerci)(adv. cercal) Paired sensory structures on the last or second last metasomal tergite; the cercus is sometimes a setose finger-like projection that articulates with the tergum, but more often it looks like a low tubercle or plate-like structure that bears several long setae (see cercal plate); sometimes called the pygostylus.
cheek: Side of the head between the base of the mandible and lower margin of the eye, consisting partly of the lower face and partly of the gena.
chelate structure: See digitus.
chitinized ridge: See ventral ridge.
clava: Apically differentiated region of the flagellum usually composed of 1-3 segments, rarely 4 segments, and exceptionally (Rotoitidae) 6 segments; the claval segments usually are larger in size and/or partly to completely fused; often called the club.
claval segments: One to six apical segments of the antennal flagellum that form a differentiated region, the clava.
clavate antenna: An antenna that looks more or less club-like because the segments of the flagellum are widened distinctly toward the apex.
closed linea calva: A linea calva that is entirely or substantially enclosed posteriorly by a line or lines of setae on the dorsal surface of the wing (see also open linea calva and interrupted linea calva).
club: See clava.
clypeal margin: Ventral or lower margin of the clypeus that forms all or part of the median portion of the mouth margin on the front of the head.
clypeogenal sulcus: Term sometimes used for the lateral, more or less vertical portion of the epistomal sulcus below each anterior tentorial pit.
clypeus: Median region of the head above the mouth that is often distinguished from the rest of the lower face by a difference in sculpture, but whose exact boundaries sometimes are

indicated by the epistomal sulcus.
collar: Subhorizontal surface of the pronotum that is posterior to the neck.
collum: See neck.
complete notaulus: Notaulus that extends posteriorly to the transscutal articulation.
compound eye: See eye.
cordate / cordiform: Triangular with the corners of the base rounded.
coronal suture: In Mymaridae, median groove or a pair of grooves on the back of the head extending from the vertexal sulcus and converging toward the occipital foramen.
costal cell: The membranous region of the forewing anterior to the submarginal vein, measured from the basal constriction that delimits the apex of the humeral plate of the wing to the point at which the submarginal vein touches the leading edge of the wing.
costula: (pl. costulae) Transverse ridge on the propodeum near its middle.
coxa: (pl. coxae) The basal segment of a leg, which articulates with the thorax basally and the trochanter apically.
coxal foramen: Openings in the body wall of the thorax to which the coxae are articulated.
cranium: The head capsule.
CU1: See first branch of cubital vein (CU1) setal line.
CU2: See second branch of cubital vein (CU2) setal line.
cubital fold: Longitudinal, convex fold near the posterior margin of the forewing that is directed from near the base of the submarginal vein to or partly to the apical margin of the wing, and which often has a line of setae (see cubital setal line) that forms the posterior margin of the basal cell and sometimes closes the speculum or linea calva posteriorly; sometimes called the cubital vein if pigmented.
cubital setal line: Row of setae on the dorsal surface of the forewing near its posterior margin, which is directed longitudinally from near the base of the submarginal vein to or partly to the apical margin of the wing (see also cubital fold and subcubital setal line); in Trichogrammatidae termed CU2 or second branch of cubital vein.
cubital vein: See cubital fold.
decumbent: Often used as a synonym of adpressed, but simply meaning to project out at an angle from a structure and then bent back toward the structure (compare with erect).
deltoid: Elongate triangular.
digital spines: One or more curved spines at the apex of the volsella (see also digitus).
digitate labrum: Labrum that is deeply emarginate so as to appear finger-like.
digitus: Apically differentiated region of the volsella, which usually bears digital spines.
disc: (adv. discal) Membranous region of the forewing beyond the basal cell.
discrimen: Median, longitudinal sulcus on the ventral surface of the mesothorax, which is terminated posteriorly by the mesofurcal pit and is external indication of an invaginated phragma.
distal / distad: See apical / apex.
dorsal / dorsad: (adv. dorsally) At or toward the top or upper surface of the body or structure (above).
dorsal aperture of the phallobase: Opening on the anterodorsal surface of the phallobase through which the aedeagus is inserted through the male genital capsule.
dorsal expansion of gonobase: See dorsal lamina.

dorsal lamina: Posterodorsal surface of the phallobase posterior to the dorsal aperture of the phallobase.
dorsellum: The central, usually convex median portion of the metanotum that is differentiated from the more concave lateral panel of the metanotum.
dorso-: Prefix meaning toward the top or upper surface of a structure, e.g. dorsolateral.
effaced: See obsolete.
elongate: Much longer than broad (compare with oblong).
emarginate: A margin with a notch or inwardly curved or angled 'cut out' portion (compare with truncate).
empodium: See arolium.
entire: See percurrent.
entire linea calva: A linea calva in which the bare band is continuous to the posterior margin of the wing, without any setae on the dorsal surface at some point within the band or across the posterior end of the band; by definition an entire linea calva is also an open linea calva, but not a closed linea calva or an interrupted linea calva.
epicnemial carina: A ridge or carina that is sometimes present anteriorly on the mesepisternum behind the procoxa, and which may continue under the coxae (see acetabular carina) to the discrimen, which delimits an epicnemium between itself and the procoxa and a mesosternal shelf between itself and the mesocoxae.
epicnemium: Term often used for an anteroventrally differentiated portion of the mesepisternum that lies under the procoxa and behind and below the prepectus, though rarely used for the ventral portion of the prepectus between the ventral surfaces of the prothorax and mesothorax. In either sense the epicnemium is not homologous with the epicnemium of sawflies (Symphyta) and is an analogous region to similar looking regions in other Apocrita.
epimeral sclerite: See mesotrochantinal plate.
epipygium: Last tergite of the metasoma; used either as a synonym of syntergum or, in Torymidae, for a more or less separated and sclerotized, partly setose, often flap-like sclerite posterior to the eighth metasomal tergum in most females.
epistomal margin: See clypeal margin.
epistomal sulcus: When visible, sulcus that differentiates the clypeus from the rest of the lower face; sometimes used only for the mostly horizontal portion of the sulcus between the anterior tentorial pits (see also clypeogenal sulcus).
erect: Upright, or projecting straight out from a structure (compare with adpressed and decumbent).
exodont mandible: Mandible in which the teeth are curved outward and the mandibles do not overlap when closed.
exserted ovipositor: An ovipositor that projects distinctly beyond the apex of the last metasomal tergum.
eye: The paired organs of sight on the head that is composed of a large number of facets, sometimes referred to as the compound eye in contrast to the simple eye or ocellus.
eye margin: One of four margins of a compound eye, the upper or dorsal margin, lower or ventral margin, inner or anterior margin, and outer or posterior margin; sometimes called the orbit.
face: In most chalcids the entire frontal surface of the head below the anterior ocellus and

between and below the eyes to the mouth margin; in Mymaridae a similar region but below the transverse suture and between the preorbital sutures.

facet: One of the lens-like divisions on the surface off the compound eye, each of which forms the surface of an ommatidium.

femoral depression: Oblique depression on the mesopleuron that extends from near the mesocoxa toward the base of the forewing, which receives the mesofemur when this is appressed to the thorax.

femur: (pl. femora) Third segment of a leg that articulates basally with the trochanter and apically with the tibia.

filiform antenna: Antenna that looks whip-like because the segments of the flagellum are subequally wide or narrow slightly toward the apex.

filum spinosum: A row of differentiated, thickened or peg-like setae along the apical margin of the linea calva.

first abscissa of Radial Sector (RS1) setal line: In Trichogrammatidae, a setal line that extends posterobasally from the stigma; in literature on Chalcididae this setal line is designated as the Radial Sector (RS) vein or setal line, and RS1 is used for what is designated as RS2 in Trichogrammatidae.

first axillary sclerite: One of three axillary sclerites of the forewing; typically an elongate rod-like sclerite with several protrusions and margins that articulate (distally) with the humeral plate of the forewing, (anteriorly and anteromesally) with the anterior notal wing process, (laterally) with the second axillary sclerite, and (posteriorly) with the posterior notal wing process.

first branch of cubital vein (CU1) setal line: In Trichogrammatidae, used for a longitudinal setal line between the second branch of cubital vein (cu2) setal line and the median setal line.

first gonapophysis: See first valvula.

first valvifer: A more or less triangular to spindle shaped sclerite of the ovipositor, which is articulated to the semicircular sheet dorsally, the inner plate of the ovipositor ventrally, and the outer plate of the ovipositor apically (see also gonocoxa).

first valvula: Gonapophysis of the eighth abdominal segment, which forms the ventral portion of the ovipositor stylets; the first valvulae are a pair of lance-like structures that are interlocked along their dorsal length with the ventrolateral margins of the fused second valvulae by the olistheter so as to move anteriorly and posteriorly in a saw-like cutting motion.

flagellar segment: One segment-like subsection of the flagellum; sometimes called a flagellomere.

flagellomere: See flagellar segment.

flagellum: The antenna beyond the pedicel, which in chalcids consists of 1-12 flagellar segments or flagellomeres and often is differentiated into three regions, the anellus, funicle and clava.

foramen: (pl. foramina) Any opening in a body wall through which organs pass from one region to another.

foramen magnum: See occipital foramen.

forewing venation: See venation.

forewings: Pair of wings borne on the mesothorax.

fossa: A deep pit.

fovea: A depression or pit.
frenal area: See frenum.
frenal line / sulcus / carina: Transverse row of differentiated sculpture, groove or ridge that differentiates a posterior region of the scutellum, the frenum.
frenum: Posteriorly differentiated region of the scutellum anterior to any marginal rim that is delineated by a transverse carina, groove, row of foveae, or other change of sculpture; sometimes called the frenal area.
frons: See upper face.
frontal carina: See preorbital carina.
frontal fork: Term sometimes used for a V-shaped frontal sulcus and a synonym of frontofacial sulcus.
frontal sulcus: Transverse groove on the face below the anterior ocellus that is above and not connected to the scrobal sulcus or interantennal area; the term is sometimes used synonymously with frontofacial sulcus, which is connected to the scrobal sulcus or interantennal area (see also frontal fork).
frontal trabecula: See preorbital trabecula.
frontofacial ridge: Term sometimes used for a transverse ridge across the face above the scrobal depression, resulting from an abrupt change in angle and differentiating the anterior margin of the frontovertex.
frontofacial sulcus: Transverse to more or less V-shaped grooves on the upper face that medially join or intersect the scrobal sulcus and/or interantennal area (see also frontal sulcus).
frontogenal suture: See malar sulcus.
frontovertex: Term used for the composite vertex and that part of the upper face that is more or less dorsal compared with a more vertical part when the upper face is abruptly angled at some level above the torulus (see also frontofacial ridge).
funicle: The region of the antennal flagellum between the anellus/anelli and clava; sometimes called the funiculus.
funicular segment: One segment-like subsection of the funicle of the antenna.
furcal pit: A small 'hole' along the midline of the pleurosternum of each of the three thoracic regions; the furcal pit is external indication of an invagination that forms the furcal phragma of each thoracic region.
furcal plate: See first valvifer.
galea: (pl. galeae) Outer, apical lobe of the maxilla.
gaster: The posteriormost of the three main body regions of a chalcid, which looks like the insect abdomen but excludes both the first 'true' abdominal segment, the propodeum, and the second 'true' abdominal segment, the petiole (see also metasoma).
gastral tail: In some Agaonidae, term used for the composite tail-like structure formed by the ovipositor and elongated one or two last metasomal terga.
gena: Side of the head below the temple, that is, the lateral surface of the head behind the eye and below the eye posterior to the malar sulcus, if present.
genal bridge: See postgenal bridge.
genal carina: Ridge on the gena that extends from the ventrolateral corner of the mouth cavity toward or partly behind the eye; unlike the occipital carina a genal carina is not continuous

dorsally.

genal hollow: See malar depression.

genal margin: Margin of the mouth cavity on the lateral surface of the head above the mandible.

genal sulcus: See malar sulcus.

geniculate: Elbowed, or being abruptly angled.

genital capsule: Combined structures of the male genitalia, which usually consists of a more or less tubular phallobase surrounding an aedeagus; sometimes also called the phallus.

glossa: (pl. glossae) Inner pair of lobes at the apex of the prementum of the labium, which combined with the paraglossae form the 'fleshy' ligula.

gonangulum: (pl. gonangula) Synonymous with first valvifer and hypothesized to represent a detached portion of the gonocoxa of the ninth abdominal segment.

gonapophysis: (pl. gonapophyses) Mesal appendage (process) of the gonocoxa; the gonapophyses of the eighth abdominal segment form the first valvulae and the gonapophyses of the ninth abdominal segment form the second valvulae.

gonobase: See phallobase.

gonocoxa: (pl. gonocoxae) The presumptive coxae of the genital segments, abdominal segments eight and nine; in Hymenoptera the second valvifer is considered to be the gonocoxa of the ninth abdominal segment, whereas the gonocoxa of the eighth segment is hypothesized to be lost and the first valvifer is thought to be derived from a detached portion of the gonocoxa of the ninth segment, the gonangulum.

gonoforcep: See paramere.

gonoplacs: See ovipositor sheaths.

gonostylus: (pl. gonostyli) Stylus of a genital segment, the eighth and ninth abdominal segments.

gula: Posteromedian region of the head ventral to the posterior tentorial pits, between the occipital foramen and hypostomae, which is delineated laterally by the gular sulcus (see also postgenal bridge and hypostomal bridge).

gular sulcus: Paired, subparallel sulci on the posterior of the head between the occipital foramen and hypostomae that distinguish the outer margins of the gula.

hair line: See setal line.

hairless streak: Rarely used general term to designate either a linea calva or speculum on the forewing.

hamuli: Curved or hook-like setae on the leading edge of the hind wing that are used to grasp the retinaculum of the forewing to couple the forewing and hind wing together during flight.

head: The first or anteriormost of the three main body regions of an insect, which bears the mouthparts and major sense organs.

hind wings: Pair of wings borne on the metathorax.

humeral plate: Basally thickened part of the forewing just beyond the tegula, which is differentiated from the rest of the wing by a constriction and which likely was derived from fusion of the bases of some ancestral veins.

hyaline break: Term sometimes used for a small clear region or 'break' in the submarginal vein near the parastigma.

hypochaeta: In Mymaridae, a long seta that projects backward from the anterior margin of the ventral surface of the forewing from within a slender membranous region in front of the marginal vein; see also macrochaeta and microchaeta.

hypognathous: Position of the head if the long axis is oriented somewhat obliquely in line with the procoxae and the mouthparts are directed somewhat posteriorly; often used as a synonym of orthognathous.

hypopygium: The last or posteriormost metasomal sternum.

hypostoma: (pl. hypostomae) Posterior, more or less inflected portion of the head capsule on either side of and often dorsal to the labiomaxillary complex, which is delimited laterally by the hypostomal carina.

hypostomal bridge: Term used for a posteromedian region of the head between the occipital foramen and mouth cavity if delimited laterally by hypostomal carinae (see also gula and postgenal bridge).

hypostomal carina: Carinate margin of the mouth cavity on the posterior surface of the head that surrounds the labiomaxillary complex.

incomplete notaulus: Notaulus that is visible anteriorly on the mesoscutum but which does not extend posteriorly to the transscutal articulation.

inner orbit: Synonymous with 'inner margin of the eye' for most chalcids, but in Mymaridae the narrow region of the head between the inner margin of the eye and the preorbital suture.

inner plate of ovipositor: The elongate portion of the second valvifer beyond the semicircular sheet, which surrounds the ovipositor stylets and is terminated by the apically projecting ovipositor sheaths.

interantennal area: Region of the upper face between the scrobes, sometimes called the interantennal prominence, projection or crest because it is convex, ridged, or even lobed.

interantennal crest: See interantennal area.

interantennal prominence: See interantennal area.

intermalar distance: Maximum distance between the mouth corners, that is, the breadth of the mouth cavity.

interorbital distance: Distance between the inner margins of the eyes; usually the minimum distance but sometimes otherwise defined.

interrupted linea calva: A linea calva that has one or more setae on the dorsal surface of the wing at some intermediate point within the bare band (see also closed linea calva and open linea calva).

intervolsellar bridge: Ventral surface of the phallobase between the base of the volsellae, including the intervolsellar process.

intervolsellar process: Ventromedian projection of the phallobase that extends posteriorly between the volsellae of the male genital capsule, and which is continuous anteriorly with the ventral ridge.

knee: Term sometimes used for the region of a leg around the articulation between the tibia and femur, that is, a region composed of the apex of the femur and the base of the tibia.

labial palpus: Paired finger-like appendages on the labium composed of up to three segments.

labiomaxillary complex: Term for the composite ventromedian labium and ventrolateral pair of maxillae.

labium: Unpaired, ventral sclerite of the mouthparts that forms the median portion of the labiomaxillary complex.

labrum: Unpaired, dorsomedian sclerite of the mouthparts that is concealed under or partly to entirely exposed below the clypeus; the labrum is usually flap-like but sometimes is deeply

emarginate so as to be digitate, that is, with finger-like projections.
lacinia: (pl. laciniae) Inner, apical lobe of the maxilla.
lamina / lamella: A thin plate-like or leaf-like cuticular protrusion.
laminated bridge: Transversely striated band of notal membrane that connects the basally unfused portions of the second valvulae or stylet sheath.
lanceolate: Spear shaped, i.e. longer than wide and tapered apically (see also oval/ovate/ovoid and spatulate).
lateral / laterad: (adv. laterally) At or toward the side of the body or outer edge of a structure.
lateral lobe of mesoscutum: See mesoscutal lateral lobe.
lateral ocellar line: Minimum distance between the anterior and a posterior ocellus, abbreviated as LOL or LOD.
lateral ocellus: See posterior ocellus.
lateral panel of axilla: Lateral, vertical surface of each axilla.
lateral panel of metanotum: More or less concave region of the metanotum on either side of the dorsellum; sometimes called the 'lateral wings' of the metanotum.
lateral panel of pronotum: The more or less vertical, lateral surface of the pronotum below the mesothoracic spiracle.
lateral tubercles: See ventral process.
lateral wing of metanotum: See lateral panel of metanotum.
ligula: The apical 'fleshy' and microsetose lobe of the labium, formed from the combined glossae and paraglossae.
linea calva: Narrow, oblique bare band on the forewing disc that is directed from the posterobasal margin of the wing toward the base of the stigmal vein (see also speculum).
linear sensilla: See longitudinal sensillum.
LOD: See lateral ocellar line.
LOL: See lateral ocellar line.
longitudinal sensillum: (pl. longitudinal sensilla) Ridge-like, longitudinal sensory structure on some or all of the funicular and claval segments of the flagellum; sometimes called multiporous plate sensilla, linear sensilla, placoid sensilla, sensory ridges, or rhinaria. Characteristic of a longitudinal sensillum is that the apex projects free for varied lengths above the surface and/or beyond the apex of the respective flagellar segment so that it can look like a seta if the projection is very long, but unlike a seta it is not articulated and its surface is continuous with the segment.
lower face: Region of the face below the toruli.
lower mesepimeron: Ventral region of the mesepimeron that is sometimes differentiated from an upper mesepimeron by a transepimeral sulcus.
lower mesepisternum: Mostly ventral region of the mesepisternum below the transepisternal line/sulcus, if present, which comprises most of the mesothoracic venter; often termed the mesosternum.
M1 seta: In Signiphoridae, seta projecting from the upper surface of the anterior margin of what is called the marginal vein in signiphorids, which, if present, is basal to seta M5.
M2 seta: In Signiphoridae, basal-most seta beyond seta M5, which projects from the upper surface of the anterior margin of what is called the marginal vein in signiphorids.
M2b seta: In Signiphoridae, seta projecting from the upper surface of the anterior margin of

what is called the marginal vein in signiphorids, which, if present, is beyond seta M2 and basal to seta M6.

M3 seta: In Signiphoridae, seta projecting from the upper surface of the anterior margin of what is called the marginal vein in signiphorids, which is beyond seta M6 and basal to seta M4.

M4 seta: In Signiphoridae, apical-most seta projecting from the upper surface of the anterior margin of what is called the marginal vein in signiphorids.

M5 seta: In Signiphoridae, basal-most seta projecting from the upper surface of the posterior margin of what is called the marginal vein in signiphorids.

M6 seta: In Signiphoridae, if present, apical-most seta projecting from the upper surface of the posterior margin of what is called the marginal vein.

macrochaeta: (pl. macrochaetae) In Mymaridae, long, stout setae that have sockets and project forward from the dorsal surface of the marginal vein; see also hypochaeta and microchaeta.

malar carina / keel / ridge: A strong carina extending between the lower margin of the eye and the base of the mandible in a similar position as the malar sulcus.

malar depression: A depression immediately above the base of each mandible on the side of the head; sometimes called the adoral depression or hollow.

malar distance: See malar space.

malar space: Minimum distance between the lower margin of the eye and the margin of the mouth at the base of the mandible; sometimes called the malar distance.

malar sulcus: Groove or line extending between the lower margin of the eye and the margin of the mouth at the base of the mandible, which differentiates the gena from the lower face; sometimes called the genal sulcus.

mandible: Pair of strongly sclerotized, lateral mouthparts lying between the labrum and labiomaxillary complex, which are used for chewing; normally a mandible is differentiated apically into one or more teeth.

mandibular appendage: Toothed or serrate structure attached to the ventral surface of the mandible of some members of Agaonidae.

mandibular formula: Number of mandibular teeth on the left and right mandible respectively, written in the form of a ratio, for example, 3:2 or 3/2.

mandibular teeth: Angular or denticle-like projections along the apical margin of a mandible.

marginal fringe: See marginal setae.

marginal rim of scutellum: Extreme posterior margin of the scutellum if differentiated by a groove, line, or row of differentiated sculpture (see also frenum).

marginal setae: Fringe of setae that project from around the wing margin in the same plane as the wing membrane.

marginal vein: Portion of the forewing vein complex that is along the leading edge of the wing basal to the stigmal vein; usually measured from the point at which the submarginal vein touches the leading edge of the wing to the point at which the stigmal vein and postmarginal vein unite (sometimes there is a narrow membranous region anterior to the marginal vein and in some families, e.g. Signiphoridae, defined to include what is likely the parastigma of most other chalcids).

maxilla: (pl. maxillae) Paired, ventral sclerite of the mouthparts that forms the lateral portion of the labiomaxillary complex.

maxillary palpus: Finger-like appendage on each maxilla composed of up to five segments.

medial / median: (adv. medially) At or toward the center or midline (middle) of the body or structure.
median (M) setal line: A longitudinal setal line near the middle of the wing (see also median fold).
median carina: Longitudinal, medial ridge on the propodeum.
median fold: A concave longitudinal fold that normally is in the posterior half of the forewing but which is anterior to the cubital fold; sometimes called the mediolongitudinal flexion line (see also median setal line).
median mesoscutal sulcus: A longitudinal groove along the midline of the mesoscutum.
median ocellus: See anterior ocellus.
median vein track: See median (m) setal line.
median ventral lamina / projection: See intervolsellar process.
median ventral projection: See intervolsellar process.
medio-: Prefix meaning toward the midline of the body or structure, e.g. mediolongitudinal.
mediolongitudinal flexion line: See median fold.
mesal / mesad: At or toward the longitudinal midline of the body.
mesepimeron: Posterodorsal portion of the mesopleuron, which is differentiated from the mesepisternum by the mesopleural suture.
mesepisternum: Anteroventral portion of the mesopleuron, which is differentiated from the mesepimeron by the mesopleural suture.
meso-: Prefix that designates structures (except for the wings) of the second segment of the thorax, the mesothorax.
mesolcus: See discrimen.
mesonotum: Dorsal sclerite of the mesothorax, which is almost always divided into an anterior mesoscutum and posterior scutellar-axillar complex by the transscutal articulation.
mesopectus: Term sometimes used for the entire lateral and ventral portion of the mesothorax (see also pleurosternum).
mesopleural suture: Oblique line on the mesopleuron that extends from near the mesocoxa toward the base of the forewing, which divides the mesopleuron into an anteroventral mesepisternum and posterodorsal mesepimeron.
mesopleuron: Pleuron of the mesothorax, which is normally subdivided into an acropleuron or subalar area, a mesepisternum , and a mesepimeron.
mesopleurum: See mesopleuron.
mesopraescutum: See mesoscutal midlobe.
mesoscutal lateral lobe: Paired lateral regions of the mesoscutum that are differentiated from a median midlobe when notauli are visible; sometimes called the scapula.
mesoscutal midlobe: Median or middle region of the mesoscutum that is differentiated from paired lateral lobes when notauli are visible.
mesoscutum: Region of the mesonotum anterior to the transscutal articulation and scutellar-axillar complex.
mesosoma: Middle of the three main body regions of apocritan Hymenoptera, which looks like the insect thorax but is composed of the thorax plus the propodeum; sometimes called the alitrunk.
mesosternal shelf: Ventral surface of the mesothorax between the mesocoxae and an epicnemial

carina, if there is one (see also epicnemium).

mesosternum: Synonymous with mesothoracic venter, that is, used for the ventral portion of the mesopleurosternum below the transepisternal line/sulcus, if such a line is visible. The ancestral mesosternum is hypothesized to be invaginated into the thorax and not externally visible in Hymenoptera, though a mesosternum has erroneously been ascribed to some Encyrtidae and Eupelmidae by some authors.

mesotarsal pegs: Peg-like structures on the ventral surface of one or more of the mesotarsal segments.

mesothoracic spiracle: Paired spiracles on the thorax that are adjacent to each anterolateral margin of the mesoscutum, typically at or near the juncture formed between the mesoscutal margin, the pronotum, and the anterodorsal angle of the prepectus; rarely the mesothoracic spiracle is surrounded by pronotal cuticle when the prepectus is fused with the pronotum; sometimes called the prothoracic spiracle.

mesothoracic venter: Ventral surface of the mesothorax, which is often called the mesosternum.

mesothorax: The middle, normally largest segment of the thorax, which bears the second pair of legs and the first pair of wings of those chalcids with wings.

mesotibial apical pegs: Peg-like structures near the anterior (outer) apical margin of the mesotibia in some chalcids, which are in a similar location and analogous to the protibial comb of the front leg of most chalcids.

mesotrochantinal lobe: Paramedial denticles or lobes that project from the posterior margin of the mesothoracic venter on which the base of the mesocoxa articulates; concealed beneath the coxal base in most chalcids but in most Eupelmidae externally visible as two distinct lobes or as a median plate that is cleft apically (see also trochantinal lobe).

mesotrochantinal plate: Posterior part of the mesothoracic venter that is reflexed dorsally under the bases of the mesocoxae and which normally is hidden.

meta-: Prefix that designates structures (except for the wings) of the last segment of the thorax, the metathorax.

metanotal flange: The thin, blade-like extensions of the dorsellum or postscutellum of the metanotum in Elasmidae.

metanotum: Dorsal sclerite of the metathorax, which is often differentiated into a median dorsellum and lateral, lateral panel of the metanotum.

metapleuron: Pleuron of the metathorax, which usually is triangular or rectangular and unlike the mesopleuron is not normally subdivided.

metascutellum: See dorsellum.

metasoma: The posteriormost of the three main body regions of apocritan Hymenoptera, which looks like the insect abdomen but excludes the first 'true' abdominal segment, the propodeum, which is fused to the thorax; the metasoma includes the second 'true' abdominal segment, the petiole (see also gaster).

metasomal spiracle: The single pair of functional spiracles on the metasoma, which are present on the seventh metasomal or sixth gastral tergum (normally the second last tergum).

metasternal shelf: In Torymidae, a widened anterior region of the metasternum that is visible externally as a more or less horizontal, ventral margin of the metapleuron above the base of the mesocoxa.

metasternum: Sternum of the metathorax, which is mostly concealed under the bases of the

metacoxae and metasoma.

metatentoria: See posterior tentorial pits.

metathoracic spiracle: Paired spiracles of the metathorax, usually not visible in chalcids but when present lying between each mesopleuron and metapleuron, usually near the dorsal margin of the metapleuron.

metathorax: The last segment of the 'true' thorax, which bears the third pair of legs and usually the second pair of wings, and is fused posteriorly to the propodeum (see also mesosoma).

microchaeta: (pl. microchaetae) In Mymaridae, setae on the margin or surfaces of the marginal vein that do not have sockets; see also microtrichia, hypochaeta, and macrochaeta.

micropilose area: Apical or ventral microsetose sensory region of the antennal clava.

microtrichia: (pl. microtrichiae) Short, setae-like spicules on the wing membrane that lack sockets; see also microchaeta.

midlobe of mesoscutum: See mesoscutal midlobe.

mouth cavity: Opening in the head capsule in which the mouthparts are positioned, sometimes called the oral fossa.

mouth margin: Margins of the mouth cavity, which consist of the clypeal margin and paraclypeal margin on the front of the head and the genal margin on the side of the head.

mouthparts: Collective term for the gustatory organs of the head, including the labrum, paired mandibles, paired maxillae, and labium.

mucro: Spine-like process formed by a posteromedial extension of the hypopygium.

multiporous plate sensilla: See longitudinal sensillum.

neck: Anteriorly convergent sloping surface of the pronotum anterior to the collar; sometimes called the collum.

notal membrane: The membranous cuticle that connects the overlapped, dorsolateral portions of the second valvulae or stylet sheath of the ovipositor stylets.

notaular line: See notaulus.

notaulix: See notaulus.

notaulus: (pl. notauli) Paired lines or grooves on the mesoscutum that subdivide the sclerite into a median midlobe and lateral lobes; the notauli, if present, usually originate anteriorly near each mesothoracic spiracle and converge posteriorly, often ending near the inner angles of the axillae if they extend to the transscutal articulation. The notauli are external indications of internal phragmata that separate the dorsolongitudinal and dorsoventral flight muscles (see also parapsidal line).

notum: (pl. nota) The tergum of a thoracic segment.

nucha: Posteromedian region of the propodeum, if the region extends more or less neck-like posteriorly between the metacoxae.

oblique: Slanting in any direction between vertical and horizontal.

oblong: Somewhat longer than broad (compare with elongate).

obsolescent: Very faintly indicated, almost gone.

obsolete: Absent.

occipital carina: An upside-down U-shaped ridge on the back or posterior surface of the head; the occipital carina differentiates the posterior occiput and postgenae from the dorsal vertex and temples and lateral genae (see also genal carina).

occipital foramen: Opening on the posterior surface of the head through which organs of the

head and body are connected; sometimes called the foramen magnum.

occipital margin: Abruptly angled or carinate posterodorsal margin of the head that differentiates a dorsal surface from an abruptly declined posterior surface (see also occipital carina).

occipital suture: In Mymaridae, term used for a groove on the sides and back of the head in a position similar to the occipital carina of many other chalcids, but which extends from the malar sulcus and likely is synonymous with the postgenal sulcus.

occiput: Posterior surface of the head above the occipital foramen.

ocellar area: See stemmaticum.

ocellar triangle: Region of the head delimited by the three ocelli.

ocellar-ocular groove: Term used for a transverse groove between the posterior ocellus and upper margin of the eye in some Eucharitidae (see also vertexal sulcus).

ocellocular line: Minimum distance between a posterior ocellus and eye margin, abbreviated as OOL or OOD.

ocellus: (pl. ocelli) One of typically three bead-like lenses usually arranged in a triangle near the dorsal surface of the head; sometimes referred to as a simple eye in contrast to the compound eye.

olistheter: Term used for the composite tongue-and-groove interlocking mechanism of the first valvulae and second valvulae of the ovipositor stylets, and consisting of the aulax and rhachis, respectively.

ommatidium: (pl. ommatidia) Single sensory cell of a compound eye (see also facet).

OOD: See ocellocular line.

OOL: See ocellocular line.

open linea calva: A linea calva in which the bare band is continuous to the posterior margin of the wing, not being entirely or substantially closed posteriorly by setae; by definition an open linea calva can be an entire linea calva or an interrupted linea calva, but not a closed linea calva.

oral cavity / fossa: See mouth cavity.

orbit: See eye margin.

orthognathous: Position of the head if the long axis is oriented more or less vertically and the mouthparts are directed ventrally; sometimes used as synonym of hypognathous.

outer panel of axilla: See lateral panel of axilla.

outer plate of ovipositor: Anterior, lateral part of the U-shaped last metasomal tergum, which articulates anteriorly with the first valvifer of the ovipositor (see also inner plate of ovipositor and ovipositor sheaths).

oval / ovate / ovoid: Sometimes used for a symmetrical elliptical shape, but more correctly designating an egg shape, i.e. with one narrower and one broader, rounded end (see also lanceolate and spatulate).

ovipositor: Composite term for the egg-laying apparatus of females, which consists of the outer ovipositor sheaths and inner drilling ovipositor stylets, but sometimes used only for the stylets.

ovipositor sheaths: Paired outer protective sclerites surrounding the ovipositor stylets, which are formed from the third valvulae or gonostyli; the term is sometimes used to include the inner plate of the ovipositor but more correctly is the slender apical portion that often is

differentiated from the inner plate by a slight constriction (see also outer plate of the ovipositor).

ovipositor stylets: Inner, drilling structures of the ovipositor; the term is sometimes used only for the actual cutting valves, the second valvulae, and sometimes for the combined second valvulae and interlocked stylet sheath or first valvulae.

para-: Prefix meaning near to, e.g. paramedian.

para-axillary suture: See scutoscutellar suture.

para-mesoscutellar suture: See axillular groove/carina.

paraclypeal margin: Part of the mouth margin on the front of the head lateral to the clypeal margin.

paraglossa: (pl. paraglossae) Outer pair of lobes at the apex of the prementum of the labium, which combined with the glossae form the 'fleshy' ligula.

paramedial / paramedian: (adv. paramedially) Close to the longitudinal midline of the body or structure; synonymous with submedial/submedian.

parameral seta: Long seta that often originates from the apex of the paramere of the male genitalia.

paramere: Posterolaterally differentiated lobe of the phallobase external to the volsellae.

parapsidal line: Differentiated line or band of sculpture anteriorly on each mesoscutal lateral lobe; the parapsidal lines are external indications of the lines of attachment of the dorsoventral flight muscles in the pharate pupa; in much of the early chalcid literature the term parapsidal furrow referred to what is now accepted as the notaulus.

parapside: See mesoscutal lateral lobe.

parascrobal area: Region of the upper face between each scrobe and inner margin of the eye.

parascutal carina / flange: The lateral, carinate to flange-like margin of the mesoscutal lateral lobe (sometimes used only for the posterolateral portion of the margin that is recurved toward the transscutal articulation adjacent to the tegula).

parascutellar suture: See axillular groove/carina.

parascutellum: Term used by some authors for the axilla and by other authors for the axillula.

paraspiracular carina: Term used in the Eulophidae for a carinate inner margin of the paraspiracular sulcus (see also postspiracular sulcus and prespiracular carina).

paraspiracular sulcus: In Eulophidae, a longitudinal, diagonal or curved depression or furrow on the propodeum behind the spiracle, sometimes also called the spiracular sulcus (see also postspiracular sulcus).

parastigma: Apical region of the submarginal vein that usually is differentiated because it is abruptly curved, thickened, or separated slightly from the marginal vein, and sometimes projects posteriorly into the disc of the forewing; called the premarginal vein in the Trichogrammatidae.

paratergite: In many Encyrtidae, a narrow sclerite in the membranous area posterior to the cercus between the outer plate of the ovipositor and the syntergum.

pectinate antenna: An antenna that is 'branched' because one or more segments of the funicle have a long projection or ramus; sometimes called a branched or ramose flagellum.

pectus: Term sometimes used for the combined lateral and ventral portions of the mesothorax and metathorax, that is the ancestral pleuron and sternum.

pedicel: Second segment of the antenna, which articulates basally with the scape and apically

with the flagellum; sometimes called the pedicellus.

percurrent: Complete, or continuous throughout the entire structure.

petiolar flange: Flange-like extension of first gastral sternum, which supports the petiole ventrally.

petiolate: Being stalked, i.e. having a narrow, stem-like base or attachment.

petiolate metasoma: A metasoma that is differentiated from the mesosoma by a distinct constriction because of a variously long, tube-like petiole (see also sessile metasoma).

petiole: The second 'true' abdominal segment of a chalcid, which connects the mesosoma and the gaster; the petiole is the first segment of the metasoma and is more or less tube-like when there is a distinct constriction between the mesosoma and metasoma, and band-like when the mesosoma and metasoma are broadly joined.

phallobase: Tube-like structure that surrounds the aedeagus and that posteriorly is usually differentiated into a pair of medial volsellae and lateral parameres.

phallotrema: (pl. phallotremata) The distal opening of the aedeagus through which sperm is released.

phallus: See genital capsule.

phragma: (pl. phragmata) An internal ridge or projection of the body wall to which muscles are attached.

placoid sensilla: See longitudinal sensillum.

plaque: See ventral plaque.

pleuron: (pl. pleura) Sclerite that forms the lateral surface of each of the prothorax, mesothorax and metathorax.

pleurosternum: (adv. pleurosternal) Term sometimes used for the combined lateral and ventral regions of a thoracic segment, particularly the mesothorax though the sternum of the mesothorax is hypothesized to be invaginated and the sternopleural region to be composed entirely of pleural elements (see also mesopectus).

pleurostomal area: A smooth area on the side of the head above the base of the mandible.

plica: (pl. plicae) Sublateral ridge on the propodeum mesal to the spiracle (see also submedian carina of propodeum).

plical carina: See plica.

plical depression: In female Eupelmidae, median or anteromedial depression of the propodeum that may or may not be overlain by a posteriorly protuberant scutellum.

plical furrow: In Eupelmidae, furrow on the propodeum that extends from the posterolateral margin of the propodeal foramen toward the anterior margin of the propodeum and which differentiates the median plical regions from the lateral callar regions; presence of a postspiracular sulcus as well as a plical furrow in some females indicates that the two are not homologous.

plical region: In female Eupelmidae, median portion of the propodeum between the plical furrows or the entire region between the spiracles if there are no plical furrows and the plical region and callar regions are not differentiated.

POD: See posterior ocellar line.

POL: See posterior ocellar line.

post-: Prefix meaning behind or following, e.g. postscutellum.

postalar plate: See lateral panel of axilla.

postcercale: Maximum distance between the metasomal cercus and posterior margin of the syntergum.
posterior: (adv. posteriorly) Toward or at the hind (rear, back) end of the body or structure.
posterior alar plate: See lateral panel of axilla.
posterior notal wing process: Projection from the ventral margin of the lateral panel of the axilla, which along with the anterior notal wing process adjusts position of the axillary sclerites for proper movement of the forewing during flight.
posterior ocellar line: Minimum distance between the two posterior ocelli, abbreviated as POL or POD.
posterior ocellus: One of two paired ocelli that are lateral to and posterior to the unpaired anterior ocellus when three ocelli are present; sometimes called the lateral ocellus.
posterior scutellum: In Mymaridae, a posterior portion of the scutellum that is differentiated by a transverse line.
posterior tentorial pits: Paired pits sometimes visible on the back of the head near the occipital foramen that are external indications of the posterior tentorial arms.
postero-: Prefix meaning toward the rear end of a structure, e.g. posterolateral.
postfrontal suture: See vertexal sulcus.
postgena: (pl. postgenae) Posterolateral region of the posterior surface of the head below the occipital foramen.
postgenal bridge: Term used for a posteromedian region of the head between the occipital foramen and mouth cavity if undifferentiated except for a median line between the foramen and mouth cavity; in some chalcids a postgenal bridge results from inflection of the postgenae over the gula, but in others it likely results from fusion of the gula with the postgenae (see also hypostomal bridge).
postgenal sulcus: Sulcus on the head that extends posteriorly from the malar sulcus below the eye to the occipital foramen (see also occipital suture).
postmarginal vein: Portion of the forewing vein complex that is along the leading edge of the wing beyond the stigmal vein; measured from the point at which the stigmal vein and postmarginal vein unite, apically to where the vein appears to end.
postoccipital carina: If present, the carina on the back of the head that partially or completely surrounds the occipital foramen.
postocciput: Narrow region on the back of the head between the occipital foramen and postoccipital carina, if there is one.
postorbital carina: A ridge on the gena that extends posteriorly from the malar sulcus below the eye (see also postgenal sulcus).
postpectal carina / flange: A ventral, rim-like posterior margin of the mesothoracic venter anterior to the mesocoxae.
postscutal flange: See axillar carina.
postscutellum: Synonym of dorsellum, but in Elasmidae sometimes used for the central region of the dorsellum that bears the thin, posterolaterally projecting metanotal flanges.
postscutum: See axilla.
postspiracular sclerite: See prepectus.
postspiracular sulcus: In some chalcids, a longitudinal, diagonal, or curved depression or furrow on the propodeum behind the spiracle (see also paraspiracular sulcus).

praescutellum: See axilla.
pre-: Prefix meaning before or preceding, e.g. preapical.
preapical carina of scutellum: See frenal line/sulcus/carina.
preaxilla: The posterior, vertical portion of the mesoscutum below the parascutal carina/flange adjacent to the tegula; the preaxilla is extended posteroventrally into the anterior notal wing process.
precoxal carina / sulcus / suture: These terms have been used by different authors for either the transepisternal line/sulcus or the transepisternal sulcus.
premarginal vein: In Trichogrammatidae, term used for the parastigma.
prementum: Basal portion of the labium, which is connected on either side to the stipes of the maxilla, and which bears the ligula apicomedially and the paired labial palpi apicolaterally.
preorbital carina: Ridge on the face that parallels the inner margin of the eye.
preorbital suture: In Mymaridae, vertical suture that is subparallel with the inner margin of the eye and that forms the inner margin of the preorbital trabecula and lateral margin of the face.
preorbital trabecula: In Mymaridae, the more or less vertical, thickened, often darker band of cuticle adjacent to and subparallel with the inner margin of each eye, which dorsally terminates at the juncture of the transverse trabecula and supraorbital trabecula (see also preorbital suture).
prepectal carina: Carina, when present, that differentiates the ventral margin of each vertical, lateral portion of the prepectus from the lateral margin of the horizontal, ventral prepectal shelf.
prepectal shelf: The ventral, horizontal portion of the prepectus that unites the two lateral, vertical portions of the prepectus, which lies between the posterior margin of the prosternum and the anterior margin of the mesothoracic venter.
prepectus: Sclerite on the side of the thorax between the lateral panel of the pronotum and the mesopleuron; in most chalcids the prepectus looks like separate, more or less triangular sclerites on either side of the thorax, but usually it is at least narrowly continuous ventrally under the procoxae (see prepectal shelf); in some chalcids the prepectus is reduced and difficult to see and in a few it is fused to the pronotum; sometimes called the postspiracular sclerite.
prescutum: See mesoscutal midlobe.
prespiracular carina: Term used in the Torymidae for a carinate inner margin of the postspiracular sulcus of the propodeum (see also paraspiracular carina).
pretarsus: Composite structure consisting of the tarsal claws and arolium, which is attached to the apex of the last or apical tarsal segment; the pretarsus is not counted as a tarsal segment although can be mistaken for one when large.
pro-: Prefix that designates structures of the first segment of the thorax, the prothorax.
prognathous: Position of the head when the long axis is oriented horizontally and the mouthparts are directed anteriorly.
pronotal carina: When present, a transverse ridge on the pronotum that differentiates a neck from the collar.
pronotal sulcus: In Eucharitidae, term used for a median longitudinal groove on the side of the pronotum.
pronotum: Dorsal sclerite of the prothorax, which overlaps the sides of the thorax so as to be

upside-down U-like; the pronotum usually is more or less loosely articulated with the mesothorax (see also lateral panel of the pronotum).

propleuron: Pleuron of the prothorax, usually mostly concealed under the pronotum.

propodeal disc: Term sometimes used for the central region of the propodeum between the spiracles or plicae if present.

propodeal foramen: Posterior opening of the propodeum through which organs of the mesosoma and metasoma are connected.

propodeal spiracle: Paired, typically oval or kidney-shaped, openings on the propodeum, usually near the anterior margin laterally.

propodeum: The first 'true' abdominal segment, which in apocritan Hymenoptera is fused to the thorax as the posteriormost section of the mesosoma.

prosternum: Sternum of the prothorax, which is usually more or less diamond-shaped and mostly concealed under the propleurae and procoxae.

prothoracic spiracle: See mesothoracic spiracle.

prothorax: The anteriormost segment of the thorax, which bears the first pair of legs but no wings.

protibial apical pegs: Peg-like structures near the dorsoapical margin of the protibia (see also).

protibial comb: A row of setae along the anterior (outer), apical margin of the protibia in the area between the calcar and basitarsus (see also mesotibial apical pegs.

protibial spur: Tibial spur of the front leg; in most chalcids the protibial spur is short and straight (inconspicuous and needle-like) when there are 3 or 4 tarsal segments, but relatively robust, curved, and apically cleft (bifid, bifurcate) when there are 5 tarsal segments; sometimes called the calcar.

proximal / proximad: See basal/base.

pygostylus: See cercus.

quadrangular: Having four angles; sometimes used as a synonym of quadrate or specifically for a rectangular shape that is wider than long (compare with quadrate and rectangular).

quadrate: Approximately square in shape (compare with quadrangular and rectangular).

r-m crossvein track: See radio-medial (r-m) setal line.

radial cell: Anteroapical region of the forewing delimited between the postmarginal vein, stigmal vein, and second abscissa of the Radial Sector (RS2) setal line.

radial process: In Trichogrammatidae, basal stub-like portion of the premarginal vein (parastigma) that extends beyond the submarginal vein into the wing membrane.

radial vein: See postmarginal vein.

radicle: Basal, neck-like or tubular constriction of the scape that articulates with the torulus, which can look like a separate antennal segment if long; sometimes called the radicula or radiculus.

radio-medial (r-m) setal line: A setal line that extends longitudinally or posteroapically from the stigma.

Radius (R) setal line: In Trichogrammatidae, a setal line that extends diagonally toward the anteroapical margin of the wing from the stigmal vein anterior to the second abscissa of Radial Sector (RS2) setal line.

ramose antenna: See pectinate antenna.

ramus: Finger-like projection or lobe of a funicular segment.

rectangular: Having four sides, more or less at right angles, and with one dimension obviously longer than the other; sometimes used specifically for a rectangular shape that is longer than broad (compare with quadrate and quadrangular).

retinaculum: The ventrally curved portion of the posterior margin of the forewing, onto which hook the hamuli of the hind wing to couple the forewing and hind wing together during flight.

rhachis: (pl. rhachies) A pair of longitudinal ridges ventrally along the length of the fused second valvulae, which fit into the aulax of each first valvula to form the tongue-and-groove olistheter interlocking mechanism of the ovipositor stylets.

rhinaria: See longitudinal sensillum.

rhomboidal: Diamond shaped.

ring segment: See anellus.

RS1: See first abscissa of Radial Sector (RS1) setal line.

RS2: See second abscissa of radial sector (rs2) setal line.

scape: The first or basal-most segment of the antenna, which articulates with the head by the radicle.

scapula: See mesoscutal lateral lobe.

scapular flange: Region (often slender) of the mesoscutal lateral lobe that is differentiated between the axillae and lateral lobe when the axillae are advanced.

sclerite: Any plate of the body wall bounded by membrane or sutures.

scrobal cavity: See scrobal depression.

scrobal channel: See scrobal depression.

scrobal depression: Depression on the upper face composed of the two scrobes, sometimes called the scrobal cavity or scrobal channel.

scrobal sulcus: Inverted V- or Y-shaped grooves on the upper face of many eulophids in the same position as the scrobes, which unite dorsally and, if inverted Y-shaped, continue dorsally as a median sulcus toward the anterior ocellus (see also frontofacial sulcus).

scrobe: Depression on the upper face immediately above each torulus for reception of the antennal scape, the pair of depressions are often united dorsomedially into a single scrobal depression.

scrobis: See scrobe.

scutal suture: See transscutal articulation.

scutellar suture: See scutoscutellar suture.

scutellar-axillar complex: Region of the mesonotum posterior the transscutal articulation; often simply referred to as the scutellum, but composed of the scutellum and axillae.

scutellum: Posteromedian, usually more or less teardrop or shield-like region of the mesonotum posterior to the transscutal articulation between the axillae.

scutoscutellar suture: Groove or line that separates the axillae from the scutellum (see also transscutal articulation).

second abscissa of Radial Sector (RS2) setal line: In Trichogrammatidae, a setal line that extends diagonally from the uncus toward the anteroapical margin of the wing; in literature on Chalcididae this setal line is designated as the RS1.

second axillary sclerite: One of three axillary sclerites of the forewing; typically a more or less triangular sclerite that articulates ventrally with the dorsal margin of the mesopleuron,

mesally with the first axillary sclerite, and dorsoapically with the base of the submarginal vein.

second branch of cubital vein (CU2) setal line: In Trichogrammatidae, used for a longitudinal setal line near the posterior margin of the wing that is termed the cubital setal line or cubital vein in other chalcids.

second gonapophysis: See second valvula.

second gonocoxa: See second valvifer.

second valvifer: Valvifer or gonocoxa of the ninth abdominal segment, which consists of a basal semicircular sheet and apically prolonged inner plate of the ovipositor, which is terminated by the ovipositor sheaths.

second valvula: Gonapophysis of the ninth abdominal segment, sometimes called the stylet sheath, which forms the dorsal part of the ovipositor stylets; in Chalcidoidea the second valvulae are separate basally for a short distance, where they are connected by the laminated bridge, but distally are fused; the fused portions consist of two asymmetric dorsolateral portions that overlap to a greater or lesser extent and that are connected by notal membrane; the second valvulae interlock ventrally with the cutting first valvulae through the olistheter and articulate basally with the inner surface of each semicircular sheet of the second valvifer.

secondary comb: See protibial comb.

semicircular sheet: Basal, more or less subtriangular or semicircularly expanded portion of the second valvula, which is continued apically as the inner plate of the ovipositor and to which muscles are attached for movement of the ovipositor stylets.

sensilla ampullacea: See capitate peg sensillum.

sensilla placodea: See longitudinal sensillum.

sensory ridge: See longitudinal sensillum.

serrate: Having a saw-tooth like margin.

sessile metasoma: A metasoma that is broadly attached to the mesosoma, that is, without a distinct constriction between the two regions (see also petiolate metasoma).

seta: Hair-like sensory structure that is articulated basally; sometimes called a trichoid sensillum (see also longitudinal sensillum).

setal line: General term for setae that are aligned into a distinct row on the forewing disc.

setal track: See setal line.

side lobe of mesoscutum: See mesoscutal lateral lobe.

simple eye: See ocellus.

spatulate: Spoon shaped (see also lanceolate and oval/ovate/ovoid).

speculum: A bare region of the forewing immediately beyond the basal setal line behind the parastigma (see also linea calva).

spicula: See terminal spine.

spiracle: External opening in the body wall for a tracheal air tube, which forms part of the respiratory system of an insect; in most chalcids at least three sets of spiracles are visible, the mesothoracic spiracle, propodeal spiracle, and metasomal spiracle, as well as sometimes a metathoracic spiracle.

spiracular sulcus of propodeum: See paraspiracular sulcus.

stemmaticum: If encompassed by grooves, a median region on top of the head that bears the ocelli; sometimes called the ocellar area.

sternaular area: Term sometimes used for an anteroventral region of the mesepisternum behind the procoxa, anterior to and below the femoral depression, if delineated by an oblique groove that likely is homologous with the transepisternal line/sulcus (see also epicnemium).
sternaulus: See transepisternal line/sulcus.
sternopleural suture: Term sometimes used for a line or sulcus on the mesothorax that seems to differentiate a pleuron and sternum, thus the term has been used for both the transepisternal line/sulcus and for the ventral part of the acropleural sulcus in chalcids with a greatly enlarged subalar area (acropleuron).
sternum: Sclerite that forms part of the ventral surface of the thorax and abdomen, except for the mesothorax where the mesopleura are thought to meet at the midline or discrimen.
stigma: More or less knob-like enlargement at the apex of the stigmal vein.
stigmal vein: Portion of the forewing vein complex that projects into the wing membrane from the apex of the marginal vein; measured from the point at which the stigmal vein and postmarginal vein unite, apically to where the vein appears to end.
stipes: (pl. stipites) Normally the largest section of the maxilla, which bears the maxillary palpus, galea and lacinia, and which is greatly enlarged in some chalcids.
strigil: Modified first tarsal segment of the front leg, consisting of a ventrobasal emargination, the basitarsal notch, in which there is a row of modified setae, the basitarsal comb, which together with the calcar forms an antennal cleaning organ.
stylet sheath: Term sometimes used for the composite structure of the fused second valvulae.
stylets: See ovipositor stylets.
sub-: Prefix meaning under, near to, or about equal to, e.g. sublateral.
subalar area: A small, often slightly convex dorsal region of the mesopleuron below the base of the forewing; sometimes called the acropleuron, particularly in families where it is enlarged to form most or all of the mesopleuron.
subalar pit: A small 'hole' in the mesopleuron below the base of the forewing, which normally lies between and delimits the posterior margin of the subalar area from the anterodorsal margin of the mesepimeron; the subalar pit is external indication of a phragma.
subantennal grooves / sulci: Paired grooves or lines on the lower face between each torulus and mouth margin.
subcostal scale: See humeral plate.
subcubital fold: A slightly concave fold in the forewing that is adjacent to the posterior margin of the wing behind the cubital fold, which often is indicated only by a line of setae (see subcubital setal line); sometimes called the subcubital vein if pigmented.
subcubital setal line: A longitudinal line of setae on the ventral surface of the wing adjacent to its posterior margin behind the dorsal cubital setal line (see also anal vein (A) setal line as well as subcubital fold).
subcubital vein: See subcubital fold.
subeffaced: See obsolescent.
subgenital plate: See hypopygium.
sublateral: (adv. sublaterally) Close to the lateral margin of the body or structure.
sublateral groove: In Eulophidae, paired longitudinal grooves very close to the sides of the scutellum that differentiate a lateral, usually more or less vertical scutellar region, the axillula, between the groove and the usually posteriorly sloping axilla (see also axillular

groove/carina).

submarginal vein: Basal-most portion of the forewing vein complex that occurs behind the costal cell; measured from the constriction that delimits the humeral plate to the point at which the vein touches the leading edge of the wing apically.

submedial / submedian: (adv. submedially) Close to the longitudinal midline of the body or structure; synonymous with paramedial or paramedian.

submedian area: Anteromedian region of the propodeum bounded laterally by the plicae and often posteriorly by the costula, and sometimes divided into paired regions by the median carina.

submedian carina of propodeum: Longitudinal ridge on both sides of the propodeum near its midline (see also plicae).

submedian groove: Paired longitudinal lines or grooves on the scutellum that are closer to the midline than to the sides (see also sublateral groove); sometimes called the submedian line.

subocellar sulcus: In male Eupelmidae, a vertical line of weakness or more distinct furrow between the anterior ocellus and apex of the interantennal area.

subocular area: In Mymaridae, region of the lower face between the malar sulcus and preorbital suture.

subocular sulcus: See malar sulcus.

subpleural area: See mesosternal shelf.

sulcus: A linear groove on a sclerite that was derived secondarily for a functional reason; often used synonymously with suture because of uncertain homology.

supraclypeal area: Median part of the lower face between the dorsal limit of the clypeus and the toruli.

supracoxal flange: Posteriorly reflexed margin of the callus that projects over the base of the metacoxa.

supraorbital suture: In Mymaridae, suture on the top of the head that parallels the upper margin of each eye and that forms the outer margins of the supraorbital trabecula and vertex.

supraorbital trabecula: In Mymaridae, the thickened, often darker band of cuticle on the top of the head that is adjacent to and parallel with the upper margin of each eye, which anteriorly terminates at the juncture of the transverse trabecula and preorbital trabecula (see also supraorbital suture).

suture: A linear groove on a sclerite that is external indication of the line of fusion of two formerly separate sclerites, but more often is used imprecisely as a synonym of sulcus.

syntergum: Term often used for the last metasomal tergum if this is a composite structure resulting from the fusion of the seventh and eighth metasomal terga; see also epipygium.

tarsal claws: Paired hooked (claw-like) structures projecting from the apex of the last tarsal segment on either side of the arolium of the pretarsus.

tarsal comb: See basitarsal comb.

tarsal segment: One segment of the tarsus.

tarsomere: See tarsal segment.

tarsus: Fifth segment of a leg that basally articulates to the tibia and normally consists of three to five subsegments.

tegula: Small, typically oval sclerite that covers the region of the mesothorax where the forewing and thorax articulate through the axillary sclerites.

temple: Region on the top of the head behind each eye (see also vertex and gena).
tentorial arms: Paired cuticular invaginations within the head that form part of the tentorium, which often are externally visible on the front of the head below the toruli as the anterior tentorial pits and on the back of the head near the occipital foramen as the posterior tentorial pits.
tentorium: Internal, usually more or less H-like endoskeleton of the head that serves as a site for muscle attachment and that braces the head.
tergite: A dorsal sclerite of any segment of the thorax or abdomen when it consists of a single sclerite, often used synonymously with tergum (see also notum).
tergum: (pl. terga) The upper or dorsal surface of any segment of the thorax or abdomen, whether consisting of one or more sclerites (see also tergite and notum).
terminal process of stigmal vein: Term sometimes used for that portion of the stigmal vein that extends beyond the uncus.
terminal spine: Needle-like projection from the apex of the clava; sometimes called the spicula.
third axillary sclerite: One of three axillary sclerites of the forewing; typically an elongate twisted sclerite that articulates distally with the remnants of the anal vein and ventrally with the dorsal margin of the second axillary sclerite.
third valvulae: See ovipositor sheaths.
thorax: (pl. thoraces) The middle of the three main body regions of an insect composed of the prothorax, mesothorax and metathorax; which bear the legs and normally two pairs of wings, sometimes used as synonym of mesosoma.
tibia: Fourth segment of a leg that articulates basally with the femur and apically with the tarsus.
tibial comb: See protibial comb.
tibial spur: One or two longer and sometimes otherwise modified, articulated spines at or near the ventroapical margin of a tibia; the protibia and mesotibia each have a single spur and the metatibia has one or two spurs (see also calcar).
torulus: (pl. toruli) Socket on the head in which the antenna articulates.
trabecula: (pl. trabeculae) In Mymaridae, term used for an H-like pattern of lines on the face and vertex, which consists of a transverse line on the upper face that connects with lines along the upper and inner margins of each eye; the lines are usually darker than the surrounding cuticle because they are thickened regions resulting from inrolled cuticle.
transcutellar sulcus / suture: See frenal line/sulcus/carina.
transepimeral sulcus: Typically a partly transverse groove or line on the mesepimeron that differentiates an upper mesepimeron and lower mesepimeron; when present it is often arched posterodorsally from near the mesocoxa, in which case it can also delimit a trochantinal lobe anterior to the mesocoxa, or it extends diagonally or transversely from the mesopleural suture, but it is quite varied and sometimes is reduced to a single pit.
transepisternal line / sulcus: A line of lighter color, change of sculpture, or more distinct groove on the mesepisternum that extends from the anterolateral corner of the mesocoxa toward the procoxa and, when present, divides the mesepisternum into an upper mesepisternum and lower mesepisternum (see also sternopleural suture).
transoccipital suture: In Mymaridae, a transverse groove extending entirely across the head between the eyes behind the vertexal sulcus.
transscutal articulation: Usually a more or less transverse line of weakness across the

mesonotum at the level of the forewings that differentiates an anterior mesoscutum and posterior scutellar-axillar complex, and that permits flexion of the mesonotum for flight; often called the transscutal sulcus or suture.

transverse: Broader than long, or at a right angle to the longitudinal axis.

transverse suture: In Mymaridae, a horizontal suture between the eyes above the toruli that forms the ventral margin of the transverse trabecula and dorsal margin of the face.

transverse trabecula: In Mymaridae, the horizontal band of thickened, often darker cuticle on the head that extends between each eye below the anterior ocellus and above the toruli, which laterally terminates at the juncture of the supraorbital trabecula and preorbital trabecula (see also transverse suture).

trapezoidal: A four sided shape in which two of the sides are parallel and two are not.

trichoid sensillum: See seta.

trochantellus: Basally delineated region of the femur that often looks like a separate segment similar to the trochanter.

trochanter: Second segment of a leg that articulates basally with the coxa and apically with the femur.

trochantinal lobe: Term sometimes used (especially Eulophidae) for a slender region along the extreme posterior margin of the mesepisternum anterior to each mesocoxa, and not homologous with mesotrochantinal lobe as used in Eupelmidae.

truncate: Cut off squarely, i.e. with the apical, transverse margin straight (compare with emarginate).

uncus: Stub-like vein projecting from the stigma that is directed obliquely toward the leading edge of the wing.

unguis: See tarsal claws.

upper face: Region of the face above the toruli; sometimes called the frons.

upper mesepimeron: Dorsal region of the mesepimeron that is sometimes differentiated from a lower mesepimeron by a transepimeral sulcus.

upper mesepisternum: Mostly lateral region of the mesepisternum differentiated between the mesopleural suture and transepisternal line/sulcus, if present.

valvifer: (pl. valvifers) The basal plates of the ovipositor (see also gonocoxa, first valvifer, and second valvifer).

venation: The complete system of veins of a wing, which in the chalcidoid forewing usually consists of a submarginal vein, marginal vein, postmarginal vein, and stigmal vein.

ventral / ventrad: (adv. ventrolaterally) At or toward the bottom or lower surface of the body or structure (below).

ventral frame of phallobase: The thickened, longitudinal, ventromedial cuticular margins of the phallobase if the phallobase is not continuous ventrally but has a median longitudinal opening.

ventral plaque: Carina or flange along the ventral edge of the scape, which often has a region of pores or other sensory patch.

ventral process: Paired papillae or tubercle-like structures on the ventral surface of the phallobase lateral to the ventral ridge at or near the base of the intervolsellar process.

ventral ridge: Median cuticular thickening of the ventral surface of the phallobase that may be continued posteriorly as the intervolsellar process between the volsellae.

ventro-: Prefix meaning toward the bottom or lower surface of a structure, e.g. ventrolateral.

vertex: Region on top of the head that is behind the anterior ocellus and between the eyes (see also temple).

vertexal sulcus: Transverse groove on the top of the head that extends from the eye just anterior or posterior of the posterior ocellus; sometimes called the occipital sulcus (see also ocellar-ocular groove).

volsella: (pl. volsellae) Posteromedially differentiated lobe of the phallobase that usually has one or more curved spines apically (see also digitus).

volsellar seta: Seta that originates from near the apex of the volsella basal to the digitus of the genitalia of some chalcid males.