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LVI.—*Notes on Fossorial Hymenoptera.*—XIV.
By ROWLAND E. TURNER, F.Z.S., F.E.S.

On the Mutillidæ of Western Australia and Tasmania.

IN these notes on Mutillidæ I have confined myself to the female sex, by which the species must mainly be distinguished in the future. Much confusion is likely to be caused by descriptions of the males before long series are available, the differences between many of the species in the male sex being exceedingly obscure. Although colour-differences are of some importance in the more highly coloured metallic species of N.E. Australia, the males of the West-Australian species can seldom be divided on colour-lines, most being black with more or less white pubescence. Four or five species can be easily distinguished amongst the males collected by me at Yallingup, W.A.; but, seeing that I took over twenty species of females, it is likely that more species are represented among the males.

Key to the West-Australian and Tasmanian Species of
Ephutomorpha.

♀ ♀.

1. With a stout spine or tubercle on each side
near the middle of the lateral margin
of the thorax..... 2.

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- Without large spines on the sides of the thorax 4.
2. With tubercles at the apical angles of the median segment; second dorsal segment black or fusco-ferruginous, with a median spot of white pubescence .. 3.
- Without tubercles at the apical angles of the median segment; second dorsal segment bright red *E. distinguenda*, Sm.
3. Entirely black *E. rugicollis*, Westw.
- Entirely fusco-ferruginous *E. condonensis*, Turn.
4. Head very large, rectangular, prolonged behind the eyes, much broader than the thorax 5.
- Head small, not rectangular or produced behind the eyes, no broader than the thorax 11.
5. Clypeus conspicuously produced into two porrect teeth *E. porrecticeps*, Turn.
- Clypeus not produced into porrect teeth . 6.
6. Antennal tubercles produced into acute spines or a lamelliform bilobed projection 7.
- Antennal tubercles normal 9.
7. Antennal tubercles produced into acute spines; inner tooth of the mandibles very broad and truncate; abdomen blue or bronze *E. blanda*, Erichs.
- Antennal tubercles produced into a bilobed lamelliform projection; mandibles bidentate, the inner tooth not truncate or broadened; abdomen without metallic colours 8.
8. Thorax almost as broad as long, produced laterally before the middle and armed with a small spine; second dorsal segment black *E. macracantha*, Turn.
- Thorax nearly twice as long as broad, without the lateral spines; second dorsal segment with a ferruginous spot on each side *E. latidentata*, Turn.
9. Head and thorax finely and closely punctured *E. germana*, Turn.
- Head and thorax punctured-rugose 10.
10. Second dorsal segment without ferruginous spots *E. soluta*, Erichs.
- Second dorsal segment with a ferruginous spot on each side *E. soluta*, Erichs., subsp. [*quadriceps*, Sm.]
11. With a longitudinal or large flat depression on the second dorsal segment 12.
- Without a depression on the second dorsal segment 19.
12. The depression large and flat, cordiform . *E. gilesi*, Turn.
- The depression longitudinal 13.
13. Without metallic colours; first dorsal segment not constricted at the apex .. 14.
- Head and thorax bronze, abdomen purple ;

- first dorsal segment distinctly constricted at the apex *E. metallica*, Sm.
14. Entirely black, densely covered with long black hairs; no spots of white pubescence *E. cocytia*, Turn.
- If black, then with spots or bands of white pubescence
15. Colour black or fusco-ferruginous; head covered with white or pale golden pubescence
16. Colour light reddish brown, head without pubescence
16. *E. nitida*, Sm.
16. Thorax long and narrow, twice as long as the greatest breadth
17. Thorax broad, never more than half as long again as broad
17. *E. albosignata*, André, [var.]
17. The depression on the second dorsal segment extending from the base to the apex; two small spots of white pubescence at the apex
17. *E. depressa*, Sm.
- The depression on the second dorsal segment not extending to the apex
18. A single spot of white pubescence at the apex of the second dorsal segment, the depression on the middle of the segment very distinct
18. *E. rubella*, Sm.
- Second dorsal segment with a narrow apical band of white pubescence, the depression on the middle of the segment very small, almost obsolete
19. Head metallic blue or bronze
20. Head without metallic colours, black or red
23. *E. perplexa*, Sm.
20. Abdomen metallic blue or bronze
21. Abdomen without metallic colours, second dorsal segment with a very large fulvous spot on each side
23. *E. cæruleiceps*, Turn.
21. Thorax dark blue, legs wholly testaceous brown
22. Thorax ferruginous red, legs more or less metallic
22. *E. amœnula*, Turn.
22. Abdomen blue
22. *E. picturata*, Turn.
- Abdomen bronze-green
22. *E. æneidorsis*, Turn.
23. Abdomen with metallic colours, at least on the second dorsal segment
24. Abdomen without metallic colours
- 27.
24. Second dorsal segment blue-black, with a large fulvous spot on each side, and without white pubescence
24. *E. postica*, Turn.
- Second dorsal segment without fulvous spots, with a spot or band of white pubescence at the apex
25. Second dorsal segment dark bronze, with a band of white pubescence at the apex. Second dorsal segment with an apical spot of white pubescence
26. *E. virulenta*, Turn.

26. Second dorsal segment bright blue, no spot of pubescence on segments 3-5 *E. æneifrons*, André.
 Second dorsal segment bronze, a spot of white pubescence on each of the three following segments *E. hirtella*, Turn.
27. Almost wholly luteous brown, entirely covered with pale golden pubescence 28.
 Not wholly or mostly brown, or not covered with golden pubescence 29.
28. Abdomen subpetiolate; front not produced between the antennæ *E. lutaria*, Sm.
 Abdomen sessile; front bluntly produced between the antennæ *E. auropilosa*, Sm.
29. First dorsal segment strongly depressed, flattened at the base, and forming a short petiole; mostly ferruginous, head and apical segments of abdomen black, with spots of pale golden pubescence *E. notabilis*, Sm.
 First dorsal segment without a flattened petiole; colour not mostly ferruginous. 30.
30. Second dorsal segment almost wholly fulvous or ferruginous, or with a large fulvous spot on each side 31.
 Second dorsal segment without conspicuous fulvous or ferruginous markings 33.
31. Second dorsal segment almost wholly fulvous or ferruginous 32.
 Second dorsal segment with a large fulvous spot on each side *E. venusta*, Sm.
32. Thorax longer than broad, black; second dorsal segment as broad as long *E. instabilis*, Sm.
 Thorax as broad as long, ferruginous; second dorsal segment much longer than broad *E. fulvodorsalis*, Turn.
33. Second dorsal segment coarsely longitudinally rugose-striate 34.
 Second dorsal segment not coarsely rugose-striate 35.
34. Head nearly as broad as the thorax; apical band of pubescence on second dorsal segment continuous, no basal spots *E. scabrosa*, Sm.
 Head much narrower than the thorax; apical band of pubescence on second dorsal segment broadly interrupted; two spots of pubescence at the base *E. scabrosiformis*, Turn.
35. Abdomen with marks of golden pubescence 36.
 Abdomen with marks of white pubescence 38.
36. Thorax as broad as long 37.
 Thorax longer than broad *E. maculata*, Sm.
37. Head and thorax ferruginous *E. bipartita*, Sm.
 Head and thorax black *E. scandens*, Turn.
38. Second dorsal segment with a median longitudinal band or elongate spot of white pubescence 39.

- Second dorsal segment without a median band or spot 42.
39. The band of pubescence starting from the base and broadly interrupted before the apex, leaving a spot only in the middle of the apical margin 40.
- The band of pubescence starting from the apex and not reaching the base 41.
40. Second dorsal segment with an elongate spot on each side and a transverse spot on each side at the apical margin of white pubescence; head black *E. trilineata*, Turn.
- Second dorsal segment without lateral spots on the sides or apex; head ferruginous *E. albolineata*, Sm.
41. Head finely and closely punctured; anterior angles of thorax not rounded *E. volubilis*, Turn.
- Head coarsely punctured; anterior angles of thorax rounded *E. comes*, Turn.
42. Second dorsal segment with a spot of white pubescence on each side and a spot or band at the apex 43.
- Second dorsal segment without spots on the sides, with median or apical spot or both, or with an apical band 46.
43. Second dorsal segment with a round spot of white pubescence in the middle of the apical margin; hind tibiæ strongly spinose 44.
- Second dorsal segment with an apical band of white pubescence; hind tibiæ with few spines 45.
44. Thorax scarcely longer than broad *E. quadrata*, Sm.
- Thorax longer by at least one-third than broad *E. pacificatrix*, Sm.
45. Head black; the apical band of pubescence not extending beyond the lateral spots *E. excerpta*, Turn.
- Head pale ferruginous, the apical band extending over the whole margin *E. subcristata*, Turn.
46. With a spot of white pubescence in the middle and at the apex of the second dorsal segment, and a spot at the apex of the first segment; thorax elongate-pyriform *E. modesta*, Sm.
- Second dorsal segment without a median spot, thorax not elongate, only a little longer than broad 47.
47. Second dorsal segment with a transverse apical spot of whitish pubescence; segments 3-5 also with median spots 48.
- Second dorsal segment with a narrow apical band of white pubescence; third or fifth segment also with an apical band 49.
48. Head and thorax coarsely rugose-reticulate; thorax black *E. hospes*, Sm.

- Head and thorax punctured; thorax ferruginous..... *E. cordata*, Sm.
49. Third dorsal segment with a white apical band, no band on the fifth; second segment at least as long as broad *E. cordatiformis*, Turn.
- Fifth dorsal segment with a white apical band, no band on third segment; second segment broader than long 50.
50. Thorax anteriorly longitudinally striate; antennæ and legs black *E. strigosa*, Sm.
- Thorax anteriorly coarsely rugose, antennæ and legs ferruginous *E. dorsigera*, Westw.

The Tasmanian species are the following :—

<i>E. blanda</i> , Erichs.	<i>E. amænula</i> , Turn.	<i>E. subcristata</i> , Turn.
<i>E. porrecticeps</i> , Turn.	<i>E. postica</i> , Turn.	<i>E. cordatiformis</i> , Turn.
<i>E. soluta</i> , Erichs.	<i>E. notabilis</i> , Sm.	<i>E. dorsigera</i> , Westw.

E. blanda also occurs in Western Australia. I have not been able to include the Tasmanian species *E. lateralis*, Westw., in the key, not having seen a specimen.

Ephutomorpha porrecticeps, sp. n.

♀. Nigra; mandibulis, clypeo, antennis pedibusque ferrugineis; segmento dorsali secundo nigro-cærulescenti; primo secundoque margine apicali testaceis, albo-pilosis; clypeo porrecto, apice acute bidentato; capite magno, subrectangulari.
Long. 8–9 mm.

♀. Mandibles simple, not bidentate; clypeus strongly porrect, produced at the apex into two strong teeth; second joint of the flagellum more than half as long again as the third. Antennal tubercles small but distinct, a sinuate carina running from them towards the eyes. Head very large, much broader than long, subrectangular, slightly narrowed posteriorly, very closely, but not coarsely, punctured. Thorax not more than half as broad as the head, half as long again as the greatest breadth, rounded anteriorly, sinuate and distinctly narrowed before the base of the median segment, punctured-rugose on the mesonotum, coarsely reticulate on the median segment, the posterior truncation oblique and smooth. Abdomen sessile, a short spine on each side at the base of the first segment beneath; second dorsal segment finely punctured, the punctures more or less confluent longitudinally; pygidial area almost smooth, with a few almost obsolete striæ at the base. Intermediate and hind tibiæ with a few delicate spines on the outer side.

Hab. Eaglehawk Neck, S.E. Tasmania; February. Adelaide, S. Australia.

The structure of the clypeus is very distinct from any other species. In some points this approaches *E. blanda*, Erichs.

Ephutomorpha latidentata, sp. n.

♀. Nigra; mandibulis, clypeo, antennis, vertice, thorace supra, segmento dorsali secundo macula magna laterali utrinque, trochanteribus, tibiis basi, tarsisque ferrugineis; segmento dorsali primo apice late testaceo, argenteo-piloso; secundo apice macula magna bilobata, tertio, quarto quintoque fascia transversa argenteo-pilosis; capite late rectangulari, fronte inter antennas porrecta, lamellata, apice bidentata, thorace angulis posticis bidenticulato.

Long. 7-9 mm.

♀. Head very large, rectangular, fully half as broad again as long, much broader than the thorax, closely punctured, the punctures more or less confluent longitudinally, the front produced between the antennæ into a broad lamella, bilobed or broadly bidentate at the apex, an oblique carina running from the eye to the base of the antennæ. Mandibles with a small but distinct tooth on the inner margin near the apex; second joint of the flagellum twice as long as the third. Thorax coarsely punctured, median segment coarsely reticulate, pleuræ smooth; the thorax and median segment combined nearly twice as long as their greatest breadth, rounded anteriorly, the prothoracic tubercles marked by a minute tooth, narrowed posteriorly and obliquely truncate, a small tooth at each angle above the truncation. Abdomen sessile, the first segment with a tooth on each side at the base beneath; second dorsal segment very closely and finely punctured. Pygidial area distinct, smooth and shining. Intermediate and hind tibiæ with three or four delicate spines on the outer side.

Hab. Yallingup, S.W. Australia; October and November.

This species seems to be the western representative of *E. sanguinceps*, André, from which it differs in the presence of a tooth on the inner margin of the mandibles, the coarser sculpture of the head, the much more strongly produced frontal lamella, and the broader second abdominal segment. The colour is also different, but *E. sanguinceps* differs much in colour in different localities. In the present species the head is often black, without any red on the vertex. The frontal lamella is somewhat similar to that of *scutifrons*, André, but in that species the head is small and much narrower than the thorax.

Ephutomorpha macracantha, sp. n.

♀. Nigra; segmento dorsali primo secundoque linea angusta apicali utrinque, tertioque linea basali utrinque argenteo-pilosis; secundo macula magna elongata utrinque, quarto quintoque macula magna mediana griseo-pilosis; capite magno, subrectangulari, fronte inter antennis producta, bidentata; thorace spina parva laterali utrinque ante medium; area pygidiali longitudinaliter striata.

Long. 11–14 mm.

♀. Mandibles very strongly bidentate at the apex; second joint of the flagellum nearly twice as long as the third. Head very large, subrectangular, slightly narrowed posteriorly, coarsely punctured; a carina from the eyes, which is produced above the base of the scape, forming a porrect tubercle on each side between the antennæ. Thorax and median segment coarsely reticulate, a little longer than the greatest breadth, a spine on each side before the middle, rather abruptly narrowed behind the spine, the anterior angles not strongly rounded, the anterior margin about half as wide again as the posterior, the truncation of the median segment almost vertical. Abdomen sessile, the second segment much broader than long, closely and finely punctured-rugose. Pygidial area longitudinally striated, smooth at the apex. Intermediate and hind tibiæ strongly spinose. There is a spine on each side at the base of the first abdominal segment beneath.

Hab. Yallingup, S.W. Australia; October to December.

This is another species of the *sanguiniceps*-group, and approaches that species very closely in the structure of the head. The differences are marked in the stronger sculpture, the bidentate mandibles, the shape of the thorax, with the small lateral spines and without the small spines at the apical angles, in the striate pygidium, the spinose tibiæ, the form of the patches of pubescence, and the colouring. The relationship to *sanguiniceps* is more remote than that of *latidentata*.

Ephutomorpha blanda, Erichs.

Mutilla blanda, Erichs. Arch. f. Naturges. p. 262 (1842). ♀.

Mutilla concinna, Westw. Arcan. Ent. ii. p. 19 (1844). ♀.

I cannot find any structural difference between these forms, and therefore look upon them as mere colour-varieties of one species, *blanda* occurring more commonly in the south of Tasmania and *concinna* in the north. The species

also occurs on the mainland, and is apparently widely distributed over the southern coast-districts of Australia. I took a single specimen at Yallingup in September.

Ephutomorpha germana, sp. n.

♀. Nigra; mandibulis, antennis dimidio basali, vertice macula mediana, thorace supra, coxis, trochanteribus tibiisque basi ferrugineis; segmento dorsali primo fascia lata apicali, secundo macula bilobata apicali, tertio, quarto quintoque macula transversa testaceis, albo-pilosis; tarsis anticis testaceis.

Long. 4-5 mm.

♀. Mandibles with a small, feebly developed tooth on the inner margin before the apex; second joint of the flagellum a little shorter than the first and third combined. Head large and short, subrectangular, broadly rounded at the posterior angles, finely and closely punctured, the eyes separated from the posterior margin of the head by a distance considerably less than their own diameter, no carina between the eyes and the antennal tubercles. Thorax longer than the greatest breadth, strongly narrowed behind the middle, the anterior angles rounded, closely punctured, coarsely reticulate on the median segment. Abdomen subsessile, the first dorsal segment not constricted, not sunk below the level of the second, with a very short spine on each side at the base beneath; second segment as long as the greatest breadth, finely and very closely punctured, the punctures more or less confluent longitudinally. Pygidial area much longer than broad, very finely and indistinctly striate longitudinally. Hind tibiae with four distinct spines on the outer side. Calcaria pale testaceous.

Hab. Yallingup, S.W. Australia; November.

This is very near *E. rectanguliceps*, André, and is doubtless the western form of that species. The most important differences are the smaller and less massive head, the rounding of the posterior angles of the head and of the anterior angles of the thorax, and the shorter distance between the eyes and the posterior margin of the head in the present species. In both species the colour of the head varies between black and red.

It is quite probable that intermediate forms may be discovered, which will show the distinctions pointed out to be of subspecific importance only; but, as they are structural and constant, it is better to treat them as of specific value at present. The type of *rectanguliceps* was taken near Mackay, Queensland; specimens from Townsville differ in having the

abdomen, with the exception of the middle of the second dorsal segment, testaceous brown.

Ephutomorpha cæruleiceps, sp. n.

♀. Nigra; capite cæruleo, antennis mandibulisque nigris; thorace elongato, supra ferrugineo, pleuris antice ferrugineis; segmento dorsali primo apice testaceo; secundo elongato, macula magna elongata utrinque, segmentoque ventrali secundo omnino fulvo-ferrugineis; segmentis dorsalibus 2-5 macula apicali albo-pilosa; pedibus nigro-cæruleis, tarsis apice ferrugineis.

Long. 8.5 mm.

♀. Head rather small, no broader than the thorax; closely and not very finely punctured, slightly narrowed behind the eyes and strongly rounded at the posterior angles, eyes very prominent, a carina running from below the eye to the antennal tubercle, second joint of the flagellum fully twice as long as the third; mandibles falcate, not bidentate. Thorax about half as long again as the greatest breadth, strongly narrowed beyond the middle, the anterior angles slightly rounded, about half as broad again anteriorly as posteriorly, coarsely punctured-rugose; the posterior slope oblique, the surface coarsely reticulate. First abdominal segment very short, depressed below the second, with a spine on each side at the base beneath, not constricted at the apex; second dorsal segment strongly and closely punctured, much longer than the greatest breadth; sides of the apical segments clothed with long black hairs. Hind tibiæ with one or two delicate spines on the outer side near the apex.

Hab. Kalamunda, S.W. Australia; March.

The pygidium is hidden in the type. The colour of the thorax and abdomen resembles that of *E. venusta*, Sm., but the thorax and second abdominal segment are much longer and narrower in the present species. In general form it approaches *E. rubromaculata*, André, but, in addition to the strong difference in colour, the sculpture is much coarser and the second joint of the flagellum distinctly longer than in that species.

Ephutomorpha picturata, sp. n.

♀. Violacea; capite cæruleo; mandibulis antennisque nigris; thorace rufo-ferrugineo, tarsis ferrugineis; segmentis dorsalibus secundo, tertio, quarto quintoque macula parva apicali albo-pilosa.

Long. 8 mm.

♀. Second joint of the flagellum distinctly longer than

the third; head about as broad as the thorax, rounded feebly at the posterior angles, the eyes further from the mandibles than from the posterior margin of the head, a strong curved carina from below the eyes to the antennal tubercles, the whole head closely punctured-rugose. Thorax fully half as long again as the greatest breadth, the anterior margin straight, the sides slightly convex, narrowed behind the middle, coarsely reticulate, the pleuræ finely punctured, the sides and apex of the median segment coarsely reticulate. Abdomen subpetiolate; the first segment short, distinctly constricted at the apex; second segment about half as long again as the greatest breadth, the sides moderately convex, closely and rather strongly, but shallowly, punctured-rugulose. Pygidial area shining, sparsely punctured, slightly convex. Hind tibiæ with one spine on the outer side situated rather nearer to the apex than to the base.

Hab. Yallingup, S.W. Australia; January.

This species seems to be more nearly allied to *rubromaculata*, André, than to any other, though the colouring and sculpture are very different. The same differences separate it from *cæruleiceps* described above.

Ephutomorpha æneidorsis, sp. n.

♀. Viridi-ænea; thorace rufo-ferrugineo, mandibulis, flagello pedibusque ferrugineis; femoribus æneis; segmento dorsali secundo apice albo-ciliato, cilia in medio interrupta.

Long. 6 mm.

♀. Second joint of the flagellum scarcely as long as the third; eyes convex, situated nearer to the posterior margin of the head than to the base of the mandibles, a low curved carina running from below the eyes to the antennal tubercles; mandibles small, with a very feeble tooth on the inner margin near the apex. Head about as broad as the thorax, very feebly rounded at the posterior angles, closely and rather deeply punctured. Thorax fully half as long again as the greatest breadth, the sides slightly convex, strongly narrowed behind the middle, rather coarsely reticulate, pleuræ sparsely punctured, sides and apex of the median segment reticulate. Abdomen subpetiolate; the first segment short, distinctly constricted at the apex; second segment about half as long again as the greatest breadth, the sides slightly convex, rather finely and not very closely punctured; pygidial area shining, with a few scattered punctures. Hind tibiæ with one spine on the outer side nearer to the apex than to the base.

Hab. Yallingup, S.W. Australia; January.

This is very near *picturata* described above, but the sculpture is finer throughout, especially on the second dorsal segment, the second joint of the flagellum is shorter, the thorax rather more strongly narrowed posteriorly, and the colour and spots of pubescence different.

Ephutomorpha hirtella, sp. n.

♀. Viridi-ænea; mandibulis antennisque fuscis; thorace brunneo-ferrugineo, pedibus testaceo-ferrugineis, femoribus nigris; segmentis dorsalibus 2-5 macula apicali albo-pilosa; secundo macula elongata utrinque sparse albo-pilosa.

Long. 5 mm.

♀. Second joint of the flagellum distinctly shorter than the third. Head strongly rounded behind the eyes, closely but rather finely punctured, a strong carina running from the eyes to the antennal tubercles, the whole head clothed with short fulvous pubescence, a spot of closer white pubescence on each side on the vertex. Thorax scarcely as broad as the head, less than half as long again as broad, the sides almost parallel, slightly narrowed behind the middle, closely but not coarsely punctured; the median segment reticulate and distinctly margined laterally, the whole thorax thinly clothed with pale fulvous pubescence. Abdomen subsessile; the first segment very short and small; second dorsal segment longer than broad, the sides strongly convex, finely and closely punctured, thinly clothed with greyish hairs, a sparse elongate patch of white hairs on each side. Pygidial area opaque, with very fine indistinct striæ at the base. Hind tibiæ with a row of slender spines on the outer side.

Hab. Yallingup, S.W. Australia; November and December.

This species seems to be related to *æneifrons*, André, but the second joint of the flagellum is shorter, the second abdominal segment is less coarsely punctured and more convex at the sides, the spots of pubescence are different, also the colour of the head.

Ephutomorpha virulenta, sp. n.

♀. Ferruginea; capite nigro; pedibus fusco-ferrugineis; tarsis mandibulisque testaceis; abdomine viridi-æneo, segmentis apicalibus infuscatis; segmentis dorsalibus primo, secundo, quarto quintoque margine apicali late albo-ciliatis.

Long. 4-6 mm.

♀. Head small, narrower than the thorax, closely punctured-rugose, strongly rounded behind the eyes; second joint of the flagellum no longer than the third; mandibles small, a feeble tooth on the inner margin near the apex; a curved carina from below the eyes to the antennal tubercles; a patch of long white pubescence on each side of the vertex. Thorax a little longer than the greatest breadth, the sides almost parallel, sharply but not strongly narrowed just behind the middle, closely punctured, the median segment coarsely reticulate. Abdomen subsessile; the second dorsal segment very little longer than the greatest breadth, the sides rather strongly convex, closely and rather finely punctured; pygidial area finely longitudinally striated at the base. Hind tibiae with a row of delicate spines on the outer side.

Hab. Yallingup, S.W. Australia; October to December.

Nearly allied to *hirtella* described above, but may be distinguished by the shorter and broader thorax and second dorsal segment, and the different distribution of the bands of pubescence.

Ephutomorpha æneifrons, André.

Ephutomorpha æneifrons, André, Ann. Soc. Ent. France, lxxii. p. 441 (1903). ♀.

The type is from Port Darwin. The species also occurs at Fremantle, W.A. (*J. J. Walker*); Yallingup, W.A., December (*Turner*); and S. Australia (coll. F. Smith). Var. *cupreiventris*, André, from Townsville, seems to be a local race of this, the thorax being more distinctly narrowed posteriorly.

Ephutomorpha formicaria, Fabr.

Mutilla formicaria, Fabr. Syst. Ent. p. 397 (1775). ♀.

Var. *Mutilla auriceps*, Sm. Descr. New Spec. Hymen. p. 201 (1879). ♀.

The type, doubtless taken at Cooktown, is in the Banksian collection, and is identical with specimens taken by me at Cape York. *M. auriceps*, Sm., is a form with golden pubescence on the head, which occurs southwards from Mackay. The species referred to as *formicaria* by André (Ann. Soc. Ent. France, p. 432, 1903) is a different species, which I have subsequently (Proc. Zool. Soc. London, 1910) described as *E. gilesi*.

Ephutomorpha subcristata, sp. n.

♀. Pallido-ferruginea, aureo-pilosa; abdomine nigro; segmento primo dorsali fascia apicali testacea; secundo macula magna

utrinque fasciaque angusta apicali; tertio, quarto quintoque macula mediana albo-pilosis.

Long. 7 mm.

♀. Second joint of the flagellum small, a little shorter than the third; mandibles strongly incised on the outer margin near the base. Head small, narrowed in front of the eyes, rounded behind the eyes, which are prominent and situated much nearer to the posterior margin of the head than to the base of the mandibles; a distinct carina from the eye to the antennal tubercle. Head and thorax rather closely punctured, more coarsely on the median segment than elsewhere, and thickly covered with rather long pale golden pubescence. Thorax about one-third longer than the greatest breadth, the anterior angles very slightly rounded, the sides nearly parallel, strongly narrowed behind the middle, the posterior margin only a little more than half as wide as the anterior. Abdomen subsessile; the second segment much longer than broad, finely and closely punctured, the punctures more or less confluent longitudinally. Pygidial area very finely punctured at the apex, the base concealed by pubescence. Hind tibiae with four distinct spines on the outer side.

Hab. Eaglehawk Neck, S.E. Tasmania; February.

Related to *E. mackayensis*, André, in the shape of the head, the incision of the mandibles, and the pale golden pubescence, but differs in the shorter second joint of the flagellum, the much stronger narrowing of the thorax posteriorly, the very different distribution of the spots and bands of white pubescence on the abdomen, and the longer second segment.

Ephutomorpha excerpta, sp. n.

♀. Nigra; thorace, mandibulis, coxis trochanteribusque ferrugineis; pedibus antennisque fusco-ferrugineis; segmento dorsali primo margine apicali testaceo; segmento dorsali secundo macula elongata utrinque fasciaque apicali lata, tertio, quarto quintoque macula transversa apicali albo-pilosis.

Long. 4.5 mm.

♀. Mandibles with a small blunt tooth on the inner margin near the apex; second joint of the flagellum no longer than the third. Head small, closely and not coarsely punctured, narrower than the thorax, broadly rounded at the posterior margin, a curved carina from below the eyes to the antennal tubercles. Thorax a little longer than the greatest breadth,

the sides very feebly convex, the anterior angles not rounded, very slightly narrowed posteriorly, rather deeply punctured, the punctures more or less confluent longitudinally, median segment coarsely reticulate. Abdomen subsessile, the first segment not constricted at the apex; second segment a little longer than broad, convex at the sides, very closely punctured; pygidial area smooth. Hind tibiæ with a row of four spines on the outer side.

Hab. Yallingup, S.W. Australia; November and December.

This is near *darwiniana*, André, and *labeculata*, Turn., but the thorax is much shorter and broader than in the former, and the sculpture much coarser than in the latter. The apical band of pubescence on the second dorsal segment is reduced to a spot in *darwiniana*, extends over the whole breadth between the lateral spots in *excerpta*, and along the whole apical margin in *labeculata*. *E. pacificatrix*, Sm., is a larger species, and has a double row of spines on the hind tibiæ.

Ephutomorpha trilineata, sp. n.

♀. Nigra; thorace ferrugineo; segmento dorsali primo fascia angusta apicali, secundo maculis tribus elongatis basalibus usque ad mediam porrectis, maculisque tribus transversis apicalibus, tertio, quarto quintoque macula apicali albo-pilosis.

Long. 8–10 mm.

♀. Mandibles bidentate at the apex, the inner tooth short; second joint of the flagellum nearly as long as the first and third combined. Head small, much narrower than the thorax, broadly rounded behind the eyes, covered with pale golden pubescence which conceals the sculpture; eyes strongly convex, situated nearer to the posterior margin of the head than to the base of the mandibles. Thorax closely and not very coarsely punctured, the median segment coarsely reticulate, thinly covered with pale golden pubescence, distinctly longer than the greatest breadth, the anterior margin feebly arched, gradually narrowed posteriorly, the anterior margin less than half as broad again as the posterior, the pleuræ smooth, the posterior truncation almost vertical, the surface smooth. Abdomen subsessile, the first segment very short, but not narrow, the second dorsal segment finely and closely punctured, longer than the greatest breadth, the sides moderately convex; pygidial area broad, smooth and shining at the apex, opaque and finely shagreened at the base. Hind tibiæ with two rows of long

spines on the outer side, basal joint of hind tarsi with a dense scopa beneath.

Hab. Yallingup, S.W. Australia; November and December.

This is a robust species, somewhat allied to *strigosa*, Sm., and *quadrata*, Sm., but differing in the spots of pubescence on the abdomen. The thorax is a little longer than in *quadrata*, and the first dorsal segment broader.

Ephutomorpha cordatiformis, sp. n.

♀. Nigra; thorace pedibusque ferrugineis, pleuris antice nigris; mandibulis basi flagelloque fusco-ferrugineis; segmentis dorsalibus secundo tertioque apice albo-ciliatis.

Long. 3-6 mm.

♀. Second joint of the flagellum no longer than the third. Head no broader than the thorax, rounded at the posterior angles, punctured-rugose, the arched carina from the eye to the antennal tubercle rather indistinct. Thorax a little longer than the greatest breadth, the sides slightly convex, rather abruptly and very strongly narrowed behind the middle, closely and deeply punctured, many of the punctures confluent longitudinally, pleuræ more sparsely punctured, median segment reticulate, the sculpture spreading on to the surface of the truncation. Abdomen sessile; first segment broad and not very short; second dorsal segment about as broad as long, the sides only slightly convex, closely but not coarsely punctured-rugose; pygidial area broad, finely granulate. Hind tibiae with two rows of spines on the outer side, the spines often short and not very distinct.

Hab. Eaglehawk Neck, S.E. Tasmania; February.

This is nearly allied to *E. cordata*, Sm., differing in the much coarser sculpture of the head, thorax, and second dorsal segment, and in the apical bands of pubescence on the second and third dorsal segments, which in *cordata* are represented by large spots on the middle of the apical margin. The thorax is much more strongly narrowed posteriorly than in *E. edmondi*, André, which is otherwise very closely related, though differing in the pubescence on the abdomen.

Ephutomorpha comes, sp. n.

♀. Nigra; flagello subtus fusco-ferrugineo; thorace rufo-ferrugineo; segmento dorsali primo fascia apicali, tarsisque testaceis; segmento dorsali secundo fascia lata longitudinali, tertio, quarto quintoque macula transversa albo-pilosis.

Long. 7-8 mm.

♀. Second joint of the flagellum distinctly longer than the third; head closely and rather strongly punctured, a carina from the eyes to the antennal tubercles, eyes moderately convex, situated about as far from the posterior margin of the head as from the base of the mandibles; head small, broadly rounded from a little behind the eyes. Thorax coarsely punctured, the punctures more or less confluent longitudinally, a little longer than the greatest breadth, broadly pyriform, the anterior margin broadly arched, median segment coarsely reticulate, the posterior slope almost vertical and rugose. Abdomen subsessile; second dorsal segment finely longitudinally punctured-rugulose, longer than broad, the sides moderately convex. Pygidial area broad, finely longitudinally striated. The longitudinal band of white pubescence on the second dorsal segment reaches from the apex nearly to the base. Hind tibiae with two rows of spines on the outer margin.

Hab. Yallingup, S.W. Australia; November and December.

This is somewhat allied to *trilineata* described above, but is a smaller and less massive species, with a shorter, more pyriform thorax, and very different arrangement of the white pubescence on the abdomen. *E. cordata*, Sm., is perhaps a nearer ally, but is without the longitudinal band on the second dorsal segment, and has much finer sculpture. *E. cordata* was described from Adelaide specimens, but also occurs at Yallingup in November and December. The female of the species identified by André as *E. morosa*, Westw., is nearer to this than to any other West Australian species, though in that Queensland form the thorax is never ferruginous and the front more coarsely rugose. But *morosa* was described from West Australia, and I doubt if it is identical with the Queensland form. Errors of identification in species described from the male only are very excusable, especially when the type is not available, the black species being extremely difficult to separate.

Ephutomorpha volubilis, sp. n.

♀. Nigra; mandibulis, antennis, thorace pedibusque fusco-ferrugineis; segmento dorsali primo margine apicali tarsisque testaceis; segmento dorsali secundo fascia lata longitudinali basin haud attingente, tertio, quarto quintoque macula transversa alba-pilosis.

Long. 4 mm.

♀. Second joint of the flagellum no longer than the third; head no broader than the thorax, strongly rounded

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posteriorly, rather finely and not very closely punctured, with an arched carina from below the eyes to the antennal tubercles. Thorax scarcely longer than the greatest breadth, rounded at the anterior angles, not very strongly narrowed posteriorly, punctured-reticulate, the median segment reticulate, rugose on the surface of the posterior truncation, the pleuræ smooth. Abdomen sessile; the first segment very short; second dorsal segment very finely and closely punctured, almost as broad as long, the sides rather strongly convex; pygidial area smooth at the apex, with a few longitudinal striæ at the base. Hind tibiæ with two rows of spines on the outer side.

Hab. Yallingup, S.W. Australia; November.

This is allied to *E. comes* described above, but is a much smaller species, the thorax is less strongly narrowed posteriorly, and the sculpture finer.

Ephutomorpha scabrosiformis, sp. n.

♀. Nigra; thorace antennisque fuscis; pedibus fusco-ferrugineis; segmentis dorsalibus secundo, tertio quartoque macula parva basali utrinque albo-pilosa, secundo crasse longitudinaliter striato; segmento primo dense albo-piloso.

Long. 6 mm.

♀. Mandibles with an ill-defined tooth on the inner margin near the apex; second joint of the flagellum scarcely longer than the third. Head small, narrower than the thorax, coarsely punctured-rugose, with sparse whitish pubescence, broadly rounded posteriorly; the eyes strongly convex, nearer to the posterior margin of the head than to the base of the mandibles, no distinct carina between the eyes and the antennal tubercles, but one or two small spines on the usual line of the carina, a larger spine on the outer side of the antennal tubercles. Thorax coarsely rugose-reticulate, as long as the greatest breadth, the anterior margin straight, the sides rather strongly convex, moderately narrowed behind the middle, the surface of the posterior truncation smooth. Abdomen subsessile, first segment short, not constricted at the apex, second coarsely and rather irregularly longitudinally striated; pygidial area sparsely punctured. Hind tibiæ with two rows of spines.

Hab. Yallingup, S.W. Australia; December.

This is easily distinguished by the sculpture of the second dorsal segment from all the allied species except *scabrosa*, Sm., to which it is closely allied, differing in the much smaller and narrower head and the much shorter second joint of the flagellum.

Ephutomorpha fulvodorsalis, sp. n.

♀. Ferruginea; abdomine pedibusque nigris; segmento abdominali secundo tarsisque fulvis; area pygidiali lata, longitudinaliter striata.

Long. 6 mm.

♀. Head small, narrower than the thorax, coarsely and closely punctured, the posterior angles rounded, eyes prominent, a carina running from below the eye to the antennal tubercles, antennæ stout, the second joint of the flagellum scarcely as long as the third, mandibles with a small tooth on the inner margin near the apex. Thorax scarcely longer than the greatest breadth, strongly narrowed beyond the middle, strongly rounded at the sides anteriorly, coarsely and closely punctured. First dorsal segment not sunk below the level of the second, not constricted at the apex, very sparsely punctured, and thinly clothed with long grey hairs; second segment closely and rather strongly punctured, much longer than broad, not much broadened in the middle; third and fourth segments with a thin cilia of long grey hairs; pygidial area large, as broad as long, finely longitudinally striated. Hind tibiæ with a few short spines near the apex.

Hab. Yallingup, S.W. Australia; October.

In structure this species somewhat approaches *E. jucunda*, Sm., but is conspicuously different in colour and sculpture, also in the larger pygidial area.

Ephutomorpha scandens, sp. n.

♀. Nigra; tibiis intermediis et posticis, tarsisque ferrugineis; capite thoraceque sparse griseo-pilosis, abdomine sessili, segmento dorsali secundo in medio late aureo-piloso, apice anguste albo-piloso, tertio, quarto quintoque macula mediana albo-pilosa; thorace rotundato, longitudine latiore.

Long. 2.5-6.5 mm.

♀. Second joint of the flagellum a little shorter than the third; a carina running from the eye to the antennal tubercle. Head small, narrowed in front of the eyes, rounded posteriorly, the eyes prominent, much nearer to the posterior margin of the head than to the base of the mandibles. Head and thorax closely punctured, the thorax distinctly broader than long, strongly rounded at the sides, narrowed, but not very strongly, posteriorly. Abdomen sessile, the first dorsal segment sunk below the level of the second, which is broader than long and very finely and

closely punctured; pygidial area large, opaque, ovate, obscurely longitudinally striated at the base. Hind tibiae somewhat thickened, with two rows of spines on the outer side.

Hab. Yallingup, S.W. Australia; November and December.

This species differs in its habits from most of the *Mutillidæ* found at Yallingup, nearly all my specimens having been taken by sweeping foliage, not running on sand.

In structure it approaches *E. auropilosa*, Sm., but differs in colour and in the much broader second abdominal segment. The colour somewhat resembles that of *E. jucunda*, Sm., but that species only has a single row of spines on the hind tibiae, the thorax is more strongly narrowed posteriorly and the second dorsal segment much longer than in the present species. As well as *E. auropilosa*, *E. bipartita*, Sm., belongs to this group, but is a much larger and differently coloured species.

Ephutomorpha argenteolineata, André.

Ephutomorpha argenteolineata, André, Zeitschr. Hym. Dipt. v. p. 271 (1905). ♀.

Ephutomorpha perelegans, Turn. Proc. Zool. Soc. London, p. 257 (1910). ♀.

As has been pointed out to me by Mons. André, these are undoubtedly identical. The type of *argenteolineata* was taken at Port Darwin, that of *perelegans* at Townsville, showing a wider range than is usual in the smaller species of *Ephutomorpha*.

Ephutomorpha quadriceps, Sm.

Mutilla quadriceps, Sm. Descr. New Spec. Hymen. p. 206 (1879). ♀.

Hab. Lower Plenty, Victoria (*Bakewell*); Yallingup, S.W. Australia. October to December.

Evidently a wide-ranging species in the southern portion of Australia. It seems to me to be the continental subspecies of the Tasmanian *E. soluta*, Erichs., differing in the presence of a dark red spot on each side of the second dorsal segment, and in the distinctly broader pygidial area. The head is usually black in both forms, but is red in a variety of *quadriceps*.

Ephutomorpha amœnula, sp. n.

♀. Viridi-cyanea; abdomine viridi-æneo; mandibulis, scapo

pedibusque pallide ferrugineis; thorace elongato, latitudine fere duplo longiore; segmento dorsali secundo apice albo-ciliato. Long. 4-6 mm.

♀. Mandibles with a short tooth on the inner margin near the apex; second joint of the flagellum a little longer than the third, but much shorter than the first and third combined; head closely punctured, small, broadly rounded behind the eyes, a low carina running from the eyes to the antennal tubercles, eyes strongly convex. Thorax nearly twice as long as the greatest breadth, not quite as broad as the head, closely and rather strongly punctured, coarsely reticulate on the median segment, the sides nearly parallel, rather abruptly but not strongly narrowed at the base of the median segment. Abdomen subpetiolate; the first segment small, very feebly constricted at the apex, with an interrupted testaceous band at the apex; second segment closely punctured, much longer than broad, very slightly convex at the sides; the three following segments with a small patch of white pubescence in the middle; pygidial area smooth and shining. Hind tibiae hairy, the outer side without spines.

Hab. Eaglehawk Neck, S.E. Tasmania; February.

This somewhat resembles *E. amœna*, André, but the thorax in that species is much broader anteriorly, more strongly pyriform, and more coarsely punctured; the hind tibiae are armed with spines on the outer side; the second segment more convex at the sides, and the pygidial area broader and less distinctly defined. *E. nigroænea*, Sm., is also somewhat similar in colour, but has the eyes much less convex, the sculpture of the head and thorax much coarser, the shape of the thorax different, and the pygidial area almost absent, in addition to other differences.

Ephutomorpha postica, sp. n.

♀. Nigra; antennis, tibiis tarsisque pallide ferrugineis; vertice rufo-ferrugineo; segmento dorsali secundo nigro-cæruleo, macula magna utrinque ochracea.

Long. 6 mm.

♀. Second joint of the flagellum distinctly longer than the third. Head small, no broader than the thorax, finely and very closely punctured-rugose, the posterior angles not strongly rounded, eyes strongly convex, situated as far from the posterior margin of the head as from the base of the mandibles, the arched carina from below the eyes to the antennal tubercles very indistinct; mandibles bidentate.

Thorax elongate-pyriform, finely rugose, about twice as long as the greatest breadth, the anterior angles strongly rounded, narrowed from the middle, the median segment reticulate, depressed, but not truncate; pleuræ smooth. Abdomen subpetiolate; the first segment short, much narrower than the second, not constricted at the apex; second dorsal segment finely longitudinally rugose, about half as long again as the greatest breadth, strongly convex at the sides; third dorsal segment with a transverse band of greyish pubescence; pygidial area concealed by long pale pubescence. Hind tibiæ covered with short pubescence, with one or two delicate spines on the outer side near the apex.

Hab. Eaglehawk Neck. S.E. Tasmania; March.

Taken on a fallen log, in dense scrub. This is not very nearly allied to any other species known to me.

LVII.—*Notes on the Hymenoptera in the Collection of the British Museum, with Descriptions of new Species.* By GEOFFREY MEADE-WALDO, M.A.

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V.

IN the following paper the descriptions of several new species of Apidæ and Diploptera are published, as well as notes on known species. Most of the new material is from collections recently formed by Mr. G. E. Bryant in Sarawak and Penang and by Mr. R. E. Turner in Australia. Mr. Turner's fine collections from Australia, the whole of which are now at South Kensington, are well known to all Hymenopterists. A new species of that curious Eumenid genus *Macrocalymma* is a very interesting discovery.

Mr. Bryant, who spent some nine months in Sarawak, was primarily occupied in collecting beetles, but at my request collected such bees and wasps as he encountered in his excursions. The *Thrincostoma* and *Caliowys* were two captures of especial interest, the former as introducing a second species to a genus recorded in the Oriental Region for the first time last year, and the latter as connecting the two sexes of a species in which sexual dimorphism is very strongly developed.