

## THE BEES OF AUSTRALIA.

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(Continued from vol. vii., part i., p. 54.)

## HALICTIDAE, subfamily HALICTINAE.

The Halictidae are spread all over the world, wherever it is possible for bees to exist, and the number of species is enormous. Most of them have been referred to the genus *Halictus*, but this may be divided into a number of subgenera, and there will no doubt be an increasing tendency to elevate these to generic rank.

## NOMIOIDES Schenck.

A genus of small bees, found in Europe, Asia and Africa, with one species extending to Australia. In the Australian fauna it is easily known by its small size (female about 5 mm. long, male about 4 mm.), the head and thorax shining bluish-green, the abdomen piceous, with yellow markings. The female clypeus is light yellow, with two broad black bars, which are sometimes practically obsolete.

*Nomioides perditella* Cockerell.

Described from the female, taken in the Mackay district by Turner. In 1925 (Stett. Ent. Zeit., 86, p. 71) Bluthgen gave an elaborate description of the male. Friese, in 1924, redescribed it as *Halictus (Nomioides) obliquus*. Its nearest relative is *N. valdezi* Cockerell, from the Philippine Islands.

## PARASPHECODES F. Smith.

This genus was established by Smith in 1853, who remarked that the species resembled *Sphecodes* in a general way, but the females had the characteristic caudal rima or furrow of *Halictus*. The males, as is common in *Halictus*, have an elongated abdomen, with the clypeus produced and yellow at the apex. The venational character (first recurrent nervure meeting second intercubitus) relied on by Smith is not constant. The hind spur of the hind tibiae in the female lacks the prominent spines or teeth often seen in *Halictus*. It was considered that all the species had the abdomen red or reddish, but it now appears that there is a series of entirely black forms, which can by no means be separated generically from the others.

Thus we are compelled to conclude that *Parasphecodes* has very little basis as a genus distinct from *Halictus*; but as it is confined to Australia, with a long series of species, and has a characteristic appearance, it seems best to retain it. Smith described a number of species, using anagrams of the word *Halictus* for the names. Dr. Reinhold Meyer revised the genus, recognising 51 species, in Archiv. f. Naturgeschichte, December, 1920. He gave tables for the determination of the species, but actually he had only a small series before him, and had to depend mainly on the literature. At present we know 17 species from Queensland, one (*P. vau* Ckll.) from N.W. Australia, two from W. Australia, five from South Australia, nine from New South Wales, 27 from Victoria, 24 from Tasmania, and three from Australia without more definite locality. These statistics require modification to the extent of stating that two of the Victorian species extend up the coast into Queensland. In general, however, the species seem to be of limited range. The great concentration of species in Victoria and Tasmania suggests that the genus belongs to the ancient Australian fauna, in this respect contrasting strongly with *Nomioides*. The genus is a difficult one to study, owing



to the large number of closely allied species, and the fact that so many are known only in one sex. Much larger series than have yet been collected, with field observations, are necessary in order to put the subject on a sound basis.

I have proposed (1930) a subgenus *Aphalictus* for *P. bribiensis* Ckll. and *P. bribionsiformis* Ckll. The females have a brown abdomen, with bosses on the first two tergites.

The following key to the species in my collection may be used to supplement those already published:—

- Abdomen black, or (*P. atrorufescens*) so dark reddish as to appear black . . . . . 1.
- Abdomen black, slightly stained with red; mesothorax red . . . . . *callomelittinus* Ckll.
- Abdomen distinctly red, at least in part . . . . . 9.
- 1. Area of metathorax large, without plicae . . . . . 2.
- (Area large, with very fine striae on basal half . . *paramelaenus* Ckll. = *tamburinei* Fr.)
- Area of metathorax with plicae, at least at sides . . . . . 4.
- 2. Area shining on apical half; tegulae very dark . . . . . *atronitens* Ckll., females.
- Area dull . . . . . 3.
- 3. Larger; tegulae black or almost . . . . . *plorator* Ckll., female.
- Smaller; tegulae red . . . . . *insculptus* Ckll., female.
- 4. Male; clypeus chrome yellow, except a large quadrate black mark on each side above; antennae very long, entirely black; second sternite elevated . . . . . *cervicalis* Ckll.
- Male; clypeus with a broad pale yellow apical band . . *infrahirtus* Ckll.
- Females . . . . . 5.
- 5. Abdomen very dark red on first three tergites; first recurrent nervure not meeting second intercubitus; second abdominal sternite with a large conical tubercle . . . . . *atorufescens* Ckll.
- Abdomen broadly dark reddish on first two tergites apically; first recurrent nervure meeting intercubitus . . . . . *fulviventris* Frieze.
- Abdomen black . . . . . 6.
- 6. Mesothorax with white hair; shining rim of metathoracic area continuous, not evidently depressed or broken in middle; stigma rufous . . . . . *dissimulator* Ckll.
- Mesothorax with black hair . . . . . 7.
- 7. Apical half of abdominal venter with black hair; tegulae black; first tergite with only a very narrow smooth margin. *fumidicaudus* Ckll.
- Apical half of abdominal venter with silvery white hair . . . . . 8.
- 8. Punctures of first tergite, though very fine, going nearly to margin; area of metathorax very short, the plicate part a transverse band; tegulae black; stigma very dark . . . . . *cervicalis* Ckll.
- First tergite with a rather broad apical smooth band; area of metathorax not so short; swollen second sternite very hairy . . . . . *noachinus* Ckll.
- 9. Tegument of scutellum clear red . . . . . 10.
- Tegument of scutellum not red . . . . . 11.
- 10. Mesothorax entirely clear red; first three tergites light red, the others black, contrasting . . . . . *aurantiacus* Ckll.
- Mesothorax more or less dusky or black; abdomen dark red to apex . . . . . *tooloomensis* Ckll.



- (The var. *musgravei* Ckll. has the female head, mesothorax and metathorax entirely black, while the scutellum and postscutellum are clear bright ferruginous; the prothorax is red; abdomen with basal half dark reddish, apical half black.)
11. Scutellum and postscutellum densely covered with fulvous tomentum; abdomen light red, dusky apically; tibiae and tarsi light red or more or less darkened . . . . . 12. (See also *P. vau* Ckll.)  
Scutellum and postscutellum not so covered . . . . . 15.
  12. Area of metathorax dull, weakly sculptured . . . . . 13.  
Area of metathorax apically shining . . . . . 14.
  13. Larger; first three tergites clear to apex . . . . . *bryotrichus* Ckll.  
Smaller; first three tergites dusky apically. *bryotrichus sordidulus* Ckll.
  14. Middle and hind femora clear red, or mid femora dark . . . . .  
. . . . . *basilautus* Ckll.
  15. Thorax above with fulvous hair; tegulae ferruginous; second cubital cell short . . . . . *fultoni* Ckll.  
(*P. cirriferus* Ckll., with fourth and following tergites black, is allied.)  
Hair of thorax above not fulvous . . . . . 16.
  16. Males . . . . . 17.  
Females . . . . . 22.
  17. First tergite black in middle, except at apex . . . . . 18.  
First tergite not black in middle . . . . . 19.
  18. Larger; abdomen conspicuously hairy; first recurrent nervure meets second intercubitus . . . . . *froggatti* Ckll. (topotype.)  
(Compare here *P. perustus* Ckll., from Tasmania; red of abdomen very bright.)  
Smaller; abdomen not hairy; first recurrent nervure reaches third cubital cell; tegulae red . . . . . *rufotegularis* Ckll.  
(Compare *P. tripunctatus* Ckll., with tegulae red; first recurrent nervure meeting intercubitus; a deep sulcus between first and second tergites.)
  19. Area of metathorax hardly sculptured; second sternite elevated into a large low tubercle . . . . . *arciferus* Ckll.  
(Closely allied is *P. fulviventrus* Friese, the abdomen very dark.)  
Area of metathorax coarsely sculptured . . . . . 20.
  20. Second sternite of abdomen elevated into a large mammiform tubercle; first three tergites chestnut red, those beyond black, contrasting . . . . . *hybodinus* Ckll.  
Second sternite not thus tuberculate . . . . . 21.
  21. First tergite somewhat blackened in middle; flagellum red beneath . . . . . *froggatti* Ckll.  
First tergite not at all blackened in middle; flagellum all black. . . . .  
. . . . . *vermiculatus* Ckll.
  22. Second sternite elevated into a conspicuous tubercle; base of abdomen black . . . . . *arciferus* Ckll.  
(Compare *P. fulviventrus* Friese, with a conspicuous tubercle, but abdomen very dark.)  
(In two other species the second sternite is gibbous; they separate thus:  
Abdomen black at base . . . . .  
. . . . . *arciferus* Ckll. (see also *fulviventrus* Friese.)  
Abdomen not at all black at base . . . . . 1.



1. Tegulae pure black; first recurrent nervure meeting intercubitus . . . . . *wilmattae* Ckll.  
Tegulae reddish; first recurrent joining apex of second cubital cell . . . . . *leptospermi* Ckll.)  
Second sternite not elevated into a tubercle . . . . . 23.
  23. Base of abdomen more or less narrowed, the first tergite not shouldered; abdomen reddish brown, not chestnut red; first two tergites with shining bosses laterally; tegulae fulvous (subgenus *Aphalictus*) . . . . . *bribiensis* Ckll.  
First tergite wide, shouldered; the red a chestnut colour. . . . . 24.
  24. Base of abdomen black or strongly blackened . . . . . 25.  
Base of abdomen not blackened . . . . . 28.
  25. Wings very strongly reddened (somewhat so in *latissimus*); tegulae dark rufous . . . . . *wellingtoni* Ckll.  
Wings not reddened . . . . . 26.
  26. First tergite black only in middle; first recurrent nervure reaches second cubital cell well before end; area of metathorax dull, with merely fine rugose sculpture . . . . . *wellingtoni griseipennis* Ckll.  
First tergite very broadly black . . . . . 27.
  27. Much larger; red of the broad abdomen dark; wings rather reddened . . . . . *latissimus* Ckll.  
Smaller; red of the abdomen bright; tegulae rufous . . . . . *excultus* Ckll.
  28. Mesothorax moderately shining in middle; tegulae black; recurrent nervure meeting intercubitus . . . . . *wilmattae* Ckll.  
Mesothorax dull; tegulae usually more or less reddened. . . . . 29.
  29. Tegulae clear fulvous red; wings very red . . . . . *rhodopterus* Ckll.  
(*P. speculiferus* may have the tegulae quite red, but wings not red, and area of metathorax shining apically.)  
Tegulae not thus fulvous red . . . . . 30.
  30. Smaller; second cubital cell narrow or not very broad; area of metathorax shining apically . . . . . *speculiferus* Ckll.  
Larger; second cubital cell very broad . . . . . 31.
  31. More robust; first two tergites dark red, dull . . . . . *lichatus* Smith.  
Less robust; first two tergites clear red, moderately shining . . . . . *leptospermi* Ckll.
- The following key separates some species of the *P. cirriferus* group, with fulvous or ochraceous hair on thoracic dorsum:
- Males . . . . . 1.
  - Females . . . . . 3.
  1. Flagellum red beneath . . . . . *notescens* Ckll.  
Flagellum black . . . . . 2.
  2. Fifth tergite black; black marks at sides of third and fourth tergites; hind tibiae black . . . . . *fultoni* Ckll.  
Fifth tergite reddish; no black marks at sides of third and fourth; hind tibiae dull red . . . . . *rufulus* Friese.
  3. Front and middle tibiae dusky red; fourth tergite dusky red . . . . . *notescens* Ckll.  
Front and middle tibiae black, more or less marked with red. . . . . 4.
  4. Fourth tergite practically black, with red hind margin; third with red hind margin, contrasting with blackish area before it . . . . . *fultoni* Ckll. (type.)  
(In *P. cirriferus* Ckll., the fourth and following tergites are black.)



- Fourth tergite red . . . . . 5.
5. Red of abdomen rather bright chestnut; wings clearer .. *fultoni* Ckll.  
 Red of abdomen dark; wings dark .. *subfultoni* Ckll.
- The following was published in 1910:
- First recurrent nervure entering second cubital cell; flagellum red  
 above and beneath .. *schomburgki* Ckll.
- First recurrent nervure meeting intercubitus .. 1.
1. Tibiae and tarsi red; clypeus partly red (females) or  
 yellow (males) .. 2.
- Tibiae and tarsi mainly dark .. 4.
2. Scutellum and postscutellum densely covered with ochraceous moss-  
 like hair .. 3.
- Scutellum and postscutellum without such hair .. *sextus* Ckll.
3. Abdomen dark reddish, tergites 3 and 4 about the same colour; first  
 tergite with a reversed black V .. *vau* Ckll.
- Abdomen bright chestnut red, in female wholly black beyond third  
 tergite; no V on first tergite .. *basilautus* Ckll.
4. Larger; general colour of thoracic hair ochreous or fulvous ..  
 .. *cirriferus* Ckll.
- Smaller; general colour of thoracic hair white .. 5.
5. Larger; hind legs more hairy .. *froggatti* Ckll.  
 Smaller; hind legs less hairy .. *vulneratus* Ckll.

The following key, based on the types in British Museum, separates Smith's species:

#### Males.

- First recurrent nervure entering basal corner of third cubital cell;  
 size smaller; abdomen red, with only the apex slightly blackish;  
 flagellum entirely black .. *sulthica* Sm.
- First recurrent nervure joining second cubital cell not far from its  
 end .. 1.
1. Flagellum ferruginous beneath; size rather large; a black cloud on  
 third tergite and tergites 4 to 6 all black; area of metathorax  
 coarsely wrinkled .. *altichus* Sm.
- Flagellum entirely black .. 2.
2. Area of metathorax rugose-granular; middle femora very dark. . . .  
 .. *stuchila* Sm.
- Area longitudinally plicate; middle femora clear red .. *hilactus* Sm.
- (*P. talchius* Sm., male, not in the British Museum, was seen at the  
 Hope Museum, Oxford. The area of metathorax has close-set  
 thick obtuse rugae, the sculpture not prominent; abdomen  
 dullish; antennae very long, entirely black; first recurrent  
 nervure falling a little short of second intercubitus; hair of head  
 and thorax above ochreous.)
- (A male *P. hilactus* in the Oxford collection was observed to have  
 a triangular yellow mark on clypeus above the very broad yellow  
 band; area of metathorax with fine striae, and in some lights  
 the appearance of a transverse ridge; abdomen stout, shining  
 between the punctures. From F. Smith's collection.)

#### Females.

- First recurrent nervure entering second cubital cell near apex; red of  
 abdomen quite bright; area of metathorax often without longi-  
 tudinal ridges or wrinkles .. 1.



- First recurrent nervure meeting second intercubitus; red of abdomen darker or duller; area with longitudinal ridges or wrinkles . . . . . 3.
1. Abdomen red, only faintly blackened apically; area dull, without distinct wrinkles or ridges; second cubital cell higher than broad . . . . . *lithusca* Sm.
  - Abdomen with tergites 1 to 3 red, 4 and 5 black . . . . . 2.
  2. Smaller; red of abdomen very bright, hind margins of tergites 1 and 2 darker; clypeus with few large punctures on a shining surface; second cubital cell about as high as broad . . . . . *tuchilas* Sm.
  - Larger; red of abdomen darker, chestnut colour, hind margins of tergites 1 and 2 not darkened; area with a delicate raised sculpture; second cubital cell very broad, broader than high, and nearly as large as third . . . . . *lichatus* Sm.
  3. Larger; abdomen shining very dark chestnut, blackened apically; ridge behind area of metathorax very prominent; second recurrent nervure and third intercubitus much weakened . . . . . *tilachus* Sm.
  - Smaller; abdomen not so dark . . . . . 4.
  4. Area with fine wrinkled ridges; abdomen dull and rather hoary; second cubital cell about square . . . . . *lacthius* Sm.
  - Area with fine straight ridges . . . . . 5.
  5. Wings strongly yellowish . . . . . *taluchis* Sm.
  - Wings clear . . . . . *hiltacus* Sm.

*Parasphecodes adelaidae* Cockerell.

Female about 9 mm. long; in the table of Smith species runs to *P. tuchilas* and *P. lichatus*, but distinct by the very dark and shining abdomen, wherein, as also in the weakened outer nervures, it resembles rather *P. tilachus*. Adelaide; type in British Museum. The following table will also be useful:

- Abdomen smooth and shining; hind legs clear red . . . *adelaidae* Ckll.
- Abdomen less shining; hind legs not red . . . . . 1.
1. Vertex and mesothorax above with much black hair . . . *lichatus* Sm.
  - Vertex and mesothorax not thus . . . . . 2.
  2. Abdomen black beyond third tergite . . . . . *loweri* Ckll.
  - Fourth tergite red . . . . . *tepperi* Ckll.

*Parasphecodes altichus* Smith.

Tasmania. Male only known.

*Parasphecodes anhybodin* Cockerell.

Cheltenham, Victoria (F. E. Wilson). Male about 10 mm. long; allied to *P. hybodin*, but elevation of second sternite much less pronounced, and red of abdomen much darker. They agree in the shining snow-white hair on inner side of hind tarsi.

*Parasphecodes annexus* Cockerell.

Adaminaby, N.S.W. (A. J. Turner). Female a little over 7 mm. long. A table separating this from other species is given in Mem. Queensland Museum, vii. (1922), p. 257.

*Parasphecodes arciferus* Cockerell.

Mordialloc, Victoria (F. P. Spry). The male, from Melbourne (H. Edwards) is described in Psyche, June, 1930, p. 151. The antennae are long and black; legs black.



*Parasphcodes atronitens* Cockerell.

Caloundra, Q. (Hacker). Also Nanango district. Female about 9.5 mm. long; close to *P. plorator*, but wings not so dark, and first two tergites finely punctured.

*Parasphcodes atrorufescens* Cockerell.

Purnong, Victoria (S. W. Fulton). For characters, see table above.

*Parasphcodes aurantiacus* Cockerell.

Brisbane, Q. (Hacker). Known by the entirely orange-fulvous thorax.

*Parasphcodes basilautus* Cockerell.

Kuranda, Q. (Turner); type in British Museum. *Halictus pilicollis* Friese, from Cairns, is a synonym.

*Parasphcodes bribiensiformis* Cockerell.

Bribie I., Queensland (Hacker); type in Queensland Museum. Female resembles *P. bribiensis*, but area of metathorax much larger, subtriangular, with coarse though irregular plicae; tegulae piceous with a red spot (fulvo-testaceous in *P. bribiensis*). Belongs to subgenus *Aphalictus*.

*Parasphcodes bribiensis* Cockerell.

Bribie Island, Q. (Hacker); also Stradbroke I. Type of subgenus *Aphalictus*. Female about 8 mm. long. A table comparing it with similar species of *Halictus* is given in Mem. Queensland Museum, v. (1916), p. 201.

*Parasphcodes bryotrichus* Cockerell.

Cheltenham, Victoria (French). Thorax above with fulvous moss-like hair.

*Parasphcodes bryotrichus sordidulus* Cockerell.

Brisbane, Q. (Hacker). For characters, see table above.

*Parasphcodes callomelittinus* Cockerell.

Melbourne (C. French); also Bribie I., Q. Type in British Museum.

*Parasphcodes carbonarius* (Smith).

Sydney. A black species, described by Smith under *Halictus*.

*Parasphcodes cervicalis* Cockerell.

Eaglehawk Neck, Tasmania (Turner); type in British Museum. Both sexes were taken by Hacker in the National Park, Queensland. The male is described in Mem. Queensland Museum, vii. (1922), p. 258. The male has the mesothorax glaucous; abdomen entirely black.

*Parasphcodes cirriferus* Cockerell.

Victoria (C. French); type in British Museum.

*Parasphcodes contaminatus* Cockerell.

Kuranda, Q. (Turner); type in British Museum. Metathorax and abdomen rufofulvous.

*Parasphcodes dissimulator* Cockerell.

Carrom, Victoria (French). For characters, see table above.

*Parasphcodes excultus* Cockerell.

Magnet, Tasmania (Arthur M. Lea); also Mt. Wellington (R. E. Turner). A table separating this from other species is given in Ann. Mag. Nat. Hist., July, 1914, p. 52.

*Parasphcodes frenchi* Cockerell.

Melbourne (French); type in British Museum. Female about 9 mm. long; abdomen very dark chestnut red, beyond second tergite strongly



blackened, sides of second and third tergites each with a triangular basal patch of white tomentum.

*Parasphecodes froggatti* Cockerell.

Bathurst, N.S.W. (Froggatt); type in British Museum. For characters, see table above.

*Parasphecodes fultoni* Cockerell.

Croydon, Victoria (S. W. Fulton). *Halictus rubriventris* Friese, from Ararat, Victoria, is the same species.

*Parasphecodes fulviventris* (Friese).

Melbourne. Female very close to *P. arciferus*, with the same large tubercle on second ventral segment of abdomen, but larger and more robust, with the abdomen very dark, and the stigma much darker.

*Parasphecodes fumidicaudus* Cockerell.

Stradbroke I., Q. (Hacker); also Bribie Island.

*Parasphecodes gibbosus* (Friese).

Sydney, N.S.W.; in Meyer's table runs to *P. tepperi*, differing (female) by the robust form and black flagellum. *P. speculiferus* has a brighter red abdomen, and entirely different area of metathorax. Friese's male is *P. subrussatus*. See Amer. Museum, Novitates, 343 (1929), p. 15.

*Parasphecodes grandis* Meyer.

Tasmania; type in Berlin Museum. Male 11 mm. long. Tergites 1 to 3 red, the rest black; flagellum clear red beneath; wings somewhat dusky apically.

*Parasphecodes hilactus* Smith.

Swan River, W.A. Male. Smith also reports it from Adelaide. Clypeus yellow at apex; abdomen black beyond third tergite, and first three with fuscous margins.

*Parasphecodes hiltacus* Smith.

"New Holland." Female. Abdomen red, the base and sides with a hoary pubescence.

*Parasphecodes hirtiventris* Cockerell.

Ebor, N.S.W. (A. J. Turner). Related to *P. arciferus* and *P. leptospermi*. Female about 10 mm. long. Fourth tergite entirely black (red in *P. annexus*).

*Parasphecodes hybodinus* Cockerell.

Windsor, Victoria (French). Male about 10 mm. long; first three tergites (except apex of third) bright chestnut red; beyond this the tergites are black, with the hind margins dark brown. A table separating this from other species is given in Ann. Mag. Nat. Hist., February, 1912, p. 225.

*Parasphecodes infrahirtus* Cockerell.

Launceston, Tasmania (F. M. Littler). *Halictus obscuripes* Friese, male from Adelaide, is the same species.

*Parasphecodes insculptus* Cockerell.

Mount Tambourine, Q. (Hacker). For characters, see table above.

*Parasphecodes insignis* Meyer.

Tasmania; type in Berlin Museum. Female 9.25 mm. long; tergites 1 to 3 red, the rest black; wings clear. Falls in Meyer's table next to *P. lichatus*, but with second cubital cell higher than broad.



*Parasphecodes lacthius* Smith.

"New Holland." Female. Abdomen red, first tergite more or less fuscous at base; fourth and following tergites fuscous, with thin hoary pubescence.

*Parasphecodes latissimus* Cockerell.

Bridport, Tasmania (Littler). For characters, see table above.

*Parasphecodes leptospermi* Cockerell.

Brisbane, Q. (Hacker). Female about 9.5 mm. long. Allied to *P. speculiferus*, but known by its large size and black apical tergites. Also near to *P. hybodinus*.

*Parasphecodes lichatinus* Cockerell.

Ararat, Victoria (Davey). Female about 10 mm. long; wings darker than in *P. lichatus*. Apical part of abdomen with black hair dorsally. Flagellum red beneath.

*Parasphecodes lichatus* Smith.

Western Australia. Female. Abdomen red, with the fourth and following tergites black. Thorax strongly and very closely punctured. Taken by Nicholson at Eradu and Kojarena, W.A. Rayment records it from Swan River (L. J. Newman).

*Parasphecodes lithusca* Smith.

Tasmania. Female. Wings reddish-hyaline, clouded apically; legs rufotestaceous.

*Parasphecodes longmani* Cockerell.

Caloundra, Q. (Hacker). Differs from *P. subbrussatus* by the light ferruginous tegulae.

*Parasphecodes loweri* Cockerell.

Adelaide; type in British Museum. For characters, see table above. Female about 9.5 mm. long; first three tergites chestnut red, the others black; the first with a blackish anchor-shaped mark.

*Parasphecodes melbournensis* Cockerell.

Female about 11 mm. long; area of metathorax broad, without a shining rim, its surface dull and minutely roughened, the basal two-fifths covered with little ridges; abdomen bright red, first tergite largely clouded with blackish, extreme apex blackish. Melbourne. Type in British Museum.

*Parasphecodes microdontus* Cockerell.

Melbourne (C. French); type in British Museum. Female about 8 mm. Sides of metathoracic truncation above with a tooth-like projection.

*Parasphecodes minimus* Meyer.

Port Philip; type in Berlin Museum. Male 7 mm. long; tergites 1 to 3 red, beyond that the abdomen is black, except that the fourth has a red band; tergites 1 and 2 are brownish in middle; wings clear.

*Parasphecodes nigrinus* Meyer.

Tasmania; type in Berlin Museum. Male 10.5 mm. long, black, including abdomen. A light mark on clypeus.

*Parasphecodes noachinus* Cockerell.

Ararat, Victoria (W. F. Hill). Female 11 mm. long. In Meyer's table it runs next to the smaller *P. carbonarius*.



*Parasphecodes notescens* Cockerell.

Beaconsfield, Victoria (F. E. Wilson); type in Queensland Museum. Closely related to *P. fultoni*, the male easily distinguished by the flagellum red beneath (all black in *P. fultoni* and in *P. rufulus*), and the female by the red anterior and middle tibiae. Length about 9 mm.

*Parasphecodes perustus* Cockerell.

Mt. Wellington, Tasmania (Turner); type in British Museum. Red of abdomen very bright; tegulae red. A table to separate this from other species is given in Ann. Mag. Nat. Hist., July, 1914, p. 52. Meyer separates it from *P. sextus* and *P. recantans* by the red fourth tergite.

*Parasphecodes plorator* Cockerell.

Melbourne (French); type in British Museum. Also at Croydon, V., and Mt. Wellington, T. It was found at Jenolan, N.S.W., at flowers of *Helichrysum lucidum* by W. P. Cockerell.

*Parasphecodes punctatissimus* Meyer.

Tasmania; type in Berlin Museum. Judging from the description, this seems to be *P. fultoni*.

*Parasphecodes punctatissimus niveatus* Meyer.

Tasmania; type in Berlin Museum. Tergites 2 and 3 with white hair-spots at sides of base; legs all black, except a little yellow on knees.

*Parasphecodes recantans* Cockerell.

Victoria (French); type in British Museum. Male about 8 mm. long. A table separating this from other species is given in Ann. Mag. Nat. Hist., February, 1912, p. 225. Meyer separates it from *P. sextus* by the third tergite dark at end.

*Parasphecodes recessus* Cockerell.

Mt. Wellington, Tasmania (Turner); type in British Museum. Area of metathorax plicate only basally (strongly plicate all over in *P. turneri*). Female about 9 mm. long.

*Parasphecodes rhodopterus* Cockerell.

Launceston, Tasmania (Littler). Female about 8 mm. long; allied to *P. taluchis*, but antennae and legs black.

*Parasphecodes rufitarsus* Rayment.

E. Gippsland. Female 11 mm. long. The hind spurs have short noduliform teeth.

*Parasphecodes rufocollaris* Cockerell.

National Park, Queensland (Hacker). Female about 7.5 mm. long; head and thorax black, but prothorax, tubercles and tegulae bright ferruginous; abdomen dark brownish red stained with blackish, beyond the third tergite practically black. Allied to *P. bribiensis*.

*Parasphecodes rufotegularis* Cockerell.

Launceston, Tasmania (Littler). Male 8.5 mm. long; black, with the broad apical margin of first tergite (extending basad at sides), and the second and third tergites entirely, very bright ferruginous; tegulae bright ferruginous; antennae black.

*Parasphecodes rufulus* (Fries).

Victoria. Male resembles *P. fultoni*, but truncation of metathorax not polished, but sculptured all over, though moderately shining. Tegulae rufous; antennae black.



*Parasphecodes schomburgki* Cockerell.

Adelaide (Schomburgk); type in Berlin Museum. Female about 8.5 mm. long. Meyer comments on this species in his revision.

*Parasphecodes sextus* Cockerell.

Adelaide (Schomburgk); type in Berlin Museum. Male 9 mm. long. Tergites 1 to 3 red; legs partly clear red.

*Parasphecodes solis* Cockerell.

Brisbane (Hacker). Abdomen wholly chestnut red; tubercles entirely black. A table separating this from other species is given in Mem. Queensland Museum, vii. (1922), p. 257.

*Parasphecodes speculiferus* Cockerell.

Victoria (French); type in British Museum. Goes north to Brisbane. A new description is given in Mem. Queensland Museum, v. (1916), p. 201. The typical form has the tegulae rufo-fuscous; the var. a. (from Sydney, N.S.W., at *Angophora* flowers) is larger, female almost nine mm. long, the tegulae piceous.

*Parasphecodes stuchila* Smith.

Tasmania. Male. Abdomen ferruginous, basal half of first tergite black; apex of clypeus yellow.

*Parasphecodes subfultoni* Cockerell.

Victoria (E. Wilson); type (female) in Queensland Museum. Very near *P. fultoni*, but tegulae rufous (not the clear rufo-fulvous of *P. fultoni*); wings blackish, unusually dark, with darker stigma and very dark nervures; abdomen very dark red, the same colour throughout.

*Parasphecodes submeracus* Cockerell.

Stanthorpe, Queensland (F. A. Perkins); type in Queensland Museum. Female a little over 9 mm.; basal nervure very strongly bent, and ending a long distance from nervulus; abdomen very broad, dull dark red, black beyond third tergite.

*Parasphecodes submoratus* Cockerell.

Russell Falls, National Park, Tasmania (A. J. Turner). Female about 7.6 mm. long; abdomen chestnut red.

*Parasphecodes subrussatus* Cockerell.

X Kosciusko (A. J. Turner); Friese's male of *Halictus gibbosus*, from "Kosciusko" (R. Helms), is the same. The female *H. gibbosus* is another species.

*Parasphecodes sulthica* Smith.

"New Holland." Male. Abdomen red, slightly fuscous at apex; face covered with fulvous hair.

*Parasphecodes talchius* Smith.

Tasmania. Male. Apex of clypeus yellow; abdomen black at base, and apex more or less fuscous.

*Parasphecodes taluchis* Smith.

Tasmania. Female. Abdomen red, slightly fuscous toward the apex. The smallest species described by Smith.

*Parasphecodes tamburinei* (Friese).

Mt. Tambourine, Queensland (Mjöberg).



*P. paramelaenus* Ckll., collected by Hacker in the National Park, Queensland, is a synonym. A table separating this from other species is given in Mem. Queensland Museum, vii. (1922), p. 257.

*Parasphecodes tepperi* Cockerell.

Adelaide; type in British Museum. Female about 9 mm. long; abdomen noticeably narrower than in *P. loweri*, and head shorter. Abdomen entirely red, the apex faintly blackish.

*Parasphecodes tilachiformis* Cockerell.

New South Wales; type in American Museum of Natural History. Female about 8 mm. long. Abdomen much darker than in *P. tilachus*, with much more abundant though prevailing shorter hair; legs black.

*Parasphecodes tilachus* Smith.

Tasmania. Female. Abdomen red, fourth and following tergites black.

*Parasphecodes tooloomensis* Cockerell.

Tooloom, N.S.W. (Hacker). Female closely related to *P. aurantiacus*, but mesothorax posteriorly black, only the broad anterior portion red; area of metathorax wholly or largely black; apical part of abdomen red. The wings are strongly dusky.

*Parasphecodes tooloomensis musgravei* Cockerell.

National Park, Macpherson Range, Q. (A. Musgrave); type in Australian Museum. For characters, see table above.

*Parasphecodes tripunctatus* Cockerell.

Ararat, Victoria (G. F. Hill); type in American Museum of Natural History. Male about 9 mm. long; abdomen with first three tergites bright chestnut red (first with a dusky T-mark), the others black or reddish black, the fourth with a transverse red band (as in the considerably smaller *P. minimus*); a deep constriction between first and second tergites.

*Parasphecodes tuchilas* Smith.

"New Holland." Female. Abdomen red, the extreme base black, as also the fourth and following tergites.

*Parasphecodes turneri* Cockerell.

Eaglehawk Neck, Tasmania (R. Turner); type in British Museum. Both sexes are separated from other species in a table in Ann. Mag. Nat. Hist., July, 1914, p. 52. Female about 8.5 mm. long, male about 8 mm.

*Parasphecodes vau* Cockerell.

N.W. Australia (C. French); type in British Museum. For characters, see table above.

*Parasphecodes vermiculatus* Cockerell.

Victoria (from G. F. Gill). For characters, see table above. I took it at Beaumaris, Victoria, March 31, at flowers of *Achillea*.

*Parasphecodes vulneratus* Cockerell.

Victoria (C. French); type in British Museum. For characters, see table above.

*Parasphecodes wellingtoni* Cockerell.

Mt. Wellington, Tasmania (R. Turner); type in British Museum. Disc of mesothorax polished.



*Parasphcodes wellingtoni griseipennis* Cockerell.

Found near the Jenolan Caves, N.S.W., by W. P. Cockerell. For characters, see table above. At flowers of *Helichrysum lucidum*, April 29.

*Parasphcodes wilmattae* Cockerell.

Found near the Jenolan Caves, N.S.W., by W. P. Cockerell. For characters, see table above. Taken at flowers of *Helichrysum lucidum*, April 29. Approaches *P. gibbosus*, but area of metathorax much shorter, and not broadly squared off behind; red of abdomen brighter.

*Parasphcodes zamelanus* Cockerell.

Dunalley, Tasmania (G. H. Hardy); type (male) in Queensland Museum. Entirely black, except for the yellow clypeus, with the sides above black, the black areas uniting above, the upward extension of yellow ending in a sharp point. Near *P. cervicalis*, but larger (length about 11 mm.), and with different venation.

In the above list, I give some descriptive details, especially concerning species described since Meyer's revision appeared, but the student must in every case consult the complete descriptions for purposes of identification. From this paper he can only establish probabilities of identity, or, in a number of cases, ascertain that species are *not* identical with those before him.

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"IMPRISONING" THE LYRE-BIRD'S SONG.

Zoologists, generally, and probably a large number of the public, will welcome the announcement that the melody of Australia's famous Lyre-Bird (*Menura*) has been captured on a gramophone record, a feat which stands to the credit of Mr. R. T. Littlejohns, of Melbourne, working in conjunction with Herschell's Pty., Ltd. Mr. Littlejohns, one would say, thoroughly deserves his success in this enterprise. He laboured long and arduously in other years before securing a motion picture giving glimpses of the male disporting and the female at the nest; and he followed this up last year by producing a sound-film recording the male bird's medley of mockery. A brilliant representation, for the most part, this sound-film (as many Sydney people will remember) was slightly marred by a curious "bump" which developed at intervals in the song, due, apparently, to some undetected fault in the recording equipment. This year, therefore, Mr. Littlejohns and his assistants went afield again, and this time they secured what is described as a perfect sound-film. It is from this that the gramophone record has been made. In view of the fact that Mr. Littlejohns is quite satisfied with the record, it seems manifest that it is, indeed, worthy of the brilliant fantasia itself, and is one which every naturalist will wish to possess. The record is to be issued by Herschell's very shortly at a moderate price. One side of the disc will be devoted to the "concert," and the other to a description of the bird and its habits.—A. H. CHISHOLM.

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Cockerell, Theodore D. A. 1932. "The bees of Australia." *The Australian zoologist* 7, 206–218.

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