

which may be modified as follows to accommodate this new species:

8. Subgenital plate elongate, more or less hairy, without a median tooth or a transverse ridge.....9
- Subgenital plate shorter, with median and apical transverse carinæ; no ventral hair brushes.
- a. Median transverse carina much shorter than width of subgenital plate, curved at extremities.....*chrysothemis*
- b. Median transverse carina nearly as long as the width of subgenital plate at the point of occurrence of the carina*bequaerti*

It differs from *P. chrysothemis* Luc. in the lighter color of the wing, the shape and length of the subapical carina of the subgenital plate and in the structure and hairiness of the sagittæ.

P. bequaerti belongs in group B, II, b, a, †, ** (p. 731) of Lucas' paper, "Die Pompiliden-Gattung Pepsis" (Ber. Ent. Zeit., XXXIX, Heft IV, 1895), where, because the key is based largely on color characters, it may run to *P. chrysothemis* or to near *P. thisbe* Luc. It differs from the description of *thisbe* in the structure of the subgenital plate and in the size of the body. The structure of the sagittæ and cochleara of the new species is not as figured by Lucas for *thisbe*.

TWO NEW SPECIES OF BEES OF THE GENUS PERDITA IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

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The species of bees of the genus *Perdita* Smith recorded here are contained in the collection of the California Academy of Sciences, and were collected in Arizona and Lower California. The collection also contains a considerable number of species from California, including several new species, but these will be considered in my account of the California species of the genus.

1. *PERDITA NUMERATA* Cockerell

One female, collected April 14, 1923, at Yuma, Arizona (E. P. Van Duzee). Previously known only from the type locality, viz., Mesilla Valley, New Mexico.

2. *PERDITA DASYLIRII* Cockerell

Three females, collected July 10 and August 20, 1924, in the Baboquivari Mountains, Arizona (O. C. Poling). At first I determined these specimens as *P. nolinæ* Ckll., but later concluded that *nolinæ* is the female of *dasyllirii*. *P. dasylliri* was described from the supposed female and male, but a specimen received from Dr. Cockerell and another received from the American Museum, collected in the Sabino Basin, Santa Catalina Mountains, Arizona, are males, although agreeing exactly with the description of the supposed female. I have concluded, therefore, that *P. dasyllirii* was based on two species, both of the male sex, and have restricted the name to the first one described, which is also the more strongly marked and more easily recognizable. My reasons for considering *P. nolinæ* Ckll. as the female of *dasyllirii* will be given fully elsewhere. *P. nolinæ* was described from the Sabino Basin, Santa Catalina Mountains, Arizona, and *P. dasyllirii* from Alamogordo, New Mexico. Both were found on Liliaceous flowers.

3. *Perdita obliqua* Timberlake, n. sp.

Known only in the female sex, which runs best, perhaps, in Cockerell's table of *Perdita* (Proc. Acad. Sci. Phil., 1896), to *P. albovittata* Ckll. (couplet 68), although the clypeus is practically nude. If continued on account of the latter character to the next couplet, it would fall with the male of *P. austini* Ckll., as the lateral face marks reach above the level of the antennal sockets. *P. obliqua* differs from *P. albovittata* by having the clypeus nude, the lateral marks thrice as high as wide and diverging above where they form an acute point considerably above antennal sockets, the abdominal bands rather narrow and straight, instead of being dilated and bent at the lateral margins, the mandibles not expanded on inner margin, the claws dentate instead of simple, maxillary palpi 6 instead of 5-jointed, etc. It can hardly be the unknown female of *P. austini*, as it is rather too large, with the pubescence not sparse but rather abundant and conspicuous, the head and thorax dark green instead of nearly black, etc.

Female. Head about as long as wide, well rounded on the sides and gently rounded above. Cheeks rather narrow. Mandibles ordinary, rather blunt and apparently simple at apex, (but closed and

not fully visible in type), and reaching not quite to far margin of labrum. Eyes large, with the inner orbits arcuate and somewhat convergent above. Clypeus rather strongly projecting in front of ocular line; disk convex, considerably broader than long and moderately broadly rounded above; lateral extensions short, strongly inflexed and concealed in frontal view of head. Lateral plates of face not much widened below, and each at level of dog-ear plates covering somewhat less than one-fourth the total width of face. Prominence between antennæ low and tectiformly rounded. Frons without a median impressed line, although there is a faint indication of one above, just below anterior ocellus. Abdomen rather narrowly oval, fully twice as long as wide, convex, the pygidium small, rather narrow and very narrowly rounded at apex. Membrane of wings with the setæ obsolete; stigma of ordinary size and width, and emitting radius somewhat beyond the middle; marginal cell about as long as stigma, squarely truncate at apex and with the substigmatal and poststigmatal parts about equal; second submarginal cell narrowed about one-half to marginal; first and second recurrent veins interstitial with the intercubiti. Claws of front and middle legs rather deeply cleft, the inner tooth somewhat shorter than the outer one and rather strongly divergent (claws of hind legs missing in type).

Head and thorax polished and shining, the vertex and cheeks delicately and not very distinctly tessellate, the mesopleura very indistinctly tessellate, propodeum finely, rather delicately but distinctly tessellate, clypeus rather dull but smooth. Face, except clypeus, frons, cheeks, mesonotum and pleura, with numerous but well separated and extremely fine punctures. Clypeus with sparse, shallow and comparatively coarse punctures. Abdomen with the usual microscopic lineolation and moderately shining. Pubescence whitish, rather abundant; short and erect on face, frons and mesonotum; similar but considerably longer on cheeks and pleura. Clypeus with only a very few short hairs. Abdomen nearly nude, except the usual coarse hair toward apex.

Head and thorax very dark green, the disk of propodeum slightly blue-green. Clypeus piceous, labrum and apex of mandibles reddish piceous. Basal two-thirds of mandibles creamy white, but shading through brownish yellow toward apex, three marks on clypeus and lateral face marks creamy white. Median mark of clypeus somewhat dagger-shaped, pointed anteriorly and not quite reaching to anterior margin. Lateral marks of clypeus placed on each side of disk anteriorly, hardly extending on lateral extensions, separated from margin of labrum by a dark line, subquadrate in shape and with the inner margin of each straight and parallel with each other. Lateral marks of face oblique to each other, diverging above, about thrice as high as wide below, narrower below than contiguous margin of lateral marks of clypeus, and very pointed above where they intrude between foveæ and orbits at a point considerably above the antennal

sockets and slightly above middle of eyes. Cheeks entirely dark. Large spot on tubercles and broad posterior margin of pronotum, almost joining with mark on tubercles, creamy white. Abdomen piceous above and below, the pygidium yellowish brown but abruptly black at base. Tergites 4 and 5 with broad testaceous apical margin, very broad on 5, but apical margin of preceding tergites not perceptibly paler. Tergites 2 to 4 with a moderately narrow, straight, basal, creamy white band, not quite reaching to lateral margins, very slightly and broadly emarginate behind medially and obliquely truncate at ends on 3 and 4, and a little narrower throughout and almost square at ends on 2. Tergite 5 at base with a thin white line, narrowly interrupted at middle, and which surely would be concealed by preceding segment when abdomen is contracted. Legs piceous, front and middle knees pale yellow or creamy white, front tibiae except behind distinctly yellow; front tarsi pale brownish yellow, with the claws brown at apex; middle tarsi pale brownish yellow toward apex. Labio-maxillary structure piceous. Antennae piceous, the scape pale yellow beneath and the flagellum rather narrowly dull yellow beneath. Tegulae testaceous hyaline and creamy white at base. Wings apparently clear hyaline (they are badly gummed together in type), the veins rather pale yellowish, with subcosta and margins of stigma deeper yellow, the stigma otherwise hyaline. Length about 5.0 mm. Described from 1 female.

Holotype, female, No. 2576, Mus. Calif. Acad. Sci., collected by O. C. Poling, August 20, 1924, in the **Baboquivari Mountains, Arizona.**

4. *Perdita keiferi* Timberlake, n. sp.

The male of *keiferi* runs to *P. biparticeps* Ckll., (couplet 31) in Cockerell's table (1896) and differs by having the head small, or more rarely only moderately enlarged, the lateral face marks subtruncate above about half-way between level of antennal sockets and anterior ocellus, the wings clear hyaline with pale brown stigma and veins, the abdomen piceous with a narrow basal yellow band on tergites 2 and 3, or sometimes on 2 to 5, etc.

The female runs to *P. phymata* Ckll. (couplet 23) and is very similar but differs by the clear hyaline wings with paler veins, the stigma much larger and broader (as in *P. rhois* Ckll.) the middle legs entirely dark, the front tibiae less broadly and less conspicuously yellow anteriorly, and the abdomen with a greenish luster.

Male. Head not enlarged, or sometimes only moderately so, but wider than thorax, considerably wider than long and strongly

rounded on sides and above. Cheeks rather narrow and simple. Eyes ordinary in size, wider below than at upper end, the inner orbits very slightly emarginate above. Mandibles slender, very acute and simple at apex, reaching, when closed, approximately to far margin of labrum. Clypeus moderately convex, the disk much broader than high, broadly truncate above between dog-ear plates and broadly continuous at sides with the lateral extensions; the latter broad at inner ends, strongly narrowed toward base of mandibles and only narrowly reflexed on anterior margin, so that they are almost wholly visible in frontal view of head. Dog-ear plates not much longer than wide and pointed below. Lateral plates of face not widened at lower end, each usually covering somewhat less than one-third the total width of face, or if head is enlarged one-third or a little more. Prominence between antennæ rather high and rounded. Lower half of frons with a distinct sulcate median line, which reaches to the prominence. Antennæ short, the scape broad and hardly twice as long as wide. Abdomen oval, rather depressed, and when not strongly contracted more than twice as long as wide, the apex not recurved; seventh tergite with a rather narrow truncate apex. Membrane of wings in apical field covered with moderately dense microscopic setæ; stigma large and broad, fully as long and as wide as first submarginal cell, and emitting radius a little beyond the middle; marginal cell strongly oblique to the costal margin, a little shorter than stigma, almost squarely truncate at apex and with the substigmatal part much narrower and nearly twice as long as post-stigmatal part; second submarginal cell narrowed about one-third above, the second intercubitus more strongly curved than usual; first recurrent vein received by the first submarginal cell near apex, the second recurrent vein interstitial with second intercubitus; subdiscoidal and second recurrent veins obsolete. Claws small, cleft not quite to the middle, and with the inner tooth a little shorter than the outer tooth.

Head moderately shining, the frons and vertex finely, rather delicately but distinctly tessellate and very sparsely and indistinctly punctured. Lateral plates of face tessellate like the frons but remainder of face very indistinctly tessellate and with sparse microscopic punctures. Cheeks more delicately tessellate and more shining than frons and with numerous, very fine, well separated punctures. Thorax shining, more delicately tessellate than frons, the sculpture rather faint and practically uniform all over, the puncturation of mesonotum and pleura very sparse and indistinct. Abdomen microscopically lineolate and shining. Pubescence whitish, rather long and erect; moderately abundant but somewhat shorter and subappressed on the cheeks; sparse on frons, vertex and mesonotum, and on the latter confined mostly to anterior part of mesoscutum; face below antennæ nude.

Head and thorax slightly bluish dark green. Mandibles, except

red apices, labrum and entire face beneath antennæ bright lemon yellow, the yellow conspicuously extending in a point above antennal sockets in median line to upper end of prominence, and laterally extending broadly to middle of frons, where it is more or less obliquely truncate or broadly rounded, but meets the margin of eyes more or less rectangularly. Cheeks beneath broadly yellow anteriorly, the yellow extending nearly or quite to end of gular cavity, and on orbits extending to middle of eyes or often with a thin line reaching almost to summits. Thorax dark, except tubercles, more or less broad posterior margin of propleura beneath tubercles, and two transversely oval spots on anterior end of mesosternum, yellow. Abdomen piceous above but with a more or less apparent, metallic greenish luster, at least on first two or three segments. Tergites 2 and 3 and frequently also 4 and 5 with a rather narrow, even, basal yellow band, usually separated from lateral margins on 2, but more frequently attaining, or nearly attaining, lateral margins on following segments. Venter and apical tergite dull yellow. Front and middle legs bright yellow, the front and middle femora and middle tibiæ behind with a large piceous mark, and the front tibiæ behind sometimes shaded with brownish; hind legs piceous, but the coxæ, trochanters, base of femora, a line on under side of both femora and tibiæ and the tarsi, yellow. Labio-maxillary structure pale brown. Scape concolorous with face, the flagellum brown or fuscous above, becoming paler at apex and broadly dull yellow beneath. Tegulæ testaceous hyaline. Wings clear hyaline, the veins and stigma pale brownish, but subcosta, margins of stigma and of marginal cell, fuscous. Length about 3.0-3.5 mm.

Female. Much like the male structurally but very different in the lack of yellow markings. Head somewhat wider than long, moderately rounded on sides and above. Cheeks not widened. Mandibles stout, ordinary, blunt at apex and provided with a strong blunt inner tooth. Clypeus large, convex, moderately projecting in front of ocular line; disk considerably broader than high, with the oblique sides rather straight and top not very broadly truncate; lateral extensions very broad, short and moderately inflexed. Lateral plates of face not widened below, each covering somewhat less than one-fourth the total width of face. Prominence between antennæ moderately high, becoming tectiform above level of middle of sockets. Frons with an impressed median line near center and a thin smooth line above toward anterior ocellus. Abdomen broadly oval, depressed, and not quite twice as long as wide; pygidium small, narrow and obtuse at apex. Wings as in the male, except that the membrane is provided with sparser, nearly obsolete setæ and the third discoidal cell is complete. Claws with a short inner tooth near middle.

Head and thorax strongly tessellate but the sculpture is only strong enough to make the surface moderately dull. Cheeks more delicately tessellate, becoming smooth in broad stripe next to the

orbits. Clypeus smooth except above. Tessellation of thorax nearly uniform. Frons and face with numerous but well separated fine punctures at the sides, sparser punctures on middle of frons and somewhat sparser punctures on disk of clypeus, but a broad median line on clypeus impunctate. Cheeks and pleura rather indistinctly punctured. Mesoscutum with fine punctures, which are sparse on middle of disk and more numerous on sides and anteriorly. Abdomen strongly shining and with the usual microscopic lineolation. Pubescence whitish, moderately long and mostly erect; thin but uniformly distributed and quite conspicuous on face, including clypeus, and on frons; denser and longer on cheeks and occiput; longer but not denser on pleura; rather thin and short on mesonotum but conspicuous; and much longer, denser and white on fifth tergite.

Head and thorax dark green, without pale markings, the propodeum slightly bluish green. Abdomen piceous, without markings, the venter dark, the tergum with a distinct greenish luster, and the pygidium brown. Labio-maxillary structure, labrum and clypeus piceous, the latter with a greenish luster on posterior border. Mandibles usually piceous at base, brownish yellow at middle and dark red or reddish piceous at apex. Antennæ piceous, but becoming narrowly dull yellowish beneath. Legs piceous, the tarsi more or less brownish, and the knees and tibiae of front legs yellow anteriorly. Tegulae almost clear hyaline, but piceous at base. Wings clear hyaline, the veins and stigma very pale brown but subcosta and margins of stigma somewhat fuscous. Length about 4.0-4.5 mm.

Holotype, male, No. 2577, and allotype, female, No. 2578, Mus. Calif. Acad. Sci., collected by H. H. Keifer, June 3, 1925, on **Cedros Island, Lower California.**

Described from 51 females and 27 males collected on Cedros Island, Lower California, Mexico. Of these, 18 females and 24 males were collected June 3, 1925, by H. H. Keifer; 3 females and 1 male (paratypes) on July 22, 1922, by G. D. Hanna; and 30 females and 2 males (paratypes) on August 4, 1922, at Bernstein Springs, by G. D. Hanna. Several of the females bear an agglutinated mass of pollen on the scopa, which I suspect was gathered from the flowers of *Eriogonum*.

5. *PERDITA VANDUZEEI* Cockerell

One male, collected June 7, 1925, at San Quentin, Lower California (H. H. Keifer).

This I presume to be the undescribed male of *P. vanduzeei* Ckll. In Cockerell's table of *Perdita* (1896) it would run straight to *P. crotonis* Ckll. (couplet 26), except that the face is not quite entirely creamy white beneath level of antennal

sockets. It consequently goes to *P. zebrata* Cress., in couplet 91, to which it is not closely allied. From the closely allied *crotonis* it differs by having the head considerably enlarged and subquadrate, the wings milky hyaline with colorless veins, the frons shining instead of dull, hind legs except trochanters mainly piceous, the labrum not notched in front, etc.

Male. Head considerably enlarged, much broader than thorax, a little broader than long, subquadrate, or only gently rounded on sides and above. Temples and cheeks broad, the latter simple. Eyes small, rather more than twice as long as wide, the inner orbits parallel. Mandibles moderately long and curved, reaching a little beyond far margins of labrum and tapering from the wide base to the very acute and simple apex. Labrum broader than long and broadly rounded on apical margin (in *P. crotonis* the labrum has a strong notch in middle of apical margin). Clypeus low, moderately convex on disk, which is much broader than high and broadly rounded above; lateral extensions almost as long as width of disk, broad at inner ends, where they are somewhat inflexed, tapering to a point at base of mandibles, and nearly completely visible in frontal view of head. Dog-ear plates hardly longer than wide. Lateral plates of face up to level of antennal sockets as broad as high and opposite middle of dog-ear plates each covering somewhat less than one-third the total width of face. Prominence between antennæ broad and low and rather sharply carinate medially above. Frons with a rather obscure median impressed line. Abdomen broad, nearly twice as long as wide, not much recurved at apex, the apex of seventh tergite much broader and more obtuse than in *P. crotonis*. Membrane of wings with dense microscopic setæ on apical field; stigma narrowly lanceolate, somewhat shorter than first submarginal cell, and emitting radius at the middle; marginal cell obliquely truncate at apex, not appendiculate, as long as stigma and with the substigmatal and poststigmatal parts about equal; second submarginal cell narrowed about one-half, or a little more, above (the second intercubitus broadly interrupted in left wing), receiving the first recurrent vein very close to base and the second at apex; subdiscoidal and second recurrent veins obsolete, other veins thicker than usual. Claws deeply cleft to near the middle, the outer tooth bent outward at apex, the inner one straight and a little shorter than the other.

Head and thorax polished and shining; vertex with very delicate indistinct tessellations; propodeum distinctly and very finely tessellate and somewhat duller than rest of thorax. Punctures of clypeus sparse, fine and shallow, of sides of face and of frons close and fine, and of vertex sparse and fine behind ocelli and nearly wanting toward the sides. Cheeks with numerous, but extremely fine and indistinct punctures. Mesonotum with numerous but well separated fine punctures, which become a little closer on the sides and anterior

part of scutum. Mesopleura with similar but more indistinct punctures. Abdomen shining and with the usual microscopic lineolation. Pubescence whitish, rather abundant and mostly erect; on cheeks and pleura only a little longer than on face or mesonotum; present on frons and sides of face but sparse on disk of clypeus and sides of vertex; on cheeks rather dense except in a broad nude strip along posterior orbits; on mesoscutum rather more abundant at sides and on anterior part than on middle of disk.

Head and thorax very dark greenish blue, the propodeum and pleura deeper blue. Mandibles, except clear red apices, labrum, clypeus, except usual dark dots, lateral face marks, dog-ear marks and supraclypeal mark creamy white. Lateral face marks equilaterally triangular, the inner margin more or less uneven, and extending from sides of clypeus just below dog-ear plates to a point on orbits very slightly above antennal sockets, so that the face is not quite entirely pale beneath antennæ. Cheeks with a small creamy white transverse mark anteriorly, which extends along posterior orbits for only a short distance. Thorax entirely dark. First four tegites of abdomen piceous, the last three segments ferruginous above and beneath, this color also shining through the broad hyaline apical margin of tergite 4; rest of venter grayish brown shaded with ferruginous yellow medially. Tergites 2 to 4 with a rather broad basal creamy white band, notched medially in front on 2 and 3 and rather broadly interrupted on the middle of 4, and on all the segments not reaching to lateral margins, although approaching rather closely on 2. Legs piceous, the front coxæ, all trochanters except behind, front and middle knees, their tibiæ except broadly behind, clear pale lemon yellow; front tarsi dull yellowish but becoming clearer yellow toward base; middle tarsi brown with apical joint pale, and hind tarsi brownish on apical joints. Labio-maxillary structure pale brown. Scape lemon yellow but fuscous above except at base; flagellum fuscous above but becoming paler toward apex, the last joint and under surface broadly dull yellow. Tegulæ almost clear hyaline but yellowish white at base. Wings milky hyaline, the veins whitish, but subcosta toward apex and margins of stigma yellowish. Length about 4.75 mm.



Timberlake, P. H. 1928. "Two new species of bees of the genus *Perdita* in the collection of the California Academy of Sciences." *The Pan-Pacific entomologist* 5, 25–33.

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