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## Descriptions and Records of Bees - XXXIV

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Miscellaneous.

Ludlow Beds are found mainly in the northern part of the where the geology is simpler. Comparison is instituted between these beds and those described in Welsh Borderland by Miss Elles & Miss Wood (Mrs. Spear), and those of Wenlock age in Southern Sweden described by Berg.

CAUTLEY.	WELSH BORDERS.	SOUTHERN SWEDEN.
<i>graptus leintwardinensis</i> .	Zone of <i>M. leintwardinensis</i> .	
Red grits and flags { ? =	" <i>M. tumescens</i> . " <i>M. scanicus</i> .	
<i>graptus nitsoni</i> .	" <i>M. nitsoni</i> .	
<i>graptus obtusicaudatus</i> . ? =	" <i>M. vulgaris</i> .	
<i>graptus lundgreni</i> .	" <i>C. lundgreni</i> .	Zone of <i>C. carratheresi</i> .
<i>graptus rigidus</i> .	" <i>C. rigidus</i> . " <i>C. binnaronsi</i> . " <i>C. symmetricus</i> .	" <i>C. rigidus</i> .
<i>graptus riccartonensis</i> .	" <i>M. riccartonensis</i> .	" <i>M. riccartonensis</i> .
<i>graptus murchisoni</i> .	" <i>C. murchisoni</i> .	" <i>C. murchisoni</i> .

Description of a *Cyrtograptus* intermediate in character between *C. rigidus* and *C. symmetricus*, and of a new *Monograptus* from the Nilsöni Beds of Wandale Hill, is given in a palaeontological section.

MISCELLANEOUS.

In reference to Plate vi. in our issue of September last, Mr. Connolly finds that, in course of reproduction, the artist's original drawings were reduced by one-fortieth. This is unfortunate, as the small figures were intended to represent the actual size of the specimens figured. Also in fig. 1 of the same plate, representing *Uma turriciformis*, the shell erroneously shows a marginal suture, which is due to a wrong light-effect, and does not exist in the original.

THE ANNALS

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[EIGHTH SERIES.]

No. 39. MARCH 1911.

XXVI. - Descriptions and Records of Bees. - XXXIV.  
By T. D. A. COCKRELL, University of Colorado.

LITHANTHIDIUM, gen. nov.

Related apparently to *Anthidium*; robust, thorax above very finely and densely punctured, sides of thorax with large coarse punctures (this sculpture practically as in *Dianthidium sayi*); hind tibiae densely hairy. Abdomen probably with a ventral scopa, but it is not clearly preserved; stigma large; marginal cell narrowly rounded at tip, the apex a little below costa; two submarginal cells, the second receiving both recurrent nervures, the first some distance from base, the second a little before apex; outer side of second s.m. with a single gentle curve; basal nervure strongly arched at lower (basal) end, where it meets the transverso-medial, the latter being slightly arched outwards and not noticeably oblique. The arching of the base of the basal nervure is also observed in the living (Asiatic) *Protanthidium steloides*, which differs, however, in the shape of the second s.m., and in having the second r.n. going beyond apex of second s.m. There is some resemblance to the fossil *Pelandrena reducta*, but in *Pelandrena* the second s.m. is contracted apically and the t.m. is oblique.

*Lithanthidium pertriste*, sp. n.

Black, very robust. Head and thorax about 4 mm. long, abdomen about 4½, doubtless 5 when extended; anterior  
*Ann. & Mag. N. Hist. Ser. 8. Vol. vii. 15*

wings 5 mm. long, strongly dusky throughout, stigma and nervures dark reddish brown. Wing-measurements as follows in  $\mu$ : depth of stigma 255; length of marginal cell 1632; depth of marginal cell 425; upper end of second t.-c. to end of marginal cell 935; second s.m. on marginal 476; length of outer side of second s.m. 510; first discoidal on second s.m. 153; greatest length (diagonally) of first discoidal 1445; third discoidal on second s.m. 595; end of second r. n. to end of second s.m. 51; basal nervure on first s.m. 272; b. n. on first discoidal (not allowing for curve) 578; length of t.-m. 408.

*Hab.* Fossil in the Miocene shales of Florissant, Colorado, at Station 14 (*W. P. Cockerell*).

*Dasypoda comberi*, sp. n.

♀.—Like *D. plumipes* (Panz.), perhaps averaging rather smaller, with the hair of head and thorax above entirely fulvo-ochraceous, without black or fuscous. Wings duskier, especially the broad apical margin; knees, tibiae, and tarsi ferruginous, outer side of anterior tibiae dusky; thick fringe of fifth abdominal segment, and hair of apical segment, warm ochraceous, not at all sooty or black; scattered hair between the abdominal bands partly black and partly ochraceous.

♂.—Pubescence pale yellowish, almost grey, white beneath; abdomen slender, about 2 mm. broad; flagellum dusky ferruginous beneath; legs coloured as in female; no dark hair on vertex; abdomen without black hair; sixth ventral segment broadly emarginate in middle, and with the lateral margin raised and thickened.

*Hab.* Karachi, India, 2 ♀, 1 ♂ (*E. Comber*). British Museum. The females are labelled April 1909. The genus is new to India.

In Friese's table of Palearctic species the Indian species falls between *D. plumipes* and *D. panzeri*, having rather the coloration of the latter, while the abdomen is formed as in *plumipes*, only rather more slender in the female, considerably more in the male. In the female the third antennal joint (about 425  $\mu$ ) is equal to the next two combined. It is evident that *D. plumipes*, var. *flavescens*, Friese, from Egypt, is very like our insect, being substantially a *plumipes* coloured like *panzeri*; but, so far as Friese's account shows, the legs of *flavescens* are as in *plumipes*, and the colour-peculiarities seem to be confined to the abdomen. *D. grohmanni*, Spinola, from Sicily, has the legs coloured as in *D. comberi*, but it is a large form like *D. risuaga*.

# Miscellaneous.

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CAUTLEY.	WELSH BORDERS.	SOUTHERN SWEDEN.
<i>Cyrtograptus leintwardinensis</i> .	Zone of <i>M. leintwardinensis</i> .	
Red grits and flags { ? =	" <i>M. tumescens</i> . " <i>M. scanicus</i> .	
<i>Cyrtograptus nilssoni</i> .	" <i>M. nilssoni</i> .	
<i>Cyrtograptus obtusicaudatus</i> . ? =	" <i>M. vulgaris</i> .	
<i>Cyrtograptus lundgreni</i> .	" <i>C. lundgreni</i> .	Zone of <i>C. carruthersi</i> .
<i>Cyrtograptus rigidus</i> .	{ <i>C. rigidus</i> . " <i>C. lönnerströmi</i> . " <i>C. symmetricus</i> .	{ " <i>C. rigidus</i> .
<i>Cyrtograptus riccartonensis</i> .	" <i>M. riccartonensis</i> .	" <i>M. riccartonensis</i> .
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## MISCELLANEOUS.

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*Euaspis (Parevaspis) carbonaria* (Smith).

Salsette, N.W. India (*E. Comber*). British Museum.

*Euaspis (Parevaspis) basalis* (Rits.).

Both sexes from Takao, Formosa, Aug. 20, 1907 (*Sauter*). Berlin Museum. These agree with the southern material of *E. basalis*, rather than with the Japanese, but I have not been able to recognize more than one species (*cf.* Ann. & Mag. Nat. Hist., Sept. 1904, p. 207).

*Systropha tropicalis*, sp. n.

♂.—Length about 9 mm.

Black, closely resembling *S. curvicornis* (Scopoli), with the same peculiar antennae, except that the apical joints are considerably shorter, but differing conspicuously as follows: Wings darker and browner; stigma and nervures very dark brown; first s.m. much shorter; sides of vertex very smooth and shining; area of metathorax a broad sharply-margined smooth and shining transverse channel. Abdomen narrower, much more delicately sculptured, finely pruinose-pubescent (not coarsely hairy) above, at sides with rather abundant long pale hair; apex rounded, rather narrow; second ventral segment with a pair of low transversely elongated shining tubercles, third with a pair of broad conical tubercles.

♀.—Length about 8 mm.

Like *S. curvicornis*, with the same thickened flagellum, but wings as described for male; mesothorax and scutellum more shining; area of metathorax granular, but sharply margined. Abdomen more finely sculptured; segments 3 to 5 with short black hair.

Hab. Ceylon, 1910 (*E. Comber*). British Museum.

The type is a male from Kandy, collected in February; another male is labelled "Kandy," March. Females are from Kandy (February) and Matale (March). Nurse records *S. planidens*, Giraud, from Quetta, but the occurrence of this Palearctic genus in Ceylon is very remarkable.

*Melecta formosana*, sp. n.

♀.—Length about 14 mm.

Black, the abdomen stained with reddish, the hind margin of second segment broadly clear ferruginous; head and thorax with abundant long pale ochreous hair, but very long dark brown hairs on vertex and at extreme sides of face,



thorax with a broad band of dark chocolate-brown hair on the wings, also a little brown hair just below the wings, and a large tuft of the same at the base of the very long, curved, acute scutellar spines; legs dark reddish or reddish black, with ochreous base and ferruginous spurs; hind basitarsus straight; mandibles margined with ferruginous. Wings very brown, translucent; abdomen broad-conical, without spots, red with very fine appressed fox-red pubescence. Head dark red except at base and apex; labrum broadly shining; flagellum dark reddish; fourth antennal joint longer than fifth, but not nearly twice as long; mandibles shining, with strong separate punctures; apical abdomen extremely narrow. Close to *M. himalayensis*, but differing in details of sculpture and

example, Formosa, 1908 (Sauter). Berlin Museum. An example of a Formosan species resembling a one. The genus is new to Formosa.

*Sphcodes formosanus*, sp. n.

Length 10-10½ mm.  
Abdomen chestnut-red, with the last two segments and middle of the fourth more or less black; face not so broad as in *S. fuscipennis*; eyes prominent; mandibles curved, dark reddish in the middle, with a rather dense on face, especially at sides, shining, with large dense punctures and antennae black, flagellum faintly brownish; fourth antennal joints very short, much shorter than the longer, both together; front and vertex very strongly and densely shining, the rather dense punctures strong (not so dense as in *S. japonicus*, Ckll.); hind part of mesothorax; pleura very coarsely shining; metathorax broadly truncate, the basal part with very strong ridges, which are crossed by its apical part with large irregular pits; at base, dilute brown beyond, the margin Wings dark fuscous, hyaline basally; legs joints red at end. Abdomen shining, rather red, the punctures strong, though much

smaller than those of thorax (they are about as in *S. fuscipennis*); first two segments gibbous subapically (especially at sides) and depressed apically; apical segments with some fuscous hair.

*Hab.* Formosa (Sauter). Berlin Museum.  
This type is labelled simply "Formosa"; others are from Taihanroku, June 4 and 11, 1908. Near to the Indian *S. fuscipennis*, Smith, but that has only the first abdominal segment constricted apically. Also rather like the European *S. fuscipennis*, Rossi. The well-punctured abdomen readily separates it from the Japanese *S. japonicus*, Ckll. The genus is new to Formosa.

*Andrena formosana*, sp. n.

♀.—Length 12-13 mm.

Black, the small joints of tarsi reddish brown; hair of head and thorax above ferruginous, not dense—on vertex it is dark fuscous, on under side of head and thorax it is dull white. Head very broad, facial quadrangle much broader than long; clypeus large, smooth and shining, with scattered distinct punctures, and a faint median raised line on its lower third; malar space linear; process of labrum broadly truncate, the truncation shallowly emarginate; cheeks broadly rounded, ordinary; face on each side of clypeus rugosely punctured; facial foveae reddish, broad, occupying at least half distance between eye and antennae, not separated from orbit, ending below slightly below level of upper margin of clypeus; antennae dark, third joint longer than the next two combined; mesothorax and scutellum shining, strongly punctured, the punctures sparse on mesothorax posteriorly and disc of scutellum; metathorax rugose, basal area triangular, rather poorly defined, irregularly wrinkled and rugose, without any distinct longitudinal ridges, the apical part transversely striate; tegulae ferruginous, darker basally. Wings strongly dusky; stigma moderate, dark rufo-piceous, nervures rufo-fuscous; second s.m. receiving first r. n. at (sometimes before) middle; third s.m. twice as broad as second, narrowed one-half above; legs normal, inner side of anterior and middle tarsi with reddish hair, but of hind tarsi with purplish sooty; hair of hind tibiae fuscous posteriorly; scopa of hind femora and trochanteric floccus white. Abdomen shining, strongly, moderately closely punctured, more sparsely on first segment; second segment very feebly depressed, less than one-half; the very scanty hair beyond first segment dark fuscous, as also the

apical fimbria, but hind margins of segments 2 to 4 with very narrow white hair-bands, which in most of the specimens are partly or wholly lost.

♂.—Length about 9 mm.

Clypeus (except two black spots) and large triangular lateral marks (nearly filling space between clypeus and eye, but hardly going above level of top of clypeus) very light yellow; hair of head and thorax above pale reddish. Abdomen with sparse small punctures, and the hind margins of the segments reddish; third antennal joint shorter than the next two combined; abdomen without hair-bands.

*Hab.* Formosa (Sauter), 6 ♀, 3 ♂, in Berlin Museum.

The genus is new to Formosa. In its broad head this resembles *A. vitiosa*, Smith, from China, but it differs in many other respects. There is also evident affinity with the European *A. labialis*, Kirby. I possess only the male of *labialis*, which is considerably larger than that of *formosana*, with the lateral face-marks longer and the abdomen duller and much more hairy. The type of *A. formosana* is a female.

*Nomada sccessa*, sp. n.

♀.—Length about 11 mm.

Ferruginous, marked with black and yellow; no yellow on thorax or legs; on face a little at lower corners, but no other yellow on head; pubescence scanty, short and fox red on vertex, mesothorax, and scutellum, white on cheeks, pleura, and metathorax; clypeus with scattered fuscous hairs, especially toward sides; head broad, facial quadrangle about square; mandibles simple; labrum with a minute tooth or tubercle; area of ocelli, middle of face irregularly (enclosing a dull reddish supraclypeal patch), and hind part of cheeks black; antennae stout, ordinary, ferruginous, the flagellum with a dusky shade; third antennal joint conspicuously shorter than fourth; mesothorax as densely punctured as possible, dull reddish, with a broad black median band and evanescent lateral ones; scutellum rather prominent, but little bilobed; metathorax with a dusky median band; pleura red; tegulae shining red, punctured. Wings dark on apical margin; b. n. going some distance basad of t.-m.; second s.m. nearly as broad above as third, receiving first r. n. at or slightly before middle; legs shining red, femora clouded with black at base. Abdomen red, very finely punctured; first segment rather narrow, its basal half black, its apical red, without yellow; second rather narrowly black at base and apex, with a large lemon-yellow spot on each side, the

distance between the spots over twice the diameter of each; third dark at extreme base and apex, with four small spots yellow, the inner ones mere dots; fourth broadly black at base, with an obscure yellow dot on each side, and a transverse median yellow band, truncate on each side, constricted in the middle; fifth with a broad yellow across middle; pygidial plate very large, covered with shining yellowish-silvery hair; third and fourth ventral segments with large yellow marks, fifth with a bifid middle and an elongate one on each side.

*Hab.* Formosa (Sauter), 1 ♀. Berlin Museum. new to Formosa.

In Nurse's key to the Indian species, *Nomada sccessa* to *N. beata*, Nurse, to which it seems to be related, differs in the sculpture of the metathorax (the area in granular, plicate basally, without a median impression) and the details of the ornamentation. In Schmiedeknecht's table of European species it runs with little difficulty with *N. ruficornis*, L., to which it is evidently related, and is certainly distinct.

*Allodape marginata*, Smith.

So far as I can at present determine, *A. marginata* is a single widely distributed species. I have specimens from the Berlin Museum, one male and two females collected by Sauter in Formosa, mostly at Taichang, Aug. 18 to Dec. 2, 1907. One female is from Taiwan, June 11, 1908. The male only differs from *cupulifera* in the absence of a yellow line on the scape. The dorsal face-marks are mentioned by Vachal, but overlooked by Bingham. The first abdominal segment in some specimens collapses on drying, giving rise to the "cupuliferous" character.

*A. picitarsis*, Cameron, from the Laccadive Islands, is a close relative, but the light colour of the female is not at all broadened below, and there are other differences. My specimen of *picitarsis* (one of the original lot) first abdominal segment cupuliferous through collapse.

*E. coneura libanensis*, Friese.

I am greatly indebted to the Rev. F. D. Morice for the original examples of this Syrian species. It is the male is unknown. Mr. Morice writes me that it was found high up on Lebanon, in a climate much

gubria, but hind margins of segments 2 to 4 with narrow white hair-bands, which in most of the species partly or wholly lost.

Length about 9 mm.

us (except two black spots) and large triangular marks (nearly filling space between clypeus and eye, going above level of top of clypeus) very light hair of head and thorax above pale reddish. Abdomen sparse small punctures, and the hind margins of segments reddish; third antennal joint shorter than the second; abdomen without hair-bands.

Formosa (Sauter), 6 ♀, 3 ♂, in Berlin Museum.

genus is new to Formosa. In its broad head this is *A. villosa*, Smith, from China, but it differs in other respects. There is also evident affinity with the *A. labialis*, Kirby. I possess only the male of which is considerably larger than that of *formosana*, lateral face-marks longer and the abdomen duller and more hairy. The type of *A. formosana* is a

*Nomada secessa*, sp. n.

Length about 11 mm.

Antennae marked with black and yellow; no yellow on face a little at lower corners, but no yellow on thorax, and scutellum, white on cheeks, clypeus with scattered-fusous hairs, head broad, facial quadrangle about middle of face irregularly (enclosing a patch), and hind part of cheeks ferruginous, the flagellum and antennal joint conspicuously thorax as densely punctured as scutellum rather prominent, but with a dusky median band; pleurae red, punctured. Wings dark on apical some distance basad of t.-m.; second and above as third, receiving first r. n. at or above middle; legs shining red, femora clouded. Abdomen red, very finely punctured; its basal half black, its apical rather narrowly black at base and yellow spot on each side, the

distance between the spots over twice the diameter of either; third dark at extreme base and apex, with four small spots of yellow, the inner ones mere dots; fourth broadly black at base, with an obscure yellow dot on each side, and a broad transverse median yellow band, truncate on each side and constricted in the middle; fifth with a broad yellow band across middle; pygidial plate very large, covered with shining yellowish-silvery hair; third and fourth ventral segments with large yellow marks, fifth with a bifid mark in middle and an elongate one on each side.

*Hab.* Formosa (Sauter), 1 ♀. Berlin Museum. Genus new to Formosa.

In Nurse's key to the Indian species, *Nomada secessa* runs to *N. beata*, Nurse, to which it seems to be related, differing in the sculpture of the metathorax (the area in *secessa* granular, plicate basally, without a median impressed line) and the details of the ornamentation. In Schmiedeknecht's table of European species it runs with little difficulty to *N. ruficornis*, L., to which it is evidently related, although certainly distinct.

*Allodape marginata*, Smith.

So far as I can at present determine, *A. marginata*, Smith, *A. philippinensis* (Ashmead), and *A. cupulifera*, Vachal, constitute a single widely distributed species. I have before me, from the Berlin Museum, one male and twenty-five females collected by Sauter in Formosa, mostly at Takao, Aug. 18 to Dec. 2, 1907. One female is from Taihanroku, June 11, 1908. The male only differs from *cupulifera* in the absence of a yellow line on the scape. The linear lateral face-marks are mentioned by Vachal, but overlooked by Bingham. The first abdominal segment in some specimens collapses on drying, giving rise to the "cupulifera" character.

*A. picitarsis*, Cameron, from the Laccadive Islands, is a close relative, but the light colour of the female clypeus is not at all broadened below, and there are other differences. My specimen of *picitarsis* (one of the original lot) has the first abdominal segment cupuliferous through collapsing.

*Exoneura libanensis*, Friese.

I am greatly indebted to the Rev. F. D. Morice for one of the original examples of this Syrian species. It is a female; the male is unknown. Mr. Morice writes me that it was found high up on Lebanon, in a climate much like that of

Switzerland or the Tyrol, among cherry-trees, vines, and fig-trees. The occurrence is very remarkable, since the other species of *Exoneura* are Australian.

Compared with the Australian *E. bicolor*, the Syrian insect differs not only in colour, but very conspicuously in the elongated face, with projecting clypeus and large malar space; also in the shape of the abdomen and the venation. Compared with *E. bicolor*, *E. libanensis* has the stigma smaller, the marginal cell narrower, the second s.m. smaller, and the lower section of b. n. much more oblique.

In general, *E. libanensis* is very like the Australian *Allodape simillima*, Smith, or the African *A. nigricollis*, Vachal; but both of these have the lower section of b. n. much more nearly vertical. *E. libanensis* has a shallow basin-like depression at the base of the metathorax, and the same is well indicated in *Allodape simillima*. There is no doubt that *E. libanensis* is an offshoot from *Allodape*, but it probably arose by a parallel variation, quite independently of the Australian forms. The South-African *Allodape rufogastra*, Lep. (the type of the genus), has the lower section of b. n. oblique as in *Exoneura libanensis*. This is not the case, however, in *A. variegata*, Smith, another species with red abdomen.

In view of the differences noted, *Exoneura libanensis* may be taken as the type of a subgenus (? genus) *EXONEURIDIA*.

*Lithurgus collaris*, Smith.

This Japanese species was described from the male. A female from Formosa, 14½ mm. long, agrees with Smith's description, except for the usual sexual characters, including the roughened mesothorax. The clypeus is longitudinally keeled, and the hair along its front margin, as well as that on lower part of cheeks and front of anterior coxae, is ferruginous. The Polynesian *L. albifimbriatus*, Siehel, has a tuft of black hair just behind the wings, but is otherwise practically the same. The Formosan *L. collaris* was taken by Sauter at Pilam, 1908, and is in the Berlin Museum.

*Andrena albihirta* (Ashmead).

Mr. S. A. Rohwer took both sexes in numbers at flowers of *Salix brachycarpa*, at Florissant, Colorado, June 1 and 2, 1907. The male has no tooth on the mandibles below and is not the same as *A. perarmata*, Ckll., which Viereck in 1904 considered synonymous. True male *A. perarmata*, with toothed mandibles, has been taken by Mrs. Bennett at

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Boulder, Colorado, April 10, at flowers of *Negundo*. male of *A. cockerelli*, Graenicher, has the hair on lower sides of metathorax white, and hair all white on mid hind femora, but otherwise it is like *A. albihirta*. *albihirta* has the hair on sides of metathorax all black good deal of long black hair on all the femora.

*Prosopis mediolucens*, sp. n.

♂.—Length 6 mm. or slightly more.

Black, with yellow markings (turned red by cyanide the type). Head ordinary, rather broad; front extremely densely and minutely punctured, sides of vertex irregularly and more sparsely, showing the shining surface; with large close punctures; face below antennae with supra-clypeal mark ending obtusely between antennae; marks ending at about level of middle of scape, which are obliquely truncate, somewhat notched; scape only rarely thick, with a broad yellow stripe in front; flagellum dark ferruginous above, pale ferruginous beneath; with short white hair, as usual; mesothorax finely and punctured, but shining, scutellum more coarsely and largely punctured; metathorax convex, finely rugulose basal area large, semicircular, smooth and shining; strong transverse ridges laterally; pleura coarsely densely punctured; upper border of prothorax into middle, and tubercles yellow; tegulae light testaceous. Wings clear, stigma ferruginous; first r. n. joining apical corner of first s.m.; second s.m. much longer, high. Legs shining, with the knees, apical third of femora beneath, anterior tibiae except a patch behind, and hind tibiae except a broad subapical annulus, basitarsi yellow; small joints of tarsi ferruginous. Men shining, finely punctured, the first segment and feebly; hind margins of first three segments thinly hairy; apex with a brush of white hair.

*Hab.* Takao, Formosa, Nov. 21, 1907 (Sauter). Museum.

Genus new to Formosa. An ordinary-looking little of Palearctic facies, with face-marks nearly as in the *A. citrinifrons*, Ckll., but recognizable by the character of the metathorax. With a compound microscope it is that the apical half of the metathoracic enclosure has complete transverse ridges, which are quite straight the basal half has four somewhat oblique ridges on each side these being evanescent and more or less coalescent in middle. So far as I know, this sculpturing is unique.

of the Tyrol, among cherry-trees, vines, and figs. The occurrence is very remarkable, since the other species of *Exoneura* are Australian.

Compared with the Australian *E. bicolor*, the Syrian insect is not only in colour, but very conspicuously in the shape of the abdomen and the venation. Compared with *E. bicolor*, *E. libanensis* has the stigma smaller, the apical cell narrower, the second s.m. smaller, and the venation of b. n. much more oblique.

General, *E. libanensis* is very like the Australian *Allo-* *...* Smith, or the African *A. nigricollis*, Vachal; but it has the lower section of b. n. much more vertical. *E. libanensis* has a shallow basin-like depression at the base of the metathorax, and the same is indicated in *Allo-* *...* There is no doubt that *...* is an offshoot from *Allo-* *...* but it probably is a parallel variation, quite independently of the *...* The South-African *Allo-* *...* has the lower section of b. n. *...* This is not the case, *...* Smith, another species with red

as noted, *Exoneura libanensis* may be placed in a subgenus (? genus) *EXONEURIDIA*.

*...* Smith.

described from the male. A *...* long, agrees with Smith's *...* sexual characters, including clypeus is longitudinally *...* as well as that *...* of anterior coxae, is ferruginous, *...* has a tuft *...* wings, but is otherwise practically *...* *L. collaris* was taken by *...* in the Berlin Museum.

*...* (Ashmead).

both sexes in numbers at flowers *...* at Florissant, Colorado, June 1 and 2, *...* on the mandibles below and *...* which Viereck in 1904 *...* male *A. perarmata*, with *...* by Mrs. Bennett at

Boulder, Colorado, April 10, at flowers of *Negundo*. The male of *A. cockerelli*, Gravenicher, has the hair on lower half of sides of metathorax white, and hair all white on middle and hind femora, but otherwise it is like *A. albihirta*. Male *albihirta* has the hair on sides of metathorax all black and a good deal of long black hair on all the femora.

*Prosopis mediolucens*, sp. n.

♂.—Length 6 mm. or slightly more.

Black, with yellow markings (turned red by cyanide in the type). Head ordinary, rather broad; front extremely densely and minutely punctured, sides of vertex irregularly and more sparsely, showing the shining surface; clypeus with large close punctures; face below antennae yellow; supraclypeal mark ending obtusely between antennae; lateral marks ending at about level of middle of scape, where they are obliquely truncate, somewhat notched; scape only moderately thick, with a broad yellow stripe in front; flagellum dark ferruginous above, pale ferruginous beneath; thorax with short white hair, as usual; mesothorax finely and closely punctured, but shining, scutellum more coarsely and irregularly punctured; metathorax convex, finely rugulose, but basal area large, semicircular, smooth and shining, with strong transverse ridges laterally; pleura coarsely and densely punctured; upper border of prothorax interrupted in middle, and tubercles yellow; tegulae light testaceous. Wings clear, stigma ferruginous; first r. n. joining extreme apical corner of first s.m.; second s.m. much longer than high. Legs shining, with the knees, apical third of anterior femora beneath, anterior tibiae except a patch behind, middle and hind tibiae except a broad subapical annulus, and the basitarsi yellow; small joints of tarsi ferruginous. Abdomen shining, finely punctured, the first segment sparsely and feebly; hind margins of first three segments at sides thinly hairy; apex with a brush of white hair.

*Hab.* Takao, Formosa, Nov. 21, 1907 (Sauter). Berlin Museum.

Genus new to Formosa. An ordinary-looking little species of Palearctic facies, with face-marks nearly as in the American *P. citrinifrons*, Ckll., but recognizable by the character of the metathorax. With a compound microscope it is seen that the apical half of the metathoracic enclosure has three complete transverse ridges, which are quite straight, while the basal half has four somewhat oblique ridges on each side, these being evanescent and more or less coalescent in the middle. So far as I know, this sculpturing is unique.

*Epeolus peregrinus*, sp. n.

♂.—Length about 7 mm.; expanse about 14.

Black, including legs and antennae, except that the scape has a red spot at extreme base; pubescent markings white; apical half of mandibles dark reddish; labrum coarsely rugoso-punctate, with a pair of little tubercles on the lower part; eyes pale grey, orbits strongly converging below; face, except lower margin of clypeus, densely covered with white hair; third antennal joint much longer than fourth, but not as long as fourth and fifth together; sides of vertex shining, with very large punctures; occipital margin sharp; cheeks covered with white hair; white hair on upper border of prothorax interrupted in middle, the interval finely punctured; mesothorax and scutellum shining, with large irregular punctures; mesothorax with a pair of short, broad, greyish-white hair-bands anteriorly, one half as long on each margin in front of tegulae, and a spot at each posterior corner; scutellum projecting but obtuse, with a strong median depression; axillar teeth thick, well-developed; mesopleura and mesosternum densely covered with white hair, but a dusky band extends obliquely upwards and forwards from middle coxae halfway across pleura, and ventrally there is a small black spot on each side; tegulae black, punctured, the margin slightly reddish. Wings strongly smoky, stigma and nervures very dark rufo-piceous; marginal cell very obtuse at end, not appendiculate; second s.m. narrowed almost to a point above, very broad below, receiving first r. n. far beyond the middle. Tibiae and tarsi with white hair on outer side, tarsi with ferruginous on inner; spurs dark. First abdominal segment broadly covered with white hair at sides, the inner excavation broad and rounded, ending posteriorly in a point, where the apical band ends obliquely, being as widely interrupted on the margin as the breadth of the median black area; second segment with a very broad band on each side, having a large anterior lobe laterally, the band squarely interrupted, the interval about equal to either lateral section; remaining segments with large subdorsal spots, the third also with lateral spots; first ventral segment with sharp ridges forming a sort of very broad Y; fourth with a fringe of black curled hairs ("Wimperhaare" of Friese).

*Hab.* Nasik, N.W. India, Sept. 28, 1908 (*N. B. K.*).  
British Museum.

Nurse records *E. pictus* (Nyl.) from Quetta; otherwise the genus is new to India.

*Nomioides karachensis*, sp. n.

♀.—Length about 7 mm.

Head and thorax brassy green, with quite abundant hair, especially long, forming a sort of radiating tuft on postscutellum; head shaped like male *N. variegata* (figured by Handlirsch), with the red eyes deeply enate; front granular and punctured, vertex more shining; clypeus small, shining, sparsely punctured, pale yellow, black behind except at base; flagellum ferruginous, infuscated above; mesothorax and scutellum shining; tubercles, extending to line on prothorax yellow, and a pale spot in middle of rather projecting scutellum; sides of prothorax beneath dark purplish of metathorax granular, plicatulate basally, and with of very white hair on each side; tegulae hyaline, yellowish spot. Wings milky hyaline, nervures a large stigma very pale yellowish; marginal cell rather obliquely truncate at apex; second and third submarginal cells greatly narrowed above; first r. n. meeting second t.c. very strongly bent. Legs black basally; the ends of femora more or less broadly, the tibiae and the tarsi yellow, the hind tibiae with a large dusky patch in the middle. Abdomen light yellow, broad, dull, only the hind segments shining; first segment with a dark greenish patch on each side basally and a narrow, black, transverse subapical band, not nearly reaching the lateral margin; segments 2 to 4 with dusky lateral basal marks, those of segment 3 largest and darkest; sides of apical region with long white hair; apical half of venter very strongly stained with brown.

*Hab.* Karachi, N.W. India, July 1909 (*E. C.*).  
British Museum.

Very distinct by its large size and pallid abdomen, it closely resembles the American *Perdita pallidior*, Cresson, and its allies. The face-markings are nearly as in the smaller *Nomioides parvula* (Fabr.).

*Epeolus peregrinus*, sp. n.

Length about 7 mm.; expanse about 14.  
 Head, including legs and antennae, except that the scape  
 has a dark spot at extreme base; pubescent markings white;  
 half of mandibles dark reddish; labrum coarsely  
 punctate, with a pair of little tubercles on the lower  
 edge; eyes pale grey, orbits strongly converging below; face,  
 lower margin of clypeus, densely covered with white  
 hairs; third antennal joint much longer than fourth, but not  
 as fourth and fifth together; sides of vertex shining,  
 with very large punctures; occipital margin sharp; cheeks  
 with white hair; white hair on upper border of  
 clypeus interrupted in middle, the interval finely punctate;  
 mesothorax and scutellum shining, with large irregular  
 punctures; mesothorax with a pair of short, broad,  
 white hair-bands anteriorly, one half as long on each  
 side in front of tegulae, and a spot at each posterior  
 angle; scutellum projecting but obtuse, with a strong  
 depression; axillar teeth thick, well-developed;  
 meso- and mesosternum densely covered with white  
 hairs; a dusky band extends obliquely upwards and  
 from middle coxae halfway across pleura, and  
 there is a small black spot on each side; tegulae  
 punctate, the margin slightly reddish. Wings  
 with dark stigma and nervures very dark rufo-piceous;  
 cell very obtuse at end, not appendiculate; second  
 cell almost to a point above, very broad below,  
 far beyond the middle. Tibiae and tarsi  
 on outer side, tarsi with ferruginous on  
 dark. First abdominal segment broadly  
 with hair at sides, the inner excavation broad  
 and deep posteriorly in a point, where the apical  
 edge being as widely interrupted on the  
 sides of the median black area; second  
 segment with a broad band on each side, having a large  
 dark spot, the band squarely interrupted, the  
 spot to either lateral section; remaining  
 segments with subdorsal spots, the third also with  
 a subdorsal spot; fourth with sharp ridges forming  
 a central segment with sharp ridges forming  
 a fourth with a fringe of black curled  
 hairs (of Friese).

India, Sept. 28, 1908 (N. B. K.).

*E. pictus* (Nyl.) from Quetta; otherwise  
 from India.

The present species belongs to Friese's group 1 (dark  
 forms), and by the character of the labrum is allied to  
*E. tristis*, Smith, differing by the smaller size and the  
 markings of the abdomen.

*Nomioides karachensis*, sp. n.

♀.—Length about 7 mm.

Head and thorax brassy green, with quite abundant white  
 hair, especially long, forming a sort of radiating tuft, on  
 postscutellum; head shaped like male *N. variegata* (as  
 figured by Handlirsch), with the red eyes deeply emarginate;  
 front granular and punctured, vertex more shining;  
 clypeus small, shining, sparsely punctured, pale yellow;  
 lateral face-marks very small, oblong, situated between  
 clypeus and base of mandibles; mandibles simple, pale  
 yellow, with the apex ferruginous; scape slender, pale  
 yellow, black behind except at base; flagellum ferruginous,  
 infuscated above; mesothorax and scutellum brilliantly  
 shining; tubercles, extending to line on prothorax, pale  
 yellow, and a pale spot in middle of rather projecting post-  
 scutellum; sides of prothorax beneath dark purplish; area  
 of metathorax granular, plicatulate basally, and with a tuft  
 of very white hair on each side; tegulae hyaline, with a  
 yellowish spot. Wings milky hyaline, nervures and the  
 large stigma very pale yellowish; marginal cell rather broadly  
 obliquely truncate at apex; second and third submarginals  
 greatly narrowed above; first r. n. meeting second t. c.; b. n.  
 very strongly bent. Legs black basally; the ends of the  
 femora more or less broadly, the tibiae and the tarsi pale  
 yellow, the hind tibiae with a large dusky patch in front.  
 Abdomen light yellow, broad, dull, only the hind margins of  
 the segments shining; first segment with a dark greenish  
 patch on each side basally and a narrow, black, transverse,  
 subapical band, not nearly reaching the lateral margins;  
 segments 2 to 4 with dusky lateral basal marks, those on 2  
 largest and darkest; sides of apical region with long white  
 hair; apical half of venter very strongly stained with dark  
 brown.

*Hab.* Karaclii, N.W. India, July 1909 (E. Comber).  
 British Museum.

Very distinct by its large size and pallid abdomen, wherein  
 it closely resembles the American *Perdita pallidior*, Ckll., and  
 its allies. The face-markings are nearly as in the much  
 smaller *Nomioides parvula* (Fabr.).

*Nomioides comberi*, sp. n.

♂.—Length 6 mm. or slightly more.

Head and thorax bluish green, truncation of metathorax yellower; abundant white hair as in *N. karachensis*, with the same tuft on postscutellum; clypeus, labrum, small round mark between clypeus and base of mandibles, and mandibles except ferruginous apex all white; eyes very deeply emarginate; shape of head about as in male *N. fallax* (as figured by Handlirsch), but emargination of eyes much stronger; face and cheeks with much white hair; front dullish, granular, vertex shining; scape short, cream-colour, black behind; flagellum long, rather thickened apically, black above, beneath pale brown, reddish at base, joints 9 to 12 whitish, last joint black beneath, strongly contrasting; upper border of prothorax and tubercles white; no light marks on scutellum or postscutellum; mesothorax and scutellum shining; area of metathorax very finely transversely striate, the striation passing into a cancellate pattern in the middle; tegulae hyaline, with an angular white patch. Wings perfectly clear, strongly iridescent; stigma and nervures very pale yellow; second r. n. bowed outwards; first r. n. meeting second t.-c. or entering base of third s. m. Legs marked as in *N. karachensis*, but the hind tibiae and all the tarsi are white, though the anterior and middle tibiae are light canary-yellow. Abdomen rather narrow, shining, black above and below, with pale yellow bands on segments 2 to 5, the first two slightly interrupted, or the first entire, the last two broadly interrupted; venter without bands.

*Hab.* Karachi, N.W. India, three males (*E. Comber*). British Museum. One is dated September-1909.

This is too different from *N. karachensis* to be its male. There is some resemblance to *N. variegata* (Oliv.), but the large size and peculiar coloration of the antennae readily distinguish it.

In his last publication (Trans. Ent. Soc. London, Sept. 1908) Edward Saunders removed *Nomioides* from the vicinity of *Halictus* and placed it between *Cilissa* and *Panurgus*. It certainly appears to have Panurgine affinities, as shown by the truncate marginal cell, the slender tongue, and the general appearance. The species look exactly like species of the American Panurgid genus *Perdita*, and it is difficult to believe that *Perdita* did not arise either from *Nomioides* or some close relative now extinct. There are, however, great differences in the mouth-parts as well as the venation; thus

On Cocoons of the Genus *Trichostibas*.

in *Perdita* the maxillary blade far exceeds the palpus, the reverse is true in *Nomioides*. If *Perdita* is related to *Nomioides*, as suggested, we have a remarkable illustration of the persistence of colour-patterns in the face of structural changes; and as the different colour-type *Nomioides* can hardly have given rise separately to several types of *Perdita*, we have also an illustration of kaleidic variation, the characters combining in various ways, sorting out again, no doubt according to Mendelian principles. A strong argument against the suggested relationship must be based on the facial foveae of *Perdita*—certainly an Andrenoid character.

XXVII.—Notes on the Cocoons and Descriptions of *Trichostibas* Species of the Genus *Trichostibas*. By EMBRIK SEIDT, of the Royal Berlin Zoological Museum.

In his interesting paper on the genus *Trichostibas* U.S. Nat. Mus. vol. xxxviii. no. 1765, October 15, Mr. August Busck describes, besides new species, a cocoon, referring to the previous accounts of the should, however, like to point out that more accounts of these cocoons exist in the literature, Bates, 'Naturalist on the Amazons,' and in Blanchard, 'Metamorphoses, Mœurs et Instinctes des Insectes,' 1877. Bates figures and describes (l. c. p. 379, German edition: Leipzig, Dyk'sche Buchhandlung) the cocoon and gives also a most interesting account of the manner in which the larva manages to construct work of the cocoon. Bates gives his insect no name, regards it as belonging to the Lithosiidae, which is explained through the great similitude of the moth genus *Trichostibas* to the Lithosiidae; owing to this, Walsingham points out (Proc. Zool. Soc. London, p. 115) that if Walker described the specimens of *stibas fumosa* Z., which probably are in the British Museum, "he would be most likely to locate the species in the Lithosiidae." Blanchard gives (l. c. p. 298) a figure of the cocoon which he ascribes to an "Alucita du Brésil."

In the Royal Berlin Zoological Museum are several cocoons of this kind, most of them belonging to the former Seidti Collection, now in the possession of the Museum. Remarks on these may not be without interest, as to

*Nomioides comberi*, sp. n.

Length 6 mm. or slightly more.

Head and thorax bluish green, truncation of metathorax clear; abundant white hair as in *N. karachensis*, with one tuft on postscutellum; clypeus, labrum, small round space between clypeus and base of mandibles, and mandibles ferruginous apex all white; eyes very deeply emarginate; shape of head about as in male *N. fallax* (as figured by Hirsch), but emargination of eyes much stronger; cheeks with much white hair; front dullish, vertex shining; scape short, cream-colour, black at base; flagellum long, rather thickened apically, black beneath pale brown, reddish at base, joints 9 to 12 black, last joint black beneath, strongly contrasting; upper part of prothorax and tubercles white; no light marks on humer or postscutellum; mesothorax and scutellum yellow; area of metathorax very finely transversely striate, venation passing into a cancellate pattern in the middle; wings hyaline, with an angular white patch. Wings perfectly clear, strongly iridescent; stigma and nervures very yellow; second r. n. bowed outwards; first r. n. meeting at base of third s. m. Legs marked as in *N. karachensis*, but the hind tibiae and all the tarsi are yellow, though the anterior and middle tibiae are light canary-yellow. Abdomen rather narrow, shining, black above and with pale yellow bands on segments 2 to 5, the first band slightly interrupted, or the first entire, the last two segments interrupted; venter without bands.

Karachi, N.W. India, three males (*E. Comber*).  
Museum. One is dated September 1909.

It is different from *N. karachensis* to be its male. It resembles to *N. variegata* (Oliv.), but the peculiar coloration of the antennae readily

separation (Trans. Ent. Soc. London, Sept. 1909). Staudinger removed *Nomioides* from the vicinity of *Panurgus* and placed it between *Cilissa* and *Panurgus*. It appears to have Panurgine affinities, as shown by the shape of the marginal cell, the slender tongue, and the venation. The species look exactly like species of the Panurgid genus *Perdita*, and it is difficult to see that *Perdita* did not arise either from *Nomioides* or from a relative now extinct. There are, however, great differences in the mouth-parts as well as the venation; thus

in *Perdita* the maxillary blade far exceeds the palpus, while the reverse is true in *Nomioides*. If *Perdita* is related to *Nomioides*, as suggested, we have a remarkable illustration of the persistence of colour-patterns in the face of great structural changes; and as the different colour-types of *Nomioides* can hardly have given rise separately to similar types of *Perdita*, we have also an illustration of kaleidoscopic variation, the characters combining in various ways and sorting out again, no doubt according to Mendelian principles. A strong argument against the suggested relationship may be based on the facial foveae of *Perdita*—certainly an Andrenoid character.

XXVII.—Notes on the Cocoons and Descriptions of Four new Species of the Genus *Trichostibas*. By EMBRIK STRAND, of the Royal Berlin Zoological Museum.

IN his interesting paper on the genus *Trichostibas* (Proc. U.S. Nat. Mus. vol. xxxviii. no. 1765, October 15, 1910) Mr. August Busck describes, besides new species, also the cocoons, referring to the previous accounts of these. I should, however, like to point out that more and older accounts of these cocoons exist in the literature, viz., in Bates, 'Naturalist on the Amazons,' and in Blanchard, 'Metamorphoses, Mœurs et Instinctes des Insectes,' 2<sup>e</sup> édit. 1877. Bates figures and describes (*l. c.* p. 379 of the German edition: Leipzig, Dyk'sche Buchhandlung, 1866) the cocoon and gives also a most interesting account of the manner in which the larva manages to construct the network of the cocoon. Bates gives his insect no name, but regards it as belonging to the Lithosiidae, which is easily explained through the great similitude of the moths of the genus *Trichostibas* to the Lithosiidae; owing to this similitude, Walsingham points out (Proc. Zool. Soc. London, 1897, p. 115) that if Walker described the specimens of *Trichostibas fumosa* Z., which probably are in the British Museum, "he would be most likely to locate the species in the Lithosiidae." Blanchard gives (*l. c.* p. 298) a figure of the cocoon, which he ascribes to an "Alucita du Brésil."

In the Royal Berlin Zoological Museum are several cocoons of this kind, most of them belonging to the former Staudinger Collection, now in the possession of the Museum. A few remarks on these may not be without interest, as they differ