THE INDIAN SPECIES OF THE GENUS *XYLOCOPA* LATR. (HYMENOPTERA).

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CONTENTS.

INTRODUCTION.

The present paper is an attempt to revise the Indian[1] species of the genus *Xylocopa* Latr. (Hymenoptera, Xylocopidae) in the light of recent advances on the subject, and is based mainly on collections of the Zoological Survey of India in the Indian Museum, Calcutta. Through the kind help of the authorities of the Survey, I have also been able to study other official collections in the country, and have examined the entire collection of Indian Xylocopids of the Deutsches Entomologisches Institut of Berlin-Dahlem.

I have as far as possible used structural characters for the separation of species both in the descriptions and in the keys, as the colouration and body-size of these insects are often very misleading and are practically of little value as primary specific characters.

In the descriptions of genera and species I have followed Comstock[2] for the terminology of the wing-venation, Allen and Jaynes[3] for that of punctuation, and Reinig[4] for the pubescence. In regard to the orientation of the insect, I have adopted the method suggested by Maulik[5] in his account of the Galerucine beetles.

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[1] The limits of "India" in this revision are the same as outlined by Blanford in the Introduction of the *Mammalia* volume (p. iv) in the "Fauna of British India Series" (1888).

[2] Comstock, J. H., *The Wings of Insects.* (Ithaca, 1918.)

[3] Allen and Jaynes, *Proc. U. S. Nat. Mus.* LXXVI, Art. 17, p. 4, figs. (1930).

[4] Reinig, W. F., *Sitzungsb. Ges. Naturf. Freunde Berlin*, p. 103, figs. 1-5 (1933).

[5] Maulik, S., *Fauna of British India, Coleoptera, Chrysomelidae, Galerucinae*, p. 3, fig. 1 (1936).

I wish to take this opportunity to express my sincere gratitude to Dr. Baini Prashad, Director of the Zoological Survey of India, Indian Museum, Calcutta, for his hospitality, guidance, criticism and for his kindness in revising the manuscript of my paper. To Dr. H. A. Hafiz, Assistant Superintendent and Officer-in-charge of the Entomological Section of the Zoological Survey of India, I am greatly indebted for his encouragement, supervision, suggestions and other help. I have also to thank the following gentlemen for their kind and generous help in various ways during the course of my study : Prof. Dr. H. Friese of Schwerin i/Mecklenburg, Germany ; Dr. O. W Richards of London, England ; Prof. Emeritus Dr. T. D. A. Cockerell of Boulder, Colorado, U. S. A. ; Dr. R. Benoist of Paris, France ; Herr J. D. Alfken of Bremen, Germany ; Dr. F. Maidl of Vienna, Austria ; Mr. V B. Popov of Leningrad, U. S. S. R. ; Mr. H. T. Pagden of Kuala Lumpur, F. M. S. ; Dr. R. Malaise of Stockholm, Sweden ; Dr. Olaw Schröder of Kiel, Germany ; and Dr. K. L. Henriksen of Copenhagen, Denmark. Finally I am greatly indebted to the authorities of various other institutes for their generosity in loaning me valuable material from the collections under their charge.

HISTORICAL ACCOUNT.

When Linné published his *Systema Naturae* (10th edition, 1758), almost all the known bees (now assigned to the superfamily Apoidea) were included in the single genus *Apis* Linné. Later authors such as Drury (1773), De Geer (1773), Fabricius (1775 *et seq.*) and others partly or entirely followed this arrangement. Latreille (1802) separated the wood-boring bees under the generic name *Xylocopa*. But the generic characters were not yet clearly and definitely defined, and even Fabricius, while accepting this new name, included some true *Xylocopa*-species under the genera *Apis*, *Bombus*, and *Centris*. Jurine (1807) similarly classified some species under *Trachusa* and *Bremus* (=*Bombus*), while Klug (1808) placed *X. carolina* (F.) (=*X. virginica* Drury) in *Megilla*. On the other hand, under the genus *Xylocopa*, Fabricius (1804) included *Chalicodoma muraria* (Rets.), and Lepeletier (1825) *Osmia aurulenta* (Panz.).

In 1807, Klug erected a new genus *Acanthopus* with Fabricius's *X. splendida* as its type. In 1825, Lepeletier split *Apis bombylans* F. from *Xylocopa* and made it the type of his new genus *Lestis*. The same author, in 1841, first attempted to divide the genus *Xylocopa* into the subgenera *Audinetia* and *Schönherria ;* this division, however, has not been accepted by later workers. The genera *Mesotrichia* Westw. (1838), *Platynopoda* Westw. (1840) and *Coptorthosoma* Grib. (1894) met with the same fate until the year 1899 when Ashmead fully revised the classification of the superfamily Apoidea and split the old genus *Xylocopa* into 5 genera : *Xylocopa*, s. s. (with *Schönherria* as a synonym), *Mesotrichia*, *Platynopoda* (with *Audinetia* as a synonym), *Coptorthosoma* and his new genus *Cyaneoderes*. Ashmead's system has, however, only partially been accepted by some authors. Most of the authors, due to lack of appropriate and reliable subgeneric or even specific characters, still follow the old and rather artificial system of grouping. Maidl's

work (1912) is a noteworthy exception, as he classifies about one-third of the known species from the Oriental, Nearctic and Neotropical Regions into natural groups. The 35 Oriental species dealt with in this paper are separated into *auripennis*-, *amethystina*-, *latipes*-, *confusa*-, and *phalothorax*-groups.

I divide the Indian species of the genus *Xylocopa* into two sections, A and B. In section A are included the subgenera *Proxylocopa* Hed. *Nyctomelitta* Ckll., *Biluna*, nov., *Xylocopa*, s. s., *Ctenopoda*, nov., *Nodula*, nov. and *Zonohirsuta*, nov. ; while section B consists of the subgenera *Orbitella*, nov., *Cyaneoderes* Ashm. and *Platynopoda* Westw.

SYSTEMATIC ACCOUNT.

Genus **Xylocopa** Latr.

1802. *Xylocopa*, Latreille, *Hist. Nat. Ins.* III, p. 379.

Head transverse, subrotundate ; breadth in cephalic aspect usually about 5/4 as long as the length. Ocelli usually placed a little below the level of upper orbital extremities. Eyes lateral, elongate-ovate ; inner orbits in ♀ usually convergent to each other at both upper and lower extremities. Coronal suture weak and short, extending from ocellar triangle to vertex, where it is in many cases represented by a broad, shallow, unpunctate depressed area. Frontal suture short, extending from the junction of epistomal and clypeal sutures to lower margin of antennal fossae. Frontal keel sometimes inconspicuous, but usually with a medial fovea lying immediately below the lower margin of medial ocellus. Area surrounding antennal fossae shallow, usually longitudinally depressed. Epistomal suture weak, in most cases straight. Clypeal suture almost straight in basal portion but very weak and sometimes running at a tangent to inner orbits in the apical portion. Tentorial pits lying at a point about 1/4 or 1/5 from the base of clypeal suture. Labrum when at rest concealed under clypeus and mandibles ; apical margin medially emarginated ; apical marginal area very flat, smooth, narrow and separated from the basal area by a broad, V-shaped transverse ridge ; basal area heavily punctate or strongly rugose, medially with a small triangular or oblong basal unpunctate band. Mandibles stout, short, grooved both externally and internally ; lateral surface exteriorly triangular. Maxillary palpi 6-segmented, the apical 5 each in succession decreasing in length and in thickness, but sometimes apical segment longer than penultimate one. Labial palpi 4-segmented, I about 5 times as long as II ; III and IV very minute and inserted in a line with I and II. Length of genae never more than 3/5 of the breadth, sometimes the base of mandibles lies tangentially to lower orbits and thus makes the genae slightly interrupted. Interspaces between lateral ocelli and inner orbits usually unpunctate or only sparsely punctate. Of the antennal segments III is by far the longest. Tegulae usually smooth and unpunctate. Wing venations as shown by Bingham (1897) for *X. dissimilis* Lep. (=*X. nasalis* Westw.) but vein *r-m* in a few cases basally or entirely suppressed. Anterior coxae usually with a sharp, slender posterior projection. Anterior and intermediate tibiae ventrally each with one

simple apical spur and dorsally with one snout-like sharp projection. Antenna-cleaners usually sharply pointed and with a basal rectangular membranous projection and a saw-toothed apico-interior margin. Posterior tibiae with two simple apical spurs : the exterior one longer and stronger ; dorsal surface usually with a more or less distinct knee-cap. Claws bifid, outer teeth usually longer than the inner. Abdomen mostly broadly flat, sometimes cylindrical. Punctures on abdominal tergites usually sparse shallowest on basal segments and increasing in succession towards the apex both in density and depth. Abdominal sternites medially unpunctate ; punctures always larger, deeper and denser than those on abdominal tergites. Spiracular tubercles on abdominal tergites usually degenerated into shallow, short sutures, bordered by small patches of minute punctures.

This generic description is based on the works of Illiger, Lepeletier, Klug, F. Smith, Bingham and Friese. For a detailed anatomical account reference may be made to Snodgrass's " Anatomy and Physiology of the Honey Bee " (1925).

Genotype.—Apis violacea Linné (1758) from the Palaearctic Region (Lectotype).

Distribution.—Cosmopolitan, but more abundant in the tropics.

In the following table are indicated the more important points of sexual dimorphism as exhibited by members of the genus :

Characters	Male	Female
Size	Usually smaller	Usually larger
Colouration	Usually lighter, often with pale face markings	Usually darker, never with pale face markings
Inner orbits	Usually narrowly separated, convergent or parallel to each other	Usually widely separated, convergent to each other at both upper and lower extremities
Frontal keel	Stronger and longer	Weaker and shorter
Clypeal suture	Curved, L-shaped, sometimes almost straight	Curved in an S-shaped manner
Clypeus	Punctuation sparser	Punctuation denser
Labrum	Heavily punctate, without tubercles, transverse ridge weak	Usually strongly rugose, shagreened and with tubercles ; transverse ridge strong
Mandibles	Weaker, thinner and longer, never tri-dentate	Stronger, thicker and shorter, sometimes tri-dentate
Genae	Shorter	Longer
Antennae	13-segmented, sometimes scape greatly dilated	12-segmented, scape never greatly dilated
Metathorax	Posteriorly more sharply edged	Posteriorly less sharply edged
Propodeum	Usually more exposed	Usually less exposed

Characters	Male	Female
Coxae	More dilated	Less dilated
Posterior femora	More sparsely punctate, more strongly keeled, sometimes with strong spur-like projections	Less sparsely punctate, less strongly keeled, never with spur-like projections
Posterior tibiae	Apically more strongly incrassate; apical spur stronger	Apically never strongly incrassate; apical spur weaker
Knee-caps	Much weaker, sometimes invisible	Much stronger, always visible
Posterior metatarsi	Sometimes basally swollen or flattened	Never flattened
Claws	Inner teeth relatively longer, less divergent from the outer	Inner teeth relatively shorter, more divergent from the outer
Abdominal segments	With 7 visible tergites	With 6 visible tergites
Epipygium	Medially never furrowed, posteriorly sometimes (but never dorsally) with submedial processes	Medially usually furrowed; sometimes dorsally (but never posteriorly) with submedial processes
Hypopygium	Apically broadly rounded; medial keel usually weaker	Apically narrowly rounded; medial keel usually stronger

Colour variation of the specimens has to be considered both for individuals and for races. In the case of the latter it is heritable but not so in the former. Generally in any locality we do not find more than one geographical race of one species, but series of specimens which are slightly different from each other in colouration or even structural characters of minor diagnostic importance may be found in the same area. In 1924, Dover published an account of the polymorphism of *Xylocopa aestuans* (Linné), but his work needs further confirmation.

The portion of body most liable to vary in colouration is the integument. In freshly emerged adults it usually exhibits more reddish-purplish tints especially on the propodeum, wings, legs, thoracic sternites and apical margin of the abdominal segments. In poorly preserved specimens and more aged adults, it is much darker, with less brilliancy on the wings. Wings of specimens preserved in alcohol are usually more greenish with less pronounced metallic lustre.

Key to Indian subgenera. ♂.

1. Scutellum and postscutellum running gradually into the succeeding segments[1] ..... 2.
   Scutellum and postscutellum sharply marked off from the succeeding segments by a distinct ridge of varying height[2] ..... 8.
2. Knee-caps on posterior tibiae absent ..... 3.
   Knee-caps on posterior tibiae present ..... 4.

[1] This division corresponds to Section A, *vide* p. 267.
[2] This division corresponds to Section B, *vide* p. 267.

3.	Face without unpunctate crescent-shaped markings laterad to median ocellus ..	*Proxylocopa* Hed.
	Face with unpunctate crescent-shaped markings laterad to median ocellus	*Biluna*, subgen. nov.
4.	Ocelli greatly enlarged, median ocellus elliptical ..	*Nyctomelitta* Ckll.
	Ocelli of ordinary size, median ocellus rounded	5.
5.	Transverse ridges laterad to median ocellus present ..	*Nodula*, subgen. nov.
	Transverse ridges laterad to median ocellus absent ..	6.
6.	Knee-caps of posterior tibiae bifurcate; spiracular tubercles on III abdominal tergite with teeth-like projections	*Ctenopoda*, subgen. nov.
	Knee-caps of posterior tibiae simple; spiracular tubercles on III abdominal tergite without teeth-like projections ..	7.
7.	Disc of mesonotum unpunctate.. ..	*Xylocopa* Latr., *s. s.*
	Disc of mesonotum punctate ..	*Zonohirsuta*, subgen. nov.
8.	Inner orbits weakly divergent at their upper extremities; dorsum of II-VI abdominal tergites very thickly pubescent	*Orbitella*, subgen. nov.
	Inner orbits converging at their upper extremities; dorsum of II-VI abdominal tergites very sparsely pubescent	9.
9.	Anterior metatarsi not dilated; vein *r-m* incomplete	*Cynaeoderes* Ashm.
	Anterior metatarsi greatly dilated; vein *r-m* complete	*Platynopoda* Westw.

Key to Indian subgenera. ♀.

1.	Scutellum running gradually into postscutellum, only separated by a suture; posterior portion of scutellum never projecting over the postscutellum which is at almost the same level	2.
	Scutellum sharply marked off from postscutellum by a distinct ridge of varying height, its posterior portion projecting over postscutellum which lies at a much lower level	8.
2.	Epipygium medially carinated	*Proxylocopa* Hed.
	Epipygium medially furrowed ..	3.
3.	Unpunctate crescent-shaped markings laterad to median ocellus present; knee-caps of posterior tibiae simple	*Biluna*, subgen. nov.
	Unpunctate crescent-shaped markings laterad to median ocellus absent; knee-caps of posterior tibiae bifurcate	4.
4.	Ocelli greatly enlarged, median ocellus elliptical ..	*Nyctomelitta* Ckll.
	Ocelli of ordinary size, median ocellus rounded	5.
5.	Transverse ridges between lateral ocelli present	*Ctenopoda*, subgen. nov.
	Transverse ridges between lateral ocelli absent	6.
6.	Mandibles tri-dentate	*Xylocopa* Latr., *s. s.*
	Mandibles bi-dentate	7.
7.	Transverse ridges anterior to lateral ocelli present; disc of mesonotum with a broad unpunctate band	*Nodula*, subgen. nov.
	Transverse ridges anterior to lateral ocelli absent; disc of mesonotum sparsely punctate but without distinct unpunctate area ..	*Zonohirsuta*, subgen. nov.
8.	Upper orbital distance greater than the lower	*Orbitella*, subgen. nov.
	Upper orbital distance less than the lower ..	9.
9.	Dorsum of thorax and of I abdominal tergite thickly pubescent; vein *r-m* incomplete ..	*Cynaeoderes* Ashm.
	Dorsum of thorax and of I abdominal tergite very sparsely pubescent; vein *r-m* complete ..	*Platynopoda* Westw.

Subgenus **Proxylocopa** Hed.

1930. *Xylocopa olivieri*-Gruppe, Alfken, *Deutsch. Ent. Zeitschr.*, p. 77.
1938. *Proxylocopa* Hedicke, *Deutsch. Ent. Zeitschr.*, p. 192.

Body of small size. Integument more or less rufous ; ♂ with pale face markings ; wings subhyaline. Pubescence more or less fulvous. Inner orbits straight, running parallel to each other. Frontal keel distinct. Ocelli greatly enlarged ; base of ocellar triangle about thrice as long as the lateral sides. Mandibles bidentate. Disc of mesonotum with a very small unpunctate area. Vein R_5 perpendicular to vein M_{1+2} ; vein R_4 acutely angulate near the middle. Knee-caps absent in ♂ ; in ♀ laterally situated, pear-shaped. Outer and inner teeth of claws in ♂ almost parallel. Epipygium of ♀ with a strong V-shaped carina in the middle. Hypopygium feebly keeled in ♀.

Type.—*Xylocopa olivieri* Lepeletier (1841).

This subgenus, known from the Palaearctic Region only, appears to be the most primitive group of this genus. It is closely related to *Nyctomelitta* Ckll. in structure and is similar in the nocturnal habit. In addition to the type-species, I assign *X. nitidiventris* F. Sm., *X. morawitzi* J. Per., *X. zonata* Alfk., *X. versicolor* Alfk., *X. pavlovskyi* Popov and *X. rufa* (Friese) to this subgenus. *X. rufa* alone is represented in India.

Xylocopa rufa (Friese).

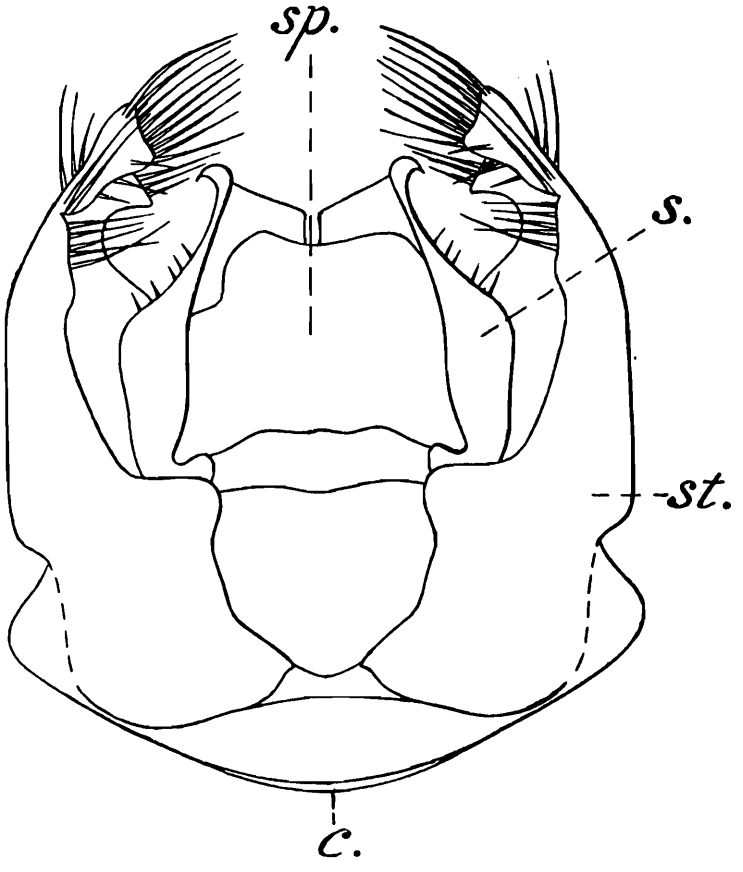
1901. *Xylocopa olivieri* var. *rufa*, Friese, *Bien. Eur.* VI, p. 221, ♀.
1901. *Xylocopa erivanensis*, J. Perez, *Actes Soc. Linn. Bordeaux* LVI, p. 19, ♂.
1903. *Xylocopa* sp., Nurse, *Journ. Bombay Nat. Hist. Soc.* XV, p. 360.
1912. *Xylocopa* (*Xylocopa*) *olivieri* var. *rufa*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 260.
1925. *Xylocopa olivieri rufa*, Dover, *Ann. May. Nat. Hist.* (9) XV, p. 224.
1930. *Xylocopa rufa*, Alfken, *Deutsch. Ent. Zeitschr.*, p. 77, ♀♂.

♂.—*Integument.*—Black ; antennae, tegulae, legs and abdominal segments except median portions of tergites I-V bright rufous ; supraclypeal region, clypeus and basal half of labrum milky white. Wings fulvo-hyaline, darkest along external margin and palest along posterior margin.

Pubescence.—Front and postgenae with thick velvety whitish hairs of *I*-type, mixed with some scattered long yellowish ones of *IIa*-type. Clypeus with long yellowish hairs only. Thorax, legs, posterior and lateral margin of abdominal segments thickly covered with velvety hairs of yellowish red colour ; these are palest on thoracic pleurites and darkest on legs and posterior abdominal tergites.

Structure.—Inter-orbital distance about 7/11 of vertico-clypeal distance. Front very finely and evenly punctate in first-degree density. Frontal keel narrow and strong ; median fovea V-shaped, very short. Supraclypeal region shallowly punctate in third-degree density, without median unpunctate band, only slightly more elevated than the neighbouring frontal regions. Epistomal suture straight, not ridged. Tentorial pits weak. Clypeus bipunctate, primary punctures shallow, in second-degree density ; median unpunctate band flat ; apical margin projecting out a little beyond mandibular bases. Labrum shallowly

punctate in second-degree density ; apical emargination narrow and shallow. Mandibles comparatively slender ; basal triangular area flat, densely punctate, without distinct demarcation with median keel and with outer marginal suture ; inner tooth truncate ; outer tooth narrowly



TEXT-FIG. 1.—Dorsal view of the ♂ genitalia of *Xylocopa rufa* (Friese). ×30.
c. cardo ; *s.* sagitta ; *sp.* spatha ; *st.* stipes.

rounded. Genae unpunctate, short. Postgenae, vertex and interspaces between lateral ocelli and inner orbits evenly punctate in first-degree density. Coronal suture distinct. Inter-ocellar distance about twice as long as ocello-ocular distance. Post-ocellar pits inconspicuous. Inter-antennal distance about twice as long as antenno-ocular distance. Anntennal segment III shorter than segments IV and V ; IV longer than broad ; V and VI subequal. Dorsum of thorax with punctures of varying size, those on marginal area of mesonotum and on posterior portion of scutellum in second-degree density, while those on central portion of mesonotum and on anterior portion of scutellum in third-degree density. Vein *M* shorter than M_{1+2} (1st section) which is equal to M_{1+2} (2nd section) ; vein M_4 parallel to vein *m-m ;* vein *r-m* weakly curved. Inner teeth of claws slightly shorter than the outer. Abdominal tergites finely punctate in third-degree density ; III-IV tergites with a rather broad, median, unpunctate band ; interspace between punctures on the median portion usually more than thrice the diameter of the punctures themselves ; epipygium punctate in second-degree density. Abdominal sternites with a narrow and indistinct median unpunctate band ; hypopygium medially very weakly depressed.

♀.—Differs from male in the following characters :—

Pubescence.—Clypeus with thick velvety whitish hairs of *I*-type.

Structure.—Inter-orbital distance about 3/4 as long as vertico-clypeal distance. Epistomal suture curved. Basal half of labrum with a strong median longitudinal ridge. Both inner and outer teeth of mandibles apically rounded. Inter-ocellar distance about one and a half times as long as ocello-ocular distance. Inter-antennal distance about one and a half times as long as the antenno-ocular distance. Knee-caps weakly elevated, apex blunt, extending over basal 1/5 of the tibial length. Inner teeth of claws of anterior and posterior legs respectively about 1/2 and 2/5 as long as the corresponding outer teeth. Epipygium with a rather broad, smooth, V-shaped carina. Median band of hypopygium punctate and weakly keeled.

Measurements.—♂, length of body 16 mm. ; anterior wing 14 mm. ; breadth of head 5 mm. ; thorax (excl. tegulae) 5 mm. ; thorax (incl. tegulae) 6·5 mm. ; II abdominal segment 8 mm. ♀, length of body 17-19 mm. ; anterior wing 14-15 mm. ; breadth of head 5·5 mm. ; thorax (excl. tegulae) 5·5 mm. ; thorax (incl. tegulae) 7 mm. ; II abdominal segment 8·5-9·5 mm.

Types.—♀, from Sarachs, Turkestan, in the Vienna Museum ; type of *X. erivanensis* J. Per., ♂, from Erivan, in the Paris Museum.

Distribution.—I have studied specimens of this species from the following localities :—

U. S. S. R. : Turkmenia, 1 ♀ (*det.* Popov) ; Firuza, near Ashabad, Turkmenia, 1 ♂, 1 ♀ (*det.* Popov) ; Ckoli, Kopet-Digh Mts., Turkmenia, 1 ♀ (*det.* Popov).

Besides the abovementioned localities and type-locality, this species is also known from Transcaspian, Turkestan (Mts. Gissar) and Bokhara. Dover recorded the species from Quetta, Baluchistan, but I have not seen any Indian material.

Remarks.—The species superficially resembles *Anthophora*, but can be distinguished readily by its concealed labrum, structure of knee-caps (♀) and epipygium (♀).

Subgenus **Nyctomelitta** Ckll.

1929. *Nyctomelitta,* Cockerell, *Ann. Mag. Nat. Hist.* (10) IV, p. 303.

Body of large size. Integument dark reddish, ♂ with reddish yellow face markings. Pubescence more or less fulvous. Inner orbits of ♂ straight and parallel to each other. Frontal keel distinct. Ocelli greatly enlarged, median ocellus elliptical ; base of ocellar triangle about two and a half (♂) or twice (♀) as long as the lateral sides. Mandibles bidentate. Disc of mesonotum with a broad unpunctate area. Vein R_5 straight and forming acute interior angles with vein M_{1+2}. Kneecaps strong, bifurcate, with distinct upper margin. Inner and outer teeth of claws divergent to each other. Submedian processes of epipygium (♀) slender, short, projecting outwards, widely separated. Hypopygium keeled in ♀ only.

Type.—Bombus tranquebaricus Fab. (1804).

This subgenus is known from the Oriental Region only. Besides the type-species, *X. myops* Rits., *X. melli* Hedicke and *X. proximata*, sp. nov. belong to this subgenus.

Key to Indian species. ♂♀.

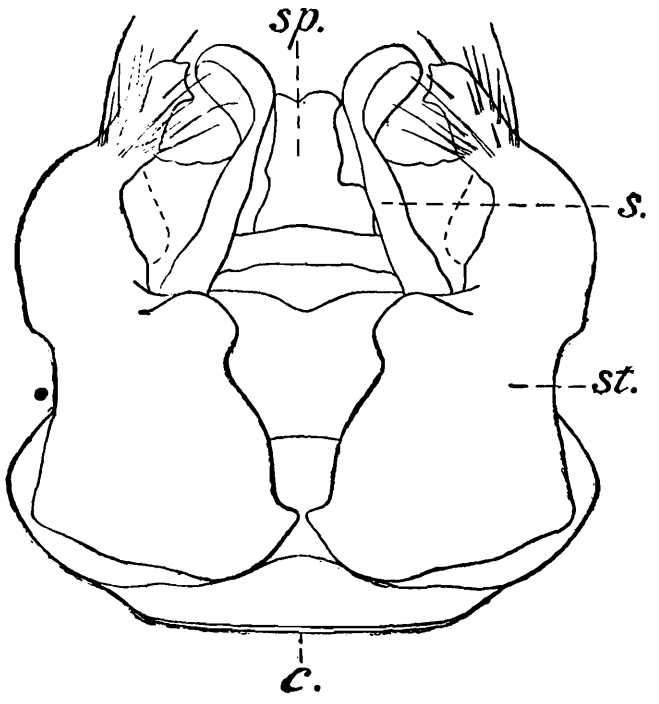
Clypeal suture S-shaped	*tranquebarica* (Fab.).
Clypeal suture L-shaped	*proximata*, sp. nov.

Xylocopa tranquebarica (Fab.).

1804. *Bombus tranquebaricus*, Fabricius, *Syst. Piez.*, p. 343, No. 3.
1806. *Bombus tranquebaricus*, Illiger, *Mag. Insectenkunde* V, p. 172.
1874. *Xylocopa rufescens*, F. Smith, *Trans. Entomol. Soc. London*, p. 271, No. 48, ♀♂.
1894. *Xylocopa* (misprint *Xylocopa*) *rufescens*, Bingham, *Journ. Bombay Nat. Hist. Soc.* VIII, p. 388, No. 39, pl. i, fig. 2, ♀.
1896. *Xylocopa rufescens* and *Bombus tranquebaricus*, Dalla Torre, *Cat. Hymen.* X, pp. 217, and 559.
1897. *Xylocopa rufescens*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 543, No. 954, fig. 182, ♀♂.
1901. *Xylocopa tranquebarica*, Schulz, *Zeitschr. Hymen. Dipt.* I, p. 273.
1906. *Xylocopa rufescens*, Brown, *Philippine Journ. Sci.* I, p. 686.
1912. *Xylocopa tranquebarica*, Maidl (in part), *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 306.
1913. *Xylocopa tranquebarica*, Strand, *Arch. Naturgesch.* LXXIX, A, 2, p. 146.
1917. *Xylocopa tranquebarica*, Cockerell, *Philippine Journ. Sci.* XII, D, p. 346.
1921. *Xylocopa rufescens* (in part) and *X. ferruginea* (*nec* Lepeletier), Dover, *Rec. Ind. Mus.* XXII, p. 390.
1921. *Xylocopa tranquebarica*, Ramakrishna Aiyar, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 98.
1922. *Xylocopa rufescens*, Dover, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 962.
1922. *Xylocopa tranquebarica* (in part) and *X. ferruginea* (*nec* Lepeletier), Dover, *Rec. Ind. Mus.* XXIV, p. 87.
1929. *Xylocopa* (*Nyctomelitta*) *tranquebarica*, Cockerell, *Ann. Mag. Nat. Hist.* (10) IV, p. 303.
1930. *Xylocopa* (*Nyctomelitta*) *tranquebarica*, Cockerell, *Philippine Journ. Sci.* XLIII, p. 266.

The *males* are dark red in colour, darkest on vertex, mandibles and abdominal tergites, and lightest in the supraclypeal region and clypeus. The inter-orbital distance is about half of the vertico-clypeal distance. Face with large and deep punctures mostly of first-degree density. Mandibles with a large basal triangular area ; inner margin with 2 weak emarginations. Genae unpunctate. Postgenae deeply punctate in third-degree density. Vertex punctate in second-degree density. Inter-ocellar distance about three and a half times as long as ocello-ocular distance. Inter-antennal distance about one and a half times as long as the antenno-ocular distance. Antennal segment III slightly longer than segments IV and V ; IV longer than broad ; V and VI subequal. Dorsum of thorax punctate mostly in first-degree density, but disc of mesonotum and a narrow band along anterior margin of scutellum unpunctate. Vein *M* about half as long as M_{1+2} (1st section) which is shorter than M_{1+2} (2nd section). Posterior femora ventrally with shallow and evenly-distributed punctures of third-degree density and two weak keels along inner margin and median line respectively. Posterior tibiae a little curved in profile, distal end strongly incrassate.

Outer teeth of claws about two and a half times as long as the inner. Abdominal tergites evenly punctate in third-degree density.



TEXT-FIG. 2.—Dorsal view of the ♂ genitalia of *Xylocopa tranquebarica* (Fab.). ×20.
c. cardo; *s.* sagitta; *sp.* spatha; *st.* stipes.

In the *females* the inter-orbital and vertico-clypeal distances are subequal. Postgenae and vertex punctate in second-degree density. Inter-ocellar distance more than twice as long as ocello-ocular distance. Inter-antennal distance a little longer than antenno-ocular distance. Vein *M* about two-thirds as long as M_{1+2} (1st section) and half as long as M_{1+2} (2nd section). Knee-caps extending to basal 3/5 of tibial length. Hypopygium medially keeled near the apex.

Measurements.—♂, length of body 24-29 mm.; anterior wing 21-24 mm.; breadth of head 7-8 mm.; thorax (incl. tegulae) 8·5-11·5 mm.; II abdominal segment 10·5-12·0 mm. ♀, length of body 20-25 mm.; anterior wing 18-21 mm.; breadth of head 7·0-8·5 mm.; thorax (incl. tegulae) 8-10 mm.; II abdominal segment 10-11 mm.

Types.—2 ♀, from Tranquebar, probably the types, in the Copenhagen Museum; types of *X. rufescens* F. Sm., ♂♀, from India and Java, in the British Museum (Natural History), London.

Distribution.—I have studied specimens of this species from the following localities :—

Bombay : Panchgani, 1,000-4,000′, W Ghats, 2 ♀; Bombay, 2 ♀ (compared with type of *X. rufescens* F. Sm. by Meade-Waldo); Karwar, 1 ♀. Mysore : Bangalore, 1 ♂; Bababuddin Hills, 4,000-5,000′, 1 ♂, 1 ♀. Coorg, 1 ♂. Madras : South Malabar, 1 ♂, 2 ♀ (previously determined as *X. ferruginea* Lepel.); Coonoor, 3 ♀; Sappel, 1,700′, Palghat, 1 ♂. Bengal : Darjeeling, 1 ♂; Jalpaiguri, 1 ♀. Sikkim, 1,800′, 6 ♀. Burma : Rangoon, 1 ♂; Petsut Reserve, Katha Division, bee holes in

dead teak stump, 1 ♀; Maymyo, Shan Plateau, 3,000′, 2 ♂, 2 ♀; Maymyo, from inside an old wooden post, 1 ♂, 3♀. Ceylon: Kanthaley, 1 ♂; Niroddumunai, near Trincomalee, 1 ♀; Vilankulam, Colleetek, N. P., 1 ♂.

Besides the localities given above, this species has also been recorded from Tenasserim and Siam.

Xylocopa proximata, sp. nov.

1921. *Xylocopa rufescens*, Dover (in part), *Rec. Ind. Mus.* XXII, p. 390.
1922. *Xylocopa tranquebarica*, Dover (in part), *Rec. Ind. Mus.* XXIV, p. 87.

X. proximata differs from *X. tranquebarica* (Fab.) in the following characters :—

♂.—Clypeal suture very slightly curved. Basal and apical portion of frontal keel almost at the same level. Outer marginal suture of mandibles deeper and broader; a little more than half of the mandibular length (at most 1/3 in *X. tranquebarica*). Inter-ocellar distance only about twice as long as the ocello-ocular distance. Vein *M* about 3/4 of M_{1+2} (1st section). Genitalia comparatively stouter, lateral and apical margins of sagittal extension forming obtuse angles at their junction.

♀.—Frontal keel and clypeal median tubercle weaker; clypeal suture weakly curved; outer marginal suture of mandibles longer and deeper; inter-ocellar distance not more than twice the ocello-ocular distance; base of ocellar triangle about one and a half times as long as the lateral sides.

Measurements.—♂, length of body 26 mm.; anterior wing 21 mm. ♀, length of body 23-25 mm.; anterior wing 19-20 mm.

Types.—Holotype, ♂, no. 1790/H3, allotype, ♀, no. 1791/H3, both deposited in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—I have only seen 1 ♂ and 2 ♀ specimens of this species, all from the Andaman Islands.

Remarks.—This new species is described from three very old and poorly preserved specimens and fresh material is necessary for a more detailed study of the species. The male is quite distinct from that of *X. tranquebarica* by its proximating lateral ocelli and the curvature of its clypeal sutures.

Subgenus **Biluna,** nov.

1912. *Xylocopa auripennis*—Gruppe Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 285.

Body of large or medium size. Integument dominantly black, sometimes with some greenish tints; ♂ with pale face markings. Pubescence dominantly black; ♂ with more or less pale hairs on basal portion of thorax and of abdomen. Inner orbits in ♂ weakly convergent both at upper and lower extremities. Median ocellus elliptical; lateral sides with elevated, unpunctate, crescent-shaped markings. Lateral portion of front on the same level as the clypeus. Mandibles bidentate. Disc of mesonotum unpunctate. Propodeum in ♂ anteriorly

strongly elevated. Vein R_5 curved and perpendicular to vein M_{1+2} at their junction. Knee-caps absent in ♂ and simple in ♀. Proximal end of posterior metatarsi of ♂ ventrally swollen and unpunctate, inner and outer teeth of claws diverging. Submedian processes of epipygium (♀) long, narrow, widely separated, not parallel. Hypopygium keeled in ♀ only.

Type.—Xylocopa nasalis Westw. (1838).

The ♂ genitalia and other important structural characters of the various species of this subgenus from the Oriental and Palaearctic Regions do not, so far as I have been able to study the different species, offer any distinguishing characters. It is, therefore, probable that they are only geographical races or varieties of the same species, while some of them may even be based on individual variations. In the following account, however, I have left *X. nasalis* Westw. and *X. pictifrons* F. Sm. as distinct species on the basis of the structure of the scutellum and the posterior femora.

Key to Indian species and subspecies. ♂.

1. Propodeum only slightly exposed ..	*pictifrons concolorata, subsp. nov.*
Propodeum greatly exposed	2.
2. Wings with strong bluish to violaceous iridescence, without reddish golden lustre	*nasalis nasalis* Westw.
Wings apically with dominant brilliant golden lustre	*nasalis auripennis* (Lepel.).

Key to Indian species and subspecies. ♀.

1. Knee-caps sharply pointed at apex, extending over basal 3/7 of tibial length..	2.
Knee-caps truncate apically, extending over basal ⅓ of tibial length	*nasalis nasalis* Westw.
2. Punctuation on supraclypeal region distinctly sparser than on clypeus; wings with uniform strong coppery-red and golden tints..	*pictifrons concolorata*, subsp. nov
Punctuation on supraclypeal region and clypeus of the same density; wings basally with greenish, violaceous and bluish tints ..	3.
3. Wings apically with dominant brilliant golden tints	*nasalis auripennis* (Lepel.).
Wings apically with beautiful purple tints, without or, at most, with very little golden tints ..	*nasalis* subsp. ?

Xylocopa nasalis nasalis Westw.

1800. *Xylocopa violacea*, Donovan (*nec* Linné), *Epit. Nat. Hist. Insects India*, pl. 57, ♂ (*nec* ♀).
1838. *Xylocopa nasalis*, Westwood in *Donovan, Nat. Hist. Insects India* (2nd edit.), p. 92, pl. 57, fig. 6, ♂ (*nec* ♀).
1841. *Xylocopa dissimilis* and *X. lunulata*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 180, No. 9, ♀♂ and p. 184, No. 14, ♂.
1854. *Xylocopa dissimilis*, F. Smith (in part), *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 356, No. 58.
1873. *Xylocopa dissimilis*, F. Smith (in part), *Journ. Linn. Soc. London, Zool.* XI, p. 394, No. 19.
1874. *Xylocopa dissimilis*, F. Smith, *Trans. Entomol. Soc. London*, p. 268, No. 43, ♀♂.
1876. *Xylocopa lunulata*, Ritsema, *Tijdschr. Entomol.* XIX. p. 63, ♂.

1879. *Xylocopa dissimilis*, Taschenberg, *Zeitschr. Naturwiss.* LII, p. 572, No. 5, ♂.
1892. ?*Xylocopa dissimilis*, Mocsary, *Term. észetrajzi. Füzetek.* XV, p. 130, No. 22.
1896. *Xylocopa dissimilis* and *X. lunulata*, Dalla Torre, *Cat. Hymen.* X, pp. 209 and 211.
1901. *Xylocopa dissimilis* and *X. lunulata*, Friese, *Bien. Eur.* VI, p. 212, No. 13, ♀♂ and p. 213, No. 14, ♂.
1907. *Xylocopa dissimilis*, Cockerell, *Bull. Amer. Mus. Nat. Hist.* XXIII, 10, p. 228.
1909. *Xylocopa lunulata* subsp. *minensis*, Cockerell, *Ann. Mag. Nat. Hist.* (8) IV, p. 404, ♂.
1911. *Xylocopa lunulata minensis*, Cockerell, *Proc. U. S. Nat. Mus.* XXXIX, 1806, p. 637.
1912. *Xylocopa* (*Xylocopa*) *dissimilis*, Maidl (in part), *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, pp. 285 and 288, ♀♂.
1917. *Xylocopa dissimilis*, Cockerell, *Philippine Journ. Sci.* XII, D, pp. 345 and 346.
1924. *Xylocopa* (*Xylocopa*) *dissimilis*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid, Zool.* XLIX, p. 31, No. 49.
1930. *Xylocopa* (*Xylocopa*) *dissimilis*, Cockerell, *Philippine Journ. Sci.* XLIII, p. 267.
1931. *Xylocopa dissimilis* and *X. lunulata minensis*, Cockerell, *Ann. Mag. Nat. Hist.* (10) VII, p. 39.
1935. *Xylocopa dissimilis*, Ng, *Lingnan Biol. Semin. Rept. 1934-35*, pp. 46 and 48.

♂.—Punctures on face usually sparse, those on venter of posterior femora and abdominal tergites strong and dense. Pale hairs on thorax usually whitish. Anterior wings apically with weak greenish golden lustre and basally with little violaceous tints. Posterior wings apically with very slight golden lustre. The broad tubercle on the centre of inner margin of posterior femora weak.

♀.—Wing colour as in ♂ *X. nasalis*. Knee-caps apically truncate and extending over basal $\frac{1}{3}$ of tibial length. Punctuation on abdominal tergites relatively dense and strong (median portion of tergite II punctate mostly in second-degree density not in third-degree density as in *X. nasalis auripennis*).

Variation.—The amount of greenish, bluish or violaceous tints and golden lustre on the wings varies in different specimens. Sometimes the wings are entirely violaceous and without any golden lustre; but sometimes bluish violaceous or bluish green and with some weak greenish golden lustre near the apex. Cockerell (1931) separated ♀ *X. dissimilis* from ♂ *X. lunulata minensis* by the presence of greenish tints in the apical field of the wings, but these differences are, in my opinion, not sufficient for separating the two forms.

Measurements.—♂, length of body 22-26 mm.; anterior wing 22-26 mm. ♀, length of body 20-26 mm.; anterior wing 21-25.

Types.—♂, from China, in the Hope Museum, Oxford University, England; types of *X. dissimilis* Lepel., ♂♀ and of *X. lunulata* Lepel., ♂ all from China, probably in the Turin Museum; that of *X. lunulata minensis* Ckll., ♂, from Sharp Peak Island at the mouth of the Min River, Fukien, China, in the U. S. National Museum, Washington, D. C.

Distribution.—Besides a long series of specimens from South China, I have only seen 2 ♂ from Myitkyina, Upper Burma. It has also been recorded from Madagascar, Borneo, the Philippines and Palau; but these records need confirmation.

Xylocopa nasalis auripennis (Lepel.).

1841. *Xylocopa auripennis*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 181, No. 10, ♀♂ (*nec* ♀ var. from China).
1845. *Xylocopa auripennis*, Guérin-Meneville, *Iconogr. Regn. Anim. Cuv.* VII, *Insect.*, p. 448, pl. 73, fig. 5.
1854. *Xylocopa auripennis* and *X. dissimilis* (in part), F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 356, Nos. 55 and 58.
1857. *Xylocopa dissimilis*, F. Smith (*nec* Lepeletier), *Journ. Proc. Linn. Soc. London, Zool.* II, p. 48, No. 7.
1867. *Xylocopa dissimilis*, Sichel (*nec* Lepeletier), *Reise Novara Zool.* II, 1, *Hymenoptera*, p. 155.
1870. *Xylocopa chloroptera*, Horne (*nec* Lepeletier), *Trans. Zool. Soc. London* VII, p. 179, pl. 21, figs. 1, 1*a* and 1*b*.
1873. *Xylocopa auripennis* and *X. dissimilis* (in part), F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 394. Nos. 18 and 19.
1874. *Xylocopa auripennis*, F. Smith, *Trans. Entomol. Soc. London*, p. 270, No. 47, ♀♂.
1884. *Xylocopa dissimilis*, Gribodo (*nec* Lepeletier), *Ann. Mus. Civ. Stor. Nat. Genova*, (2) I, p. 350, No. 1.
1896. *Xylocopa dissimilis*, Bingham (*nec* Lepeletier), *Proc. Zool. Soc. London*, p. 457, No. 332.
1896. *Xylocopa auripennis*, Dalla Torre, *Cat. Hymen.* X, p. 205.
1897. *Xylocopa auripennis*, *X. dissimilis* (*nec* Lepeletier) and *X. iridipennis* (*nec* Lepeletier), Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 538, No. 942, ♀♂, No. 943, figs. 3-5 and 181, ♀♂, and p. 540, No. 947, ♀♂.
1901. *Xylocopa dissimilis* (*nec* Lepeletier) (in part) and *X. auripennis*, J. Perez, *Actes Soc. Linn. Bordeaux* LVI, pp. 42 and 45, ♀♂.
1907. *Xylocopa iridipennis* (*nec* Lepeletier) and *X. dissimilis* (*nec* Lepeletier), Paiva, *Rec. Ind. Mus.* I, pp. 16 and 17.
1912. *Xylocopa* (*Xylocopa*) *auripennis*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, pp. 257 and 285, fig. 26, ♀♂.
1913. *Xylocopa auripennis*, Strand, *Arch. Naturgesch.* LXXIX, A, 2, p. 146.
1922. *Xylocopa attenuata* (in part), *X. auripennis*, *X. dissimilis* (*nec* Lepeletier), *X. fenestrata* (in part), and *X. amethystina* (in part), Dover, *Rec. Ind. Mus.* XXIV, pp. 86 and 87.
1922. *Xylocopa attenuata* (*nec* J. Perez), *X. auripennis*, *X. dissimilis* (*nec* Lepeletier) and *X. iridipennis* (*nec* Lepeletier), Dover, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.
1924. *Xylocopa* (*Xylocopa*) *auripennis*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid, Zool.* XLIX, p. 30, No. 46.
1925. *Xylocopa fenestrata auripennis* and *X. fenestrata iridipennis* (*nec* Lepeletier), Dover, *Ann. Mag. Nat. Hist.* (9) XV, p. 222.
1926. *Xylocopa auripennis*, Alfken, *Entomol. Mitt.* XV, p. 318.
1929. *Xylocopa hemichlora*, Cockerell, *Ann. Mag. Nat. Hist.* (10) III, p. 203, ♀.
1929. *Xylocopa iridipennis* var. *semipurpurea* and *X. auripennis* var. *phenachroa*, Cockerell, *Ann. Mag. Nat. Hist.* (10) IV, p. 302, ♂ and p. 303, ♀.

I have nothing to add to the detailed re-description of this species by J. Perez cited above, but the following notes dealing with variation and the measurements of the species should prove useful for future workers.

Variation.—The black marginal band of the clypeus in the ♂ usually occupies its apical ¼ but sometimes extends to apical ½, or even the entire clypeus is blackened. The supraclypeal region is sometimes partly blackish brown. The shape and extent of pale lateral frontal markings are very variable. In one instance, I and II abdominal sternites were found partly fused together. In the ♀, the punctuation on propodeum and venter of posterior coxae is variable in density and shape. The relative lengths of the segments of maxillary palpi and of the wing veins are also very variable.

Measurement.—♂, length of body 20-29 mm. ; anterior wing 18-29 mm. ; breadth of head 5·5-8·5 mm. ; thorax (incl. tegulae) 6·5-11·0 mm.;

II abdominal segment 7·0-12·5 mm. ♀, length of body 20-29 mm. ; anterior wing 22-29 ; breadth of head 7·0-9·5 mm. ; thorax (incl.tegulae) 8·0-11·5 mm. ; II abdominal segment 8·5-12·0 mm.

Distribution.—I have studied specimens of this subspecies from the following localities :

Kashmir : Chashma Shahi, Srinagar, 1 ♂. United Provinces : Lucknow, 1 ♂ ; Kotdwara, Lansdowne, ex hollow of bamboo, 1 ♂, 1 ♀ ; Barielly, 600′, 1 ♂ ; Dehra Dun, 1 ♀. Central Provinces : Nagpur, 1000′, 1 ♂. Bombay : Bandra, 1 ♂ ; Castle Rock, 3 ♀ ; Nasik, 1900′, 1 ♀ ; Bassein, 1 ♂ ; Surat, 1 ♀ ; Bombay, 3 ♂ (1 ♂ compared with type of *X. dissimilis* Lepel. by Meade-Waldo) Mysore : Goorghalli Estate, 1 ♀ ; Bangalore, 3 ♂, 7 ♀ ; " Mysore," 1 ♀. Goa : Andheri, Salsette, 1 ♂, 1 ♀. Soccorro, 1 ♀. Travancore : Trivandrum, 2 ♀ ; Agisamtenge, S. end of Kayangulam, 1 ♂. Cochin State : Parambikulam, 1700-2000′, 1 ♀. Madras : Forest between Diguvametta and railway tunnel, 8 miles from station, ca. 1000-1500′, foot of Nallamalai Hills (E.), 2 ♀ ; Coimbatore, 1 ♂ ; Pudura, Coimbatore, 1 ♂ ; Palmaner, 2300′, Chittoor, boring bamboo, 1 ♂ ; Madras, 2 ♂, 3 ♀ ; Annampalle, Godavari Dist., 1 ♀ ; Nadur, ca. 1800′, Javadi Hills, 3 ♀ ; Kotagiri, Nilgiris, 1 ♀ ; Kuttur, 2110′, Yelagiri Hills, 1 ♀. Bihar : Raxaul, 1 ♂, 1 ♀ ; Purneah Dist., 1 ♀ ; Chapra, 1 ♀ ; Pusa, 1 ♀ (det. Dutt as *X. dissimilis*). Bengal : Mariambari, Tea Estate near Pankhabari P. O., ca. 5000′, E. Himalayas, 1 ♀ ; Siliguri, 1 ♀ ; Jalpaiguri, 1 ♀ ; Singla, Darjeeling Dist., 1500′, 2 ♀ ; Monghat Point, Jalpaiguri Dist., 1 ♀ ; Calcutta, 5 ♀ (1♀ *det.* Bingham) ; Santiniketan, Birbhum Dist., 1 ♂, 8 ♀. Orissa : Cuttack, 1 ♀. Sikkim : Gnatong, 1 ♀ ; " Sikkim ", 1 ♂, 5 ♀ (1 ♀ *det.* Maidl). Assam : Harmatti, base of hills, 1 ♂ ; Shillong, 2 ♀ ; Sibsagar, 1 ♂ ; Darrang, 1 ♂ ; Chanduar, Darrang Division, in bamboo, 1 ♀ ; Naga Hills, 1 ♀ ; Mazbat, Mangaldai Dist., 1 ♀. Burma : Fort Stedman, ca. 3000′, Yawnghwe State, S. Shan States, 1 ♀ ; Inle Lake S. end of Taungdo, 900M., S. Shan States, 1 ♀ ; Moulmein, 1 ♀ (*det.* Dutt as *X. iridipennis* Lepel.) ; Roadside vegetation, Pankkaungto Taungley, 1 ♂ ; Maymyo, Shan Plateau, 3000′, 4 ♀ ; Mandalay, 2 ♀. Ceylon : Habarana, 1 ♀ (*det.* Maidl). China : Mongwan, Yunnan, 1 ♂.

Besides the localities listed above, this subspecies has been recorded from Tenasserim, Malaya, and Borneo.

Remarks.—A ♀ specimen from Fort Stedman, Burma, which I considered to be *X. hemichlora* Ckll. was sent to Prof. Cockerell and his reply was " probably correct, but I have no specimen to compare with " I have found several intermediate forms between the typical *auripennis* and typical *hemichlora* from different localities in the Indian Peninsula. As the colouration of the wings in this species is variable and the punctuation of the scutellum in the ♀ is usually finer and more numerous than that in the ♂, I am inclined to the view that neither *X. iridipennis semipurpurea* Ckll. ♂, nor *X. auripennis phenachroa* Ckll. ♀, which are based on such differences, can be classified as distinct varieties.

There is no probability of the occurrence of *X. iridipennis* Lepel. in Siam or India, and of typical *X. nasalis* Westw. in India, W Burma or in Ceylon. So that Gribodo's *X. dissimilis* Lepel. from Minhla, Burma and Bingham's *X. dissimilis* Lepel. and *X. iridipennis* Lepel. from various localities in India proper and Ceylon should without any doubt be referred to the present subspecies.

Bingham treated *X. chloroptera* Horne (*nec* Lepeletier) as a synonym of his *X. iridipennis*, but with a question mark and was doubtful whether he had identified the latter correctly. From Horne's illustration and our present knowledge of the *Xylocopa*-fauna of N. W India, *X. chloroptera* Horne is most probably a synonym of *X. nasalis auripennis*.

The ♂ specimen from Bombay compared with the type of *X. dissimilis* ♀ by Meade-Waldo is a typical *X. nasalis auripennis*. It is a ♂, and not ♀, as labelled by Meade-Waldo and most probably, was only compared with material determined by F. Smith or some later worker in the British Museum.

Dover treated *X. auripennis* as a "colour variety" of *X. fenestrata* (Fab.), but this is untenable. His original examples of *X. fenestrata* in the Indian Museum are composed of a mixture of *X. nasalis auripennis*, *X. fenestrata*, *X. valga*, *X. bentoni* and even *X. acutipennis* and *X. tenuiscapa*.

According to Lepeletier, the ♂ *X. auripennis* differs from the ♀ only by "Pedibus posticis elongatis, femoribus crassis, subtus dilatato subdentatis." F. Smith's and Bingham's later remarks on the ♂ are merely an English translation of Lepeletier's description. Bingham even said that *X. dissimilis* could be easily distinguished from *X. auripennis* by the presence of "yellow lunule on each side of the anterior ocellus" But I have never found the ♂ of any members of this group without such markings and it seems as if Lepeletier had overlooked this character or his ♂ and ♀ *X. auripennis* did not belong to the same species

Xylocopa nasalis Westw. subsp. ?

1878. *Xylocopa amethystina*, F. Smith (*nec* Fabricius), *Journ. Asiat. Soc. Bengal* XLVII, ii, p. 168, No. 16.
1922. *Xylocopa fenestrata*, Dover (in part), *Rec. Ind. Mus.* XXIV, p. 86.

♀.—Body uniformly large and flat. Differing from typical *X. nasalis auripennis* (Lepel.) in the colouration of the wings, which are beautifully purple, basally with slightly greenish tints and apically at most with very feeble greenish golden lustre.

Distribution.—I refer to this interesting subspecies 3 examples from: Upper Tenasserim, 2 ♀; Tavoy, 1 ♀.

Remarks.—The specimen from Tavoy bears the name "*X. latipes*" The other two, from Upper Tenasserim were determined by F. Smith as *X. amethystina* (Fab.) and according to his paper they were collected by O. Limborg East of Moulmein, Tenasserim in 1876-77 Perhaps they will prove to be a distinct race. I have also seen a specimen from Moulmein which is a typical *X. nasalis auripennis*.

Superficially these 3 examples look much like *X. nasalis iridipennis* (Lepel.) (=*X. pictipennis* F. Sm.) from Java, but are easily separated by the size and density of their punctures.

Xylocopa pictifrons concolorata, subsp nov.

1897. *Xylocopa pictifrons*, Bingham (*nec* F. Smith), *Faun. Brit. Ind. Hymenoptera* I, p. 538, No. 941, ♀♂.
1912. *Xylocopa (Xylocopa) attenuata*, Maidl (in part), *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 287, ♀♂.
1922. *Xylocopa attenuata*, Dover (in part), *Rec. Ind. Mus.* XXIV, p. 85.

Differs from *X. nasalis auripennis* (Lepel.) in the following characters :—

♂.—Apical black band of clypeus very narrow. Wings smoky brown, with vivid golden iridescence and a little purplish and greenish tints. Body uniformly subcylindrical in general shape, never broadly flat. Clypeus and lateral frontal regions with evenly distributed punctures of second-degree density. Clypeus with a very broad median unpunctate band. Labrum centrally, weakly elevated. Unpunctate area on the disc of mesonotum smaller, only about 1/5 as broad as the distance between tegulae. Propodeum punctate in second-degree density, basal portion not at the same level as mesonotum. Punctures of abdominal tergites relatively denser.

♀.—Wings smoky brown, with very strong coppery-red and golden iridescence, deepest near the base. Supraclypeal region with sparser punctures than clypeus. Punctures along the median line of clypeus distinctly sparser than those on other portion of it. Punctuation on abdominal tergites denser and deeper.

Measurements.—♂, length of body 22 mm. ; anterior wing 19 mm. ♀, length of body 18-22 mm. ; anterior wing 19-23 mm.

Types.—Holotype, ♂, no. 1793/H3, allotype, ♀, no. 1794/H3 in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—I have seen only the following examples : Bengal : Singla, Darjeeling Dist., 17 ♀. Sikkim, 1 ♂ (in poor condition).

Remarks.—The topotypical *X. pictifrons* F. Sm. was described from the Chusan Islands, E. China and can readily be distinguished from my new subspecies by its basally hyaline wings. The differences between the typical and the Himalayan forms have been noted by Bingham and Maidl ; and to avoid further confusion, I have thought it best to separate the Himalayan form under a distinct name.

Subgenus **Xylocopa** Latr., *s. s.*

Body of medium or small size. Integument purely black, but sometimes with a little greenish, bluish or purplish tints ; ♂ without pale face markings. Pubescence black, ♂ sometimes with some sooty brownish hairs. Inner orbits of ♂ very slightly curved and weakly converging at their upper extremities. Frontal keel weak. Base of ocellar triangle about twice as long as the lateral sides. Labrum of ♀ very weakly tuberculated. Mandibles of ♂ bidentate, of ♀ tridentate. Disc of mesonotum with a narrow unpunctate area. Vein R_5 very weakly curved, not forming acute interior angles with M_{1+2}. Knee-caps very strong, simple in ♂ and bifurcate in ♀. Inner teeth of claws in ♂ almost parallel to each other. Submedian processes of epipygium (♀) parallel to each other, long, stout. Hypopygium keeled in ♀ only.

Type.—Apis violacea Linné. (1758).

Only one species of this subgenus is known from within the Indian limits, but possibly other members such as *X. violacea* (Linné)—known from as far as Persia and Central Asia—*X. cyanescens* Brulle—known from as far as Turkestan and Afghanistan—and *X. rogenhoferi* Friese —described from Persia—may be found in Kashmir or Baluchistan.

Xylocopa valga Gerst.

1791. *Apis violacea*, Christ (*nec* Linné), *Naturgesch. Insect.*, p. 119, pl. iv, fig. 5.
1872. *Xylocopa valga*, Gerstaecker, *Entomol. Zeitung. Stettin*, p. 276, No. 2, ♂♀.
1874. *Xylocopa valga*, F. Smith, *Trans. Entomol. Soc. London*, p. 253, No. 5, ♀♂.
1874. *Xylocopa ramulorum*, Rondani, *Bull. Soc. Ent. Ital.* VI, p. 105, No. 2 and p. 134, No. 26, ♂.
1876. *Xylocopa valga*, Ritsema, *Tijdschr. Entomol.* XIX, p. 61.
1876. *Xylocopa valga*, F. Morawitz, *Fedtchenko: Turkest. Mellif.* II, p. 68, No. 99.
1878. *Xylocopa convexa*, F. Smith, *Sci. Result. 2nd Yarkand Miss.*, p. 8, No. 18, ♀.
1879. *Xylocopa valga*, Taschenberg, *Zeitschr. Naturwiss.* LII, p. 583, No. 16.
1880. *Xylocopa valga*, F. Morawitz, *Bull. Acad. Sci. St. Petersb.* XXVI, p. 387, No. 154.
1886. *Xylocopa valga*, F. Morawitz, *Horae Soc. Ent. Ross.* XX, p. 212, No. 20.
1886. *Xylocopa valga*, Radoszkowski, *Horae Soc. Ent. Ross.* XX, p. 8.
1890. *Xylocopa valga*, F. Morawitz, *Horae Soc. Ent. Ross.* XXIV, p. 356.
1896. *Xylocopa convexa* and *X. valga*, Dalla Torre, *Cat. Hymen.* X, pp. 209 and 219.
1899. *Xylocopa valga*, Vachal, *Misc. Entomol.* VII, pp. 8 and 20, ♀♂.
1901. *Xylocopa valga* and *X. convexa*, Friese, Bien. Eur. VI, p. 204, No. 2, ♂♀ and p. 208, No. 6, ♀.
1908. *Xylocopa valga*, Cockerell, *Ann. Mag. Nat. Hist.* (8) I, p. 338.
1912. *Xylocopa* (*Xylocopa*) *valga*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 254, figs. 3 and 4, ♂.
1922. *Xylocopa tenuiscapa* and *X. fenestrata*, Dover (in part), *Rec. Ind. Mus.* XXIV, pp. 85 and 86.
1924. *Xylocopa* (*Xylocopa*) *valga*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid, Zool.* XLIX, p. 11, No. 11.
1930. *Xylocopa valga*, Benoist, *Ann. Soc. Ent. France*, p. 78, ♂♀.
1935. *Xylocopa valga*, Alfken, *Wissen. Ergeb. Nied. Exped. Karakorum Zool.*, p. 254.
1935. *Xylocopa valga*, Alfken, *Entomol. Rundschau* LII (author's copy), p. 10.
1935. *Xylocopa valga*, Alfken, *Mitt. Ent. Verein Bremen* XXIII, p. 22.
1935. *Xylocopa valga*, Popov, *Trav. filiale Acad. Sci. U.S.S.R. Tadjikistan* V, p. 395.
1936. *Xylocopa valga*, Alfken, *Arkiv Zool.* XXVII, A, 37, p. 5.
1937. *Xylocopa valga*, Alfken, *Konowia* XVI, p. 102, ♀.
1938. *Xylocopa valga*, Hedicke, *Deutsch. Ent. Zeitschr.*, p. 186.

The following detailed notes on this species are published as a supplement to Friese's description cited above.

♂.—Inter-orbital distance about 8/11 as long as vertico-clypeal distance. Face evenly and deeply punctate in first-degree density. Clypeus with an elevated median unpunctate band. Tentorial pits weak, round. Apical emargination of labrum deep. Mandibles smooth; basal triangular area poorly defined; inner tooth as broad as the outer. Genae each with 3 to 4 punctures near the posterior margin. Postgenae and vertex heavily punctate in first-degree density. Inter-ocellar distance a little longer than ocello-ocular distance. Coronal suture basally deep. Inter-antennal distance shorter than antenno-ocular distance. Mesonotum, anterior portion of scutellum and propodeum punctate in third-degree density. Vein *M* about half as long as M_{1+2}

(1st section) which is equal to M_{1+2} (2nd section). Venter of posterior femora shallowly and evenly punctate in third-degree density. Knee-caps extending to basal $\frac{1}{2}$ of tibial length. Inner surface of posterior metatarsi with a smooth, elevated, triangular area. Inner teeth of posterior claws much shorter than the outer. Abdominal tergites finely and shallowly punctate in third-degree density, with a narrow median unpunctate band; epipygium apically emarginated.

♀.—Inter-orbital distance about 18/19 as long as vertico-clypeal distance. Tentorial pits elongate. Mandibles with emarginated inner margin and truncate inner teeth; intermediate and outer teeth sharply pointed. Genae usually unpunctate. Postgenae and vertex punctate in second-degree density. Knee-caps extending to basal $\frac{3}{4}$ of tibial length; upper projection flat, thin, broadly rounded; lower projection sharp, thick. Abdominal tergites except the epipygium with fine, shallow and irregularly distributed punctures of third-degree density, with a distinct median unpunctate band. Hypopygium with a median keel near the apex.

Measurements.—♂, length of body 21-22 mm.; anterior wing 19-20 mm.; breadth of head 6·5 mm.; thorax (incl. tegulae) 9·5 mm.; II abdominal segment 9·5 mm. ♀, length of body 22-29 mm.; anterior wing 19-23 mm.; breadth of head 7·5-9·0 mm.; thorax (incl. tegulae) 9·5-11·0 mm.; II abdominal segment 10-11 mm.

Types.—♂♀, from Bozen, Crimea, Trieste and Syria, in the Berlin Museum; type of *X. ramulorum* Rond., ♂, from Italy, probably in the Parma Museum; that of *X. convexa* F. Sm., ♀, from Kogyar, China, No. 3532/10, in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—The present species is widely distributed in the Palaearctic Region, the entire Mediterranean Subregion, the North-European Subregion (northwards to Wolynia, Russia), the Siberian Subregion (eastwards to Manchouli, China). Besides the European material, I have examined specimens from the following Asiatic localities:

Kashmir: Jhelum Valley, 5,200′, 4 ♀; Gilgit Exped., 1 ♀; Srinagar, 1 ♀; Nishad Bag Srinagar, on rose flower, 1 ♀; Haran Plateau, 5,000′, Sindh Valley, 1 ♀; "Kashmir," 2 ♀. N. W. Frontier Province: Karakal, Bumboret Valley, Chitral, 9 ♀; Ustui Gol, Rambhar Valley, Chitral, 2 ♀; Abbotabad, 1 ♀ (*det.* Narayana as *X. amethystina* Fab.). Punjab: Sarol Garden, Chamba, 2 ♀; Shahpur, 2,469′, small rocky stream close to Dak Bungalow, 1 ♀. Assam(?): Goalpara, on bamboo, 1 ♀. Turkey: Taurus Pampe, Asia Minor, 1 ♀. U. S. S. R.: Turkestan, 1 ♂; Nun-bulak, 1 ♀ (*det.* Friese). China: Kogyar, E. Turkestan, Yarkand Exped., 2 ♀ (type-series of *X. convexa* F. Sm.); Hechyei, Kohtai, Kansu, 1 ♀; Manchouli, 1 ♀.

Remarks.—The types of *X. convexa* F. Sm. are somewhat smaller than the average specimens of the species; they are, however, not separable from typical *X. valga* Gerst.

Hedicke's reference to *X. convexa* in the work quoted above (p. 190) appears to me to be incorrect. The two females on which he based his identification probably represent a new species.

Subgenus **Ctenopoda,** nov.

Body of medium or small size. Integument black. Wings with more or less violaceous tints; basally hyaline in ♂. Pubescence black or whitish. Inner orbits of ♂ straight, parallel or weakly converging at their upper extremities. Frontal keel of ♀ extraordinarily short. ♀ with transverse ridges lying between lateral ocelli. Base of ocellar triangle about one and one-third times as long as the lateral sides. Mandibles of ♂ bidentate, of ♀ tridentate. Disc of mesonotum unpunctate. Vein R_5 forming obtuse interior angles with vein M_{1+2} Knee-caps very strong, apically bifurcate, that of ♀ with two rows of spine-like processes. Inner and outer teeth of claws of ♂ almost parallel. Spiracular tubercles on III abdominal tergite of ♂ teeth-like and strongly projecting outwards. Submedian processes of epipygium of ♀ narrow, projecting outwards. Hypopygium of ♂ apically very broadly rounded that of ♀ medially keeled.

Type.—Apis fenestrata Fab. (1798).

This subgenus is distinguished by the shape of the frontal keel, the presence of ridges between the lateral ocelli and the spiracular tubercles and genitalia of the ♂. Only two species are represented in the Indian limits.

Key to Indian species. ♂♀

♂: Posterior metatarsi normal; epipygium apically with two pointed tooth-like projections. ♀: Submedian processes of epipygium running parallel to each other	*fenestrata* (Fab.).
♂: Posterior matatarsi extraordinarily swollen and with scanty pubescence; epipygium normal. ♀: Submedian processes of epipygium not running parallel to each other . ..	*basalis* F. Sm.

Xylocopa fenestrata (Fab.).

1798. *Apis fenestrata*, Fabricius, *Entomol., Syst. Suppl.*, p. 273, No. 3, ♂.
1804. *Xylocopa fenestrata*, Fabricius, *Syst. Piez.*, p. 339, No. 6, ♂.
1806. *Xylocopa fenestrata*, Illiger, *Mag. Insectenkunde* V, p. 150, No. 4.
1807. *Xylocopa fenestrata*, Jurine, *Nouv. Méthod. Class. Hymen.*, p. 256, ♂.
1807. *Xylocopa fenestrata*, Klug, *Mag. Insectenkunde* VI, p. 226.
1807. *Xylocopa lunata* and *X. indica*, Klug, *Mag. Ges. Naturf. Freunde Berlin* I, p. 264, ♀♂, pl. 7, fig. 2.
1825. *Xylocopa fenestrata*, Lepeletier, *Encycl. Méthod. Insect.* X, p. 792.
1841. *Xylocopa fenestrata*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 184, No. 15, ♀♂.
1854. *Xylocopa lunata*, *X. indica* and *X. fenestrata*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.*, p. 352, Nos. 37-38 and p. 353, No. 46.
1858. *Xylocopa fenestrata*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* III, p. 8, No. 1.
1873. *Xylocopa lunata*, *X. indica* and *X. fenestrata*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 392, No. 2, p. 393, Nos. 3 and 10.
1874. *Xylocopa fenestrata*, *X. indica* and *X. lunata*, F. Smith, *Trans. Entomol. Soc. London*, p. 269, No. 44, ♂♀, p. 276, No. 60, ♂ and No. 61, ♀.
1879. *Xylocopa fenestrata*, Taschenberg, *Zeitschr. Naturwiss.* LII, p. 577, No. 9, ♂.
1884. *Xylocopa hottentotta*, Gribodo (*nec* F. Smith), *Ann. Mus. Civ. Stor. Nat. Genova* (2) I, p. 351, No. 2, ♀.
1896. *Xylocopa fenestrata*, *X. indica* and *X. lunata*, Dalla Torre, *Cat. Hymen.* X, pp. 210, 213 and 214.
1896. *Xylocopa fenestrata*, Bingham, *Proc. Zool. Soc. London*, p. 456, No. 326.
1897. *Xylocopa fenestrata*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 539, No. 945, ♀♂.

1899. *Xylocopa fenestrata*, Vachal, *Misc. Entomol.* VII, pp. 6 and 20, ♀♂.
1901. *Xylocopa fenestrata*, Friese, *Bien. Eur.* VI, p. 208, No. 7, ♀♂.
1901. *Xylocopa fenestrata* J. Perez, *Actes Soc. Linn. Bordeaux* LVI, p. 41, ♀♂.
1902. *Xylocopa gardineri*, Cameron, *Faun. Geogr. Mald.-Laccad. Archip.* I, *Hymenoptera*, p. 62, No. 25, ♂.
1907. *Xylocopa fenestrata*, Paiva, *Rec. Ind. Mus.*, I, p. 16.
1907. *Xylocopa fenestrata*, Cockerell, *Bull. Amer. Mus. Nat. Hist.* XXIII, 10, p. 228.
1908. *Xylocopa fenestrata*, Cockerell, *Ann. Mag. Nat. Hist.* (8) I, p. 339.
1912. *Xylocopa (Xylocopa) fenestrata*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, pp. 256, 270 and 307, fig. 6, ♂.
1912. *Xylocopa amethystina*, Annandale (*nec* Fabricius), *Rec. Ind. Mus.* VIII, p. 41, No. 18.
1913. *Xylocopa fenestrata*, Strand, *Arch. Naturgesch.* LXXIX, A, 2, p. 146.
1914. *Xylocopa fenestrata*, Meade-Waldo, *Ann. Mag. Nat. Hist.* (8) XIV, p. 404.
1918. *Xylocopa fenestrata*, Friese, *Zool. Jahrbücher Abt. Syst.* XLI, p. 495, No. 37.
1919. *Xylocopa fenestrata*, Cockerell, *Proc. U. S. Nat. Mus.* LV, p. 171.
1921. *Xylocopa gardineri*, Ramakrishna Aiyar, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 98.
1921. *Xylocopa fenestrata* and *X.* nr. *fenestrata*, Dover, *Rec. Ind. Mus.* XXII, p. 390.
1922. *Xylocopa fenestrata* and *X. amethystina*, Dover (in part), *Rec. Ind. Mus.* XXIV, pp. 86 and 87.
1924. *Xylocopa (Xylocopa) fenestrata*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid, Zool.* XLIX, p. 31, No. 50.
1926. *Xylocopa fenestrata*, Alfken, *Entomol. Mitt.* XIV, p. 318.

Taschenberg and J. Perez have published detailed descriptions of the male and female of the species but the following additional points may be noted.

♂.—*Pubescence.*—Occiput with a mixture of black and whitish hairs; anterior and lateral portions of mesonotum and spiracular tubercles on III abdominal tergite with white hairs; outer surface of anterior metatarsi with sooty brown hairs.

Structure.—Inter-orbital distance about $\frac{5}{8}$ as long as vertico-clypeal distance. Face very deeply and evenly punctate in first-degree density, except interspaces between lateral ocelli and inner orbits, where it is of third-degree density. Tentorial pits shallow, elongate. Mandibles with a poorly defined basal triangular area; inner margin emarginated. Genae unpunctate, very short. Punctures on postgenae and on vertex mostly of first-degree density. Inter-ocellar distance about one and a half times as long as ocello-ocular distance. Coronal suture basally suppressed. Anterior portion of scutellum punctate in third-degree density; remaining portion of dorsum of thorax (except disc of mesonotum) with punctures mostly of second-degree density. Posterior portion of scutellum depressed, at the same slope with postscutellum and propodeum. Vein *M* about $\frac{2}{3}$ of M_{1+2} (1st section) which is shorter than M_{1+2} (2nd section). Venter of posterior femora punctate in third-degree density; inner margin sharply keeled, with a few irregularly shaped emarginations. Knee-caps extending to basal half of the tibial length. Inner teeth of claws about $\frac{2}{3}$ as long as the outer. Abdominal tergites I-V with fine and shallow punctures of third-degree density; VI-VII punctate in first-degree density, with a narrow median unpunctate band; VII (epipygium) discally depressed, apical margin medially truncate, laterally with a strong triangular projection, which is dorsally punctate and ventrally unpunctate. Hypopygium medially depressed, without median keel or unpunctate band.

♀.—Inter-orbital distance about 18/21 as long as vertico-clypeal distance. Face very flat. Transverse ridges between lateral ocelli very strong. Tentorial pits elongate, extending along clypeal sutures up to the junctions of frontal and epistomal sutures. Labrum with large punctures of second-degree density, but the small areas laterad to median unpunctate band finely punctate in first-degree density. Mandibles very stout ; inner margin with 2 emarginations ; outer marginal sutures extending to basal $\frac{1}{3}$ of mandibular length, interrupted near the base. Postgenae and vertex punctate in second-degree density. Inter-ocellar distance and ocello-ocular distance subequal. Inter-antennal distance and antenno-ocular distance subequal. Coronal suture basally distinct. Submedian processes of epipygium parallel to each other. Hypopygium basally with a broad median unpunctate band and apically with a strong median keel.

Variation.—Klug (1807) distinguished his new species *X. lunata* from *X. fenestrata* by " alae posticae macula magna marginali semilunari hyalinis." I find that the hyaline markings of the wings vary both in extent and in density in different specimens.

Measurements.—♂♀, length of body 18-25 mm. ; anterior wing 18-23 mm. ; breadth of head 6·0-8·5 mm. ; thorax (incl. tegulae) 7·5-9·5 mm. ; II abdominal segment 8·5-10·5 mm. One abnormally small ♂ specimen from Nasik, Bombay, with the body and the anterior wing both 16 mm. long.

Types.—2 examples, without locality, in the Kiel Museum. The types of *X. lunata* Klug, ♂ and *X. indica* Klug, ♀, both from Tranquebar, in the Berlin Museum ; that of *X. gardineri* Cam., ♂, from the Maldive Archipelago, in the British Museum (Natural History), London.

Distribution.—I have studied specimens of this species from the following localities :—

Kashmir : Srinagar, 1 ♀ ; Chashma Shahi, Srinagar, 1 ♂ ; Ramban, 2,600′, Udhampur Division, 1 ♀. Baluchistan : Pasni, Mekran Coast, 3 ♂. Punjab : Rawalpindi, 1 ♀ ; Kangra Valley, 4,500′, 1 ♂, 1 ♀ ; Choa, 10 miles from Khewra, Salt Range, 5 ♂, 1 ♀ ; Gandhala Reserve Forest, ca. 4 miles from Choa Saidan Shah, Salt Range, 2 ♀ ; Low Hills near Sohawa, eastern extremity of Salt Range, 1 ♀ ; Kallar Kahar, Salt Range (Lake), 1 ♀. Delhi, 5 ♂, 1 ♀. United Provinces : Bijnor, 1 ♂, 2 ♀ ; Mailani, Naini Tal Dist., 2 ♂ ; Anaithpur, Bijnor Dist., 1 ♀ ; Dehra Dun, 2 ♂, 1 ♀ ; Hemipur Road, 1 ♀ ; Kichha, Naini Tal Dist., 1 ♂ ; Bareilly, 2 ♂ ; Mohammadpur, Roorkee, 1 ♀ : Tret, 3,306′, Mussoorie Subdivn. 3 ♀. Central Provinces : Asirgarh, 1 ♂ ; Mandla, 2 ♀ ; Sankal, 1 ♂ ; Mohagaon, Mandla Dist., 1 ♀ ; Nagpur, 1,000′, 1 ♂, 2 ♀. Bombay : Chiplum, Vashishti Valley, Ratnagiri Dist., 0-300′, 1 ♂, 1 ♀ ; Karachi, 2 ♂, 2 ♀ ; Medla, Yenna Valley, Satara Dist., 2,200′, 1 ♀ ; Nasik, 2 ♂, 4 ♀ ; Bombay, 1 ♂ ; Ahmedabad, 1 ♂ (*det.* Dutt). Goa : Andheri, Salsette, 1 ♂. Mysore : Bangalore, 2 ♀. Madras : Ramnad, 2 ♂ ; Forest around Chelama, 1,075′, Nallamalai Hills, 1 ♀ ; Barkuda Island, Chilka Lake Ganjam Dist., 1 ♂,2 ♀ ; Madras, 1 ♀ ; Tummalabailu, ca. 2,500′, Palkonda Hils, E. Ghats, at

light, 1 ♂; Nadur, ca. 1,800′, Javadi Hills, E. Ghats, 1 ♂; Vempali, Cuddapah Dist., 1 ♂; Coimbatore, 1 ♂; Olavakkot, Malabar Dist., 1 ♂; Tranquebar, 1 ♂ (*det.* Friese). Bihar: Harihar Nallah, Hazaribagh Dist., 1 ♀; Katihar, Purneah Dist., 2 ♀; Ranchi, 2 ♂, 4 ♀; Dalkhola, Purneah Dist., 3 ♀. Bengal: Calcutta and environs, 6 ♂, 10 ♀ (1 ♀ *det.* Friese as *X. valga* Gerst.); Dakhindari Salt Lake, near Calcutta, 8 ♂, 1 ♀; Paresnath, 4,000-4,400′, 1 ♀ (*det.* Paiva as *X. amethystina* Fab.); Manbhum, 1 ♀; Santiniketan, Birbhum Dist., 74 ♂, 94 ♀; Khargpur, 1 ♀; Bettiah, Champaran, 2 ♂; Raneeganj, 1 ♂; Darjeeling, 1 ♂ (*det.* Alfken). Nepal: Pipan Hali, Nepal Terai, 1 ♂. Assam: Companyganj, 1 ♂. Burma: Minhla, 1 ♀ (*det.* Gribodo as *X. hottentotta* F. Sm.); Maymyo, Shan Plateau, 3,000′, 4 ♂, 3 ♀; Mandalay, 3 ♂, 7 ♀; Tatkon, 1 ♂; Shwebo, 1 ♀. Ceylon: Niroddumunai, near Trincomalee, E. P., 1 ♀; Colombo, 1 ♂, 1 ♀; Kandy 2 ♂; Negomobo, 2 ♂; Puttalam, 1 ♀. Persia: Bendar Abbas, 1 ♂, 3 ♀ (*det.* Alfken).

The species has also been recorded from Mesopotamia, Mauritius, Madagascar, the Andamans, Celebes (?) and French Indo-China (?).

Remarks.—I have examined the original examples of Gribodo's *X. hottentotta* from Burma and of Annandale's *X. amethystina* from W. Bengal, but cannot separate them from the typical female *X. fenestrata*. One ♂ of this species sent to the British Museum (Natural History), London for comparison with the type of *X. gardineri* Cam. was found to offer no distinguishing character. *X. lunata* Klug, as indicated above, cannot even stand as a variety of *X. fenestrata*.

The general shape and colouration of the body of this species are very similar to those of *X. valga* Gerst., but can easily be distinguished by the frontal keel, ridges between lateral ocelli, knee-caps and epipygium of the ♀ and by the spiracular tubercles and epipygium of the ♂.

J. Perez has given a very detailed description of the frontal keel and knee-caps of the female. Bingham's remark " front not carinate " in the female is incorrect.

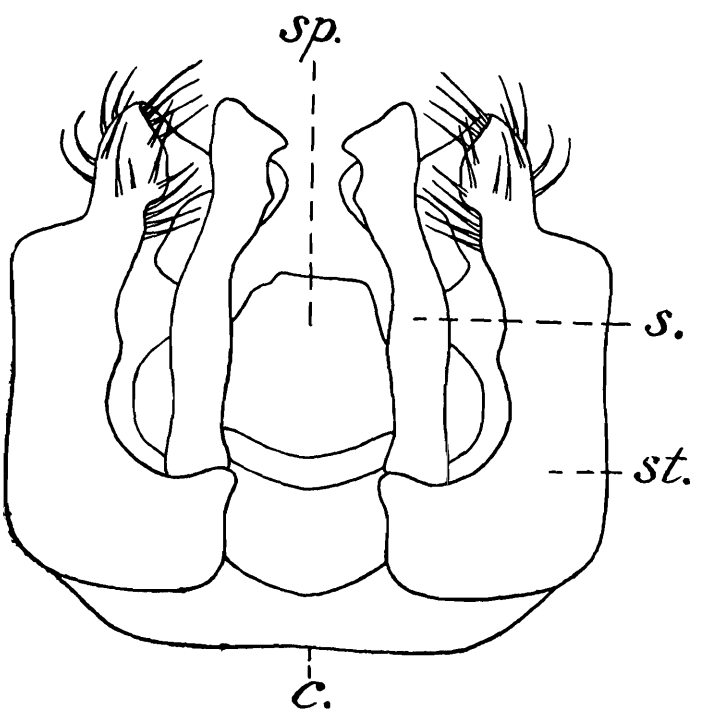
Xylocopa basalis F. Sm.

1854. *Xylocopa basalis*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 355, No. 54, ♀♂.
1873. *Xylocopa basalis*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 394, No. 17.
1874. *Xylocopa basalis*, F. Smith, *Trans. Entomol. Soc. London*, p. 271 No. 49, ♀♂.
1896. *Xylocopa basalis*, Dalla Torre, *Cat. Hymen.* X, p. 205.
1897. *Xylocopa basalis*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 542, No. 951, ♀♂
1922. *Xylocopa basalis*, Dover, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.

Differs from *X. fenestrata* (Fab.) by the following characters:—

♂.—Pubescence brownish black; lower half of labrum, postgenae, tegulae, propodeum, apices of posterior metatarsi with pale hairs; basal portion of venter of posterior femora with a thick tuft of brown and yellow hairs. Inner orbits very weakly convergent at their upper extremities. Clypeus with a strong narrow median band. Inter-ocellar

distance about 3 times as long as ocello-ocular distance. Inter-antennal distance about twice as long as antenno-ocular distance. Antennal segment III broader than long and slightly longer than segments IV and V Vein *M* about $\frac{2}{3}$ as long as M_{1+2} (1st section) or M_{1+2} (2nd section). Venter of posterior femora basally with a small patch of minute punctures along the inner margin. Punctures on abdominal tergites denser, deeper and more evenly distributed ; median portion of I tergite almost unpunctate ; spiracular tubercles on III tergites weaker ; epipygium without apical projections.



TEXT-FIG. 3.—Dorsal view of the ♂ genitalia of *Xylocopa basalis* F. Sm. ×30.
c. cardo ; *s.* sagitta ; *sp.* spatha ; *st.* stipes.

♀.—Pubescence differing from that of ♂ *X. basalis* in the absence of pale hairs on thorax and posterior legs. Inter-orbital distance about 7/9 as long as vertico-clypeal distance. Clypeus with a median unpunctate band. Basal triangular area of mandibles strongly depressed and punctate in first-degree density. Antennal segment III about 4/5 as long as segments IV-VI. Abdominal tergites I-V more densely punctate, with a narrow median unpunctate band. Submedian processes of epipygium widely separated, apically convergent.

Measurements.—♂, length of body 15-17 mm.; anterior wing 13-16 mm. ♀, length of body 16 mm.; anterior wing 14 mm.

Types.—♂♀, from Northern India, in the British Museum (Natural History), London.

Distribution.—I have studied specimens of the species from the following localities :

Punjab : Wazirabad, 3 ♂. Bombay : Karachi, found in *Calotropis* stems, 3 ♂, 1 ♀.

Remarks.—In F. Smith's original description of the ♂, for basal joint of tibiae read basal joint of tarsi ; and in Bingham's later account, for apex of tibiae read apex of metatarsi.

Subgenus **Nodula,** nov.

Body usually of small size. Integument black, ♂ with pale face markings. Pubescence dominantly black, ♂ with more or less pale hairs. Inner orbits of ♂ straight and parallel. Frontal keel distinct. Transverse ridges anterior to lateral ocelli more or less distinct. Base of ocellar triangle about one and a half times (♂) or twice (♀) as long as the lateral sides. Labrum of ♂ strongly tuberculated. Mandibles bidentate. Disc of mesonotum unpunctate. Scutellum posteriorly not sharply marked off, but its anterior and posterior portions distinctly not on the same level. Veins *r-m* and M_{1+2} forming acute interior angles. Knee-caps simple in ♂ and bifurcate in ♀. Inner and outer teeth of claws divergent. Submedian processes of ♀ epipygium almost parallel, widely separated, apically projecting outwards.

Type.—Apis amethystina Fab. (1793).

This subgenus serves as a connecting chain between the subgenera *Biluna, Zonohirsuta* and *Orbitella.* In certain characters it also shows affinities to *Xylocopa,* s.s. and *Ctenopoda.*

It is not found in the Palaearctic, Australian and eastern portion of the Oriental Regions, but is richly represented in Southern India.

The material of this subgenus at my disposal is very insufficient, but I have been able to recognise 10 species and subspecies; only in the case of 4 of them both males and females are known.

Key to Indian species and subspecies. ♂.

1. Supraclypeal region unpunctate ..	*meyeri Dusm.*
Supraclypeal region punctate	2.
2. Pale frontal markings extending upwards to the level of lateral ocelli; venter of posterior femora strongly punctate	3.
Pale frontal markings extending upwards to the level of antennal fossae only; venter of posterior femora smooth and unpunctate	4.
3. Body with dominant black hairs; knee-caps sharply pointed	*punctigena,* sp. nov.
Body with dominant pale hairs; knee-caps apically blunt.	*bentoni* Ckll.
4. Inter-orbital distance about 4/7 as long as vertico-clypeal distance; median unpunctate band of clypeus as broad as supraclypeal region ..	*madurensis* Friese.
Inter-orbital distance about 3/7 as long as vertico-clypeal distance; median unpunctate band of clypeus distinctly much narrower than supraclypeal region	5.
5. Median unpunctate band of clypeus about as broad as the antennal scape or the band of supraclypeal region; anterior metatarsi without any trace of pale hairs	*nigrotarsata,* sp. nov.
Median unpunctate band of clypeus about twice as broad as the antennal scape or the band of supraclypeal region (if present); anterior metatarsi with dominant pale hairs	6.
6. Median unpunctate area of labrum oval, broader than long, poorly defined; posterior metatarsi normal ..	*amethystina amethystina* (Fab.).
Median unpunctate area of labrum triangular or T-shaped, as broad as long, well defined; inner surface of posterior metatarsi basally swollen and unpunctate	*amethystina phanerocephala* (Ckll.).

Key to Indian species and subspecies. ♀.

1.	Transverse ridges anterior to lateral ocelli strongly projecting outwards	*bentoni* Ckll.
	Transverse ridges anterior to lateral ocelli not projecting outwards	2.
2.	Genae each with about 12 punctures	*punctigena*, sp. nov.
	Genae unpunctate, or, at most, with 1-2 punctures ..	3.
3.	Clypeus medially not keeled, flat ..	4.
	Clypeus with a distinct median keel	7.
4.	Clypeus with a more or less distinct median unpunctate band	5.
	Clypeus medially evenly punctate except the extreme apex. ..	6.
5.	Basal triangular area of mandibles strongly depressed; veins M and M_{1+2} (1st section) subequal ..	*madurensis* Friese.
	Basal triangular area of mandibles very weakly depressed; vein M distinctly longer than M_{1+2} (1st section)	*prashadi*, sp. nov.
6.	Frontal keel strong; supraclypeal region medially punctate; abdominal tergites medially unpunctate ..	*ramakrishnai*, nom. nov.
	Frontal keel very weak; supraclypeal region medially unpunctate; abdominal tergites medially punctate ..	*remota*, sp. nov.
7.	Frontal and epistomal sutures forming acute interior angles; knee-caps extending to basal 2/3 of tibiae	*amethystina amethystina* (Fab.).
	Frontal and epistomal sutures forming obtuse interior angles; knee-caps extending to basal half of tibiae ..	*nigrotarsata*, sp. nov.

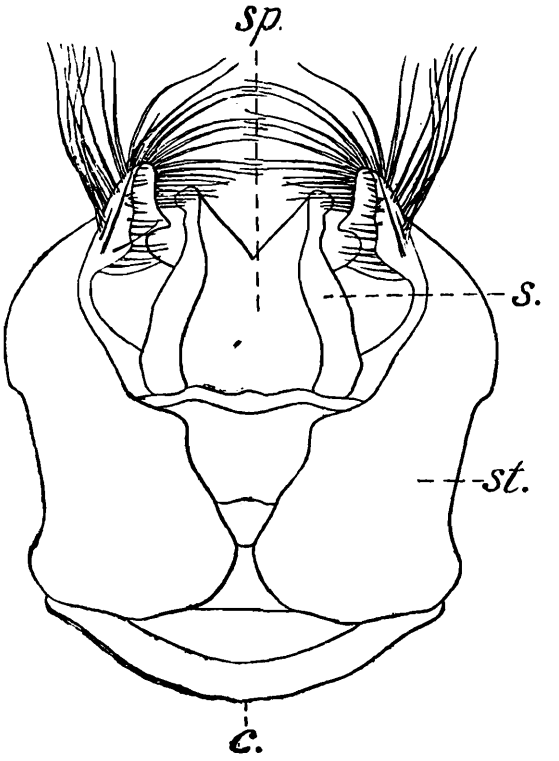
Xylocopa punctigena, sp. nov.

♂.—*Integument.*—Supraclypeal marking extending upwards to the level of upper margin of antennal fossae. Lateral frontal markings extending upwards to the level of lateral ocelli, where they are a little divergent from inner orbits. Wings dark brown, with a strong and magnificent bluish to violaceous iridescence, which is deepest near the base.

Pubescence.—Head and legs covered with black hairs, regions above antennal fossae with white hairs. Thoracic and abdominal sternites with sooty brown hairs. Lateral corners of I and II abdominal tergites with whitish hairs.

Structure.—Inter-orbital distance about $\frac{7}{8}$ as long as vertico-clypeal distance. Frontal keel weak. Transverse ridges anterior to lateral ocelli moderately strong. Supraclypeal region convex. Tentorial pits shallow. Median unpunctate band of clypeus about 1/11 as broad as its apical margin. Basal unpunctate area of labrum T-shaped, elevated. Basal triangular area of mandibles depressed. Genae very long, posterior portion with 7-14 fine deep punctures. Inter-ocellar distance about one and one-third times as long as ocello-ocular distance. Inter-antennal distance and antenno-ocular distance subequal. Antennal segment III slightly shorter than segments IV and V; V and VI subequal. Punctures on dorsum of thorax mostly of second-degree density; those on posterior 2/3 of scutellum of first-degree density. Posterior portion of scutellum and postscutellum lying on the same level. Vein M about 2/3 as long as M_{1+2} (1st section) which is slightly longer than M_{1+2} (2nd section). Posterior coxae and trochanters with deep and coarse punctures of

second-degree density. Venter of posterior femora strongly punctate in third-degree density, but a small area near the base of inner margin punctate in first-degree density; inner margin curved, weakly keeled and basally angulate. Knee-caps extending to basal 2/7 of tibial length. Inner surface of posterior metatarsi basally with an elevated, oval, polished area. Inner teeth of anterior and posterior claws respectively about 1/3 and 1/5 as long as the corresponding outer teeth. Punctures on abdominal tergites of third-degree density.



TEXT-FIG. 4.—Dorsal view of the ♂ genitalia of *Xylocopa punctigena*, sp. nov. ×20.
c. cardo; *s.* sagitta; *sp.* spatha; *st.* stipes.

♀.—Integument and pubescence similar to those of the ♂, but face with sooty brown hairs and body without pale hairs. Median unpunctate band of clypeus poorly defined. Tentorial pits weak. Epistomal suture curved. Transverse ridges anterior to lateral ocelli strong and situated at the level of upper margin of median ocellus. Vertex punctate in first-degree density. Posterior portion of scutellum weakly convex. Knee-caps extending to basal 3/4 of tibial length. Punctures on abdominal tergites relatively fine, sparse and shallow, notably those on tergites I and II.

Variation.—The labrum of the ♂ specimen from Mussoorie is purely black.

Measurements.—♂♀, length of body 20 mm.; anterior wing 21-22 mm.

Types.—Holotype, ♂, No. 1619/H3, in the Zoological Survey of India (Indian Museum), Calcutta; allotype, ♀, in the Forest Research Institute, Dehra Dun, U. P.

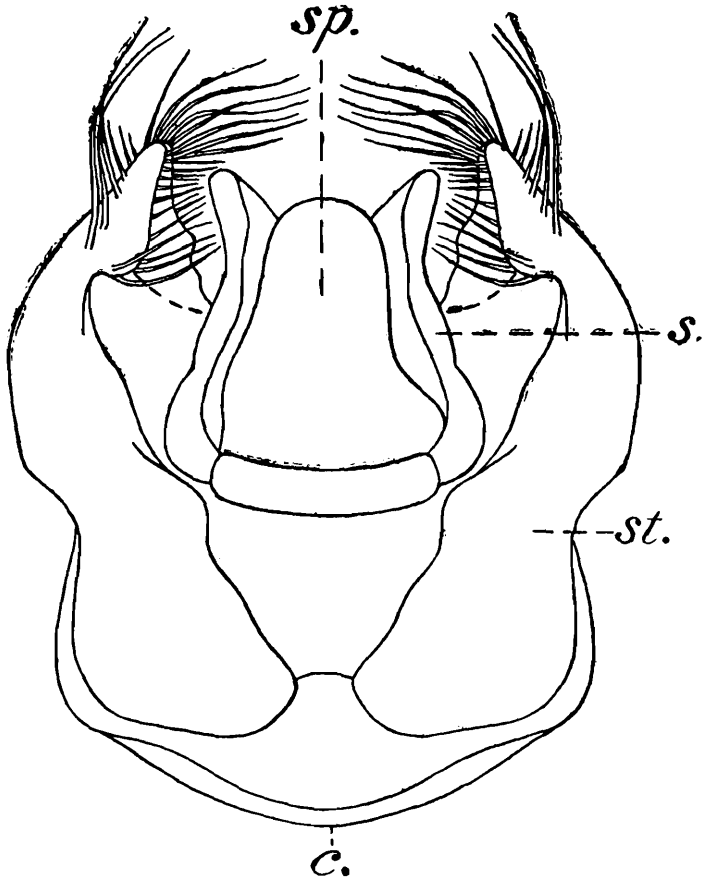
Distribution.—I have studied specimens of this new species from the following localities: Punjab: Hamirpur Range, Hoshiarpur, 2 ♂, 1 ♀ (types). United Provinces: Bhadraj, 500', Mussoorie, 1 ♂.

Remarks.—The chief distinguishing characters of *X. punctigena* from *X. amethystina* have been discussed in the detailed description of the species. It also shows superficial resemblance to *X. nasalis nasalis* Westw. in both the sexes, but is easily distinguished by its transverse ridges anterior to lateral ocelli, genae, scutellum and the knee-caps.

Xylocopa bentoni, Ckll.

1919. *Xylocopa bentoni*, Cockerell, Proc. U. S. Nat. Mus. LV, p. 172,♂.
1922. *Xylocopa amethystina*, Dover (in part), *Rec. Ind. Mus.* XXIV, p. 87.
1938. *Xylocopa kotzschi*, Hedicke, *Deutsch. Ent. Zeitschr.*, p. 186, fig. 2, ♀.

♂.—Frontal keel apically narrow and ending sharply. Supraclypeal region medially unpunctate. Median unpunctate band of clypeus about 1/11 as broad as the apical clypeal margin. Basal triangular area of mandibles not depressed, not separable from the median keel. Postgenae and vertex evenly punctate in first-degree density. Posterior tibiae with a narrow longitudinal band of golden hairs beyond knee-caps, which are apically blunt.



TEXT-FIG. 5.—Dorsal view of the ♂ genitalia of *Xylocopa bentoni* Ckll. ×30.
c. cardo; *s.* sagitta; *sp.* spatha; *st.* stipes.

♀.—Face with punctures of second-degree density at regions laterad to frontal keel. Apex of frontal keel extraordinarily strong, nodule-like. Transverse ridges anterior to lateral ocelli subquadrate, strongly projecting outwards. Supraclypeal region and clypeus convex, medially unpunctate. Frontal sutures and basal portion of clypeal sutures very deep. Tentorial pits elongate. Basal triangular area of mandibles depressed; inner margin weakly emarginated. Inter-ocellar distance

slightly longer than ocello-ocular distance. Antennal segment III slightly longer than segments IV-VI. Vein *M* slightly shorter than M_{1+2} (1st section). Knee-caps strong, with sharp spine-like processes.

Measurements.—♂, length of body 16-17 mm.; anterior wing 16 mm. ♀, length of body 19-22 mm.; anterior wing 18-19 mm.

Types.—Holotype, ♂, from Abbottabad, N.-W. Frontier Province, in the U. S. National Museum, Washington, D. C.; type of *X. kotzschi* Hed., ♀, from Andarab, W Hindu Kush, Afghanistan, in Hedicke's Collection, Berlin.

Distribution.—I have studied specimens of this species from the following localities :—

Punjab : Dharmsala, 4,800′, 1 ♀; Kaisdhar, 8,500′, Kulu, 1 ♀. United Provinces : Mossy nullah, below Barlowganj, ca. 3 miles from Mussoorie, Dehra Dun Dist., 1 ♀; Ranikhet, on flowers of *Robinia* and *Acacia*, 1 ♀; Seoni, Ranikhet, on flowers of *Calotropis* sp., 1 ♂, 1 ♀; Painsur, above Lohba, 7,500′, Garhwal, 1 ♀; Lohba, 5,000′, Garhwal, 2 ♂; Tarakhet, Almora, 1 ♂; Suini, Almora, on fir tree, 1 ♀; West Almora, 4,000′, 1 ♀; Takula, Kumaon, 1 ♀; Dehra Dun, 1 ♀; Thadiar, Chakrata, 1 ♀. " India ", 1 ♂.

Remarks.—This species is closely allied to the preceding one, but is distinguished by the paler pubescence and blunt knee-caps of the male and by the strong frontal keel, subquadrate transverse ridges anterior to lateral ocelli and spinous knee-caps of the female. On the other hand, this and the preceding species are distinguished from the remaining members of this subgenus by their broad face, long pale face markings, more prominent transverse ridges anterior to lateral ocelli, long genae, strongly punctate posterior femora and long abdominal pubescence. Cockerell, in describing this species, compared it to *X. collaris binghami* Ckll., but the latter belongs to the subgenus *Zonohirsuta*, and except for superficial resemblance there are no true affinities between them.

My determination of the male has been confirmed by Prof. Cockerell. The identification of the female, is based on the general shape of the body, the site of the transverse ridges anterior to lateral ocelli and the distribution of the species.

Hedicke remarked that the female of this species was nearly related to *X.* (s. s.) *violacea* (Linné), but the latter does not belong to the subgenus (*Nodula*)., nov.

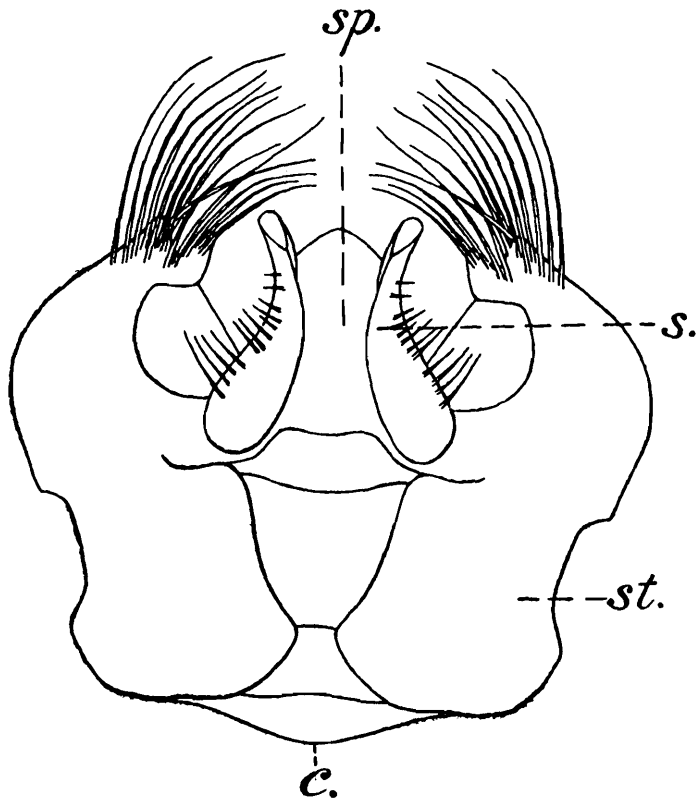
Xylocopa madurensis Friese.

1913. *Xylocopa madurensis*, Friese, *Deutsch. Ent., Zeitschr.*, p. 88, No. 7,♀♂.
1921. *Xylocopa madurensis*, Ramakrishna Aiyar, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 98.
1925. *Xylocopa collaris madurensis*, Dover, *Ann. Mag. Nat. Hist.* (9) XV, p. 224,♂.

♂.—*Integument.*—Lateral frontal markings extending upwards to the level of upper margin of antennal fossae.

Pubescence.—Pale hairs on scutellum and on mesonotum mixed with very few black hairs. Intermediate and posterior legs with dominant pale hairs.

Structure.—Inter-orbital distance about 4/7 as long as vertico-clypeal distance. Frontal keel apically sharpened. V-shaped basin anterior to median ocellus absent. Median unpunctate band of clypeus about 3/8 as broad as apical margin of the latter. Basal triangular area of mandibles depressed. Veins M, M_{1+2} (1st section) and M_{1+2} (2nd section) subequal. Knee-caps apically blunt, extending to basal 1/3 of tibial length. Posterior femora ventrally flat, smooth, unpunctate. Inner surface of basal portion of posterior metatarsi smooth and slightly swollen. Punctures on abdominal tergites of third-degree density.



TEXT-FIG. 6.—Dorsal view of the ♂ genitalia of *Xylocopa madurensis* Friese. ×30.
c. cardo ; *s.* sagitta ; *sp.* spatha ; *st.* stipes.

♀.—Median unpunctate band of clypeus narrow, not keeled. Basal unpunctate area of labrum very strong. Basal triangular area of mandibles deeply depressed, sometimes fused up with outer marginal suture. Antennal segment III almost as long as segments IV-VI. Lower projection of knee-caps narrower than the upper.

Measurments.—♂, length of body 15-17 mm. ; anterior wing 14-16 mm. ♀, length of body 16-18 mm. ; anterior wing 14-16 mm.

Variation.—The posterior tibiae and abdominal tergite II of ♂ sometimes with a little pale hairs.

Types.—♂♀, from Shembaganur, Madura, Madras, in the Berlin Museum.

Distribution.—I have studied specimens of this species from the following localities : Madras : Shembaganur, Madura Dist., 1 ♂, 1 ♀ (*det.* Strand), 2 ♀ (*det.* Maidl as *X. amethystina* Fab.) ; Kodaikanal, 6,700-7,200′, Palni Hills, 2 ♂, 1 ♀.

Remarks.—From the general shape of head and the distribution of pale thoracic pubescence, this species appears to form a connecting link between *X. punctigena* and *X. bentoni* on the one hand and *X. meyeri* and *X. prashadi* on the other. It is distinguished from *X. bentoni* by the short pale face markings and smooth venter of posterior femora of ♂ and by the weak frontal keel, transverse ridges anterior to lateral ocelli and knee-caps of ♀.

Xylocopa meyeri Dusm.

1924. *Xylocopa (Xylocopa) meyeri*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid, Zool.* XLIX, p. 33, No. 52, ♂.

I have not seen any specimens of this species. From its original description, it seems distinguishable from *X. madurensis* only by its unpunctate supraclypeal region and darker pubescence. The species was described from 1 ♂ from "Dekán"

Xylocopa prashadi, sp. nov.

♀.—Inter-orbital distance about 3/4 as long as vertico-clypeal distance. Frontal keel broad. Median unpunctate band of clypeus narrow, not keeled. Supraclypeal region punctate in third-degree density. Epistomal suture curved. Basal triangular area of mandibles shallowly punctate. Genae long. Vein *M* slightly longer than M_{1+2} (1st section), which is subequal to M_{1+2} (2nd section).

Measurements.—♀, length of body 18 mm.; anterior wing 13·5 mm.

Type.—Holotype, ♀, no. 1781/H3, in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—Madras: Stillbrook Garden, Coonoor, 6,000′, Nilgiris, 1 ♀.

Remarks.—This species is allied to *X. madurensis*, but is distinguished by its smaller size, broader face and flat clypeus.

Xylocopa ramakrishnai, nom. nov.

1911. *Xylocopa amethystina*, Cockerell (*nec* Fabricius), *Ann. Mag. Nat. Hist.* (8) VII, p. 311, ♀.
1919. *Xylocopa ignita*, Cockerell (*nec* F. Smith), *Ann. Mag. Nat. Hist.* (9) III, p. 193, ♀.
1922. *Xylocopa amethystina*, Dover (in part), *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.

♀.—Clypeus heavily punctate, medially (except the extreme apical portion) punctate and flat. Basal triangular area of mandibles very long, poorly demarcated from outer marginal suture. Veins *M*, M_{1+2} (1st section) and M_{1+2} (2nd section) subequal.

Measurements.—♀, length of body 17 mm.; anterior wing 15 mm.

Distribution.—I have examined only one ♀ specimen of this species, without locality, probably received from the Bombay Natural History Society, determined by Dover as *X. amethystina* (Fab.). Cockerell's specimen was from Dodabetta, Nilgiris, Madras.

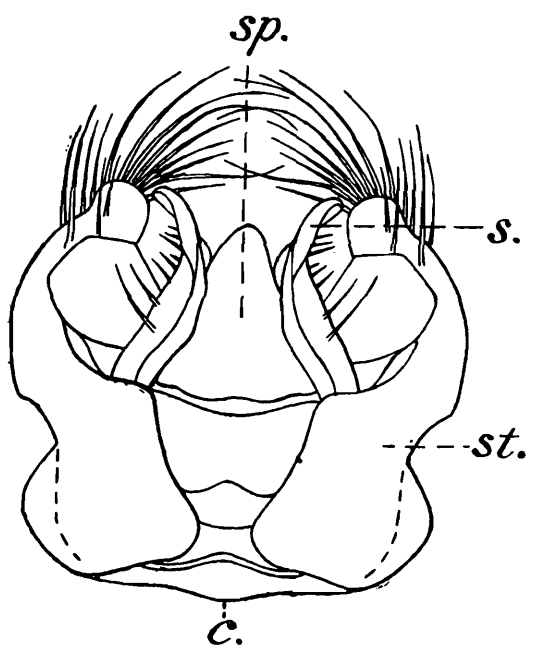
Remarks.—This species is allied to the preceding one and is chiefly characterised by its clypeus and wing venation.

Xylocopa amethystina amethystina (Fab.).

1793. *Apis amethystina*, Fabricuis, *Entomol. Syst.* II, p. 325, No. 51, ♀.
1802. *Andrena amethystina*, Latreille, *Hist. Nat. Insect.* III, p. 373.
1804. *Xylocopa amethystina*, Fabricius, *Syst. Piez.*, p. 341, No. 16, ♀.
1806. *Xylocopa amethystina*, Illiger, *Mag. Insectenkunde*, V, p. 152, No. 28.
1807. *Trachusa amethystina*, Jurine, *Nouv. Méthod. Class. Hymen.*, p. 251, ♀.
1854. *Xylocopa amethystina*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 348, No. 22.
1874. *Xylocopa ignita*, F. Smith, *Trans. Entomol. Soc. London*, p. 276, No. 62,♀.
1876. *Xylocopa amethystina*, Ritsema, *Tijdschr. Entomol.* XXIX, p. 62.
1896. *Xylocopa amethystina* and *X. ignita*, Dalla Torre, *Cat. Hymen.* X, pp. 204 and 212.
1896. *Xylocopa ignita*, Bingham, *Proc. Zool. Soc. London*, p. 457, No. 329.
1897. *Xylocopa amethystina*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 540, No. 946, ♀♂.
1901. *Xylocopa amethystina*, Friese, *Bien. Eur.* VI, p. 211, No. 11, ♀.
1911. *Xylocopa amethystina* subsp. *sigiriana*, Cockerell, *Ann. Mag. Nat. Hist.* (8) VII, p. 310, ♂♀.
1912. *Xylocopa* (*Xylocopa*) *ignita*, Maidl. *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 292, pl. 4, fig. 12, ♀.
1913. *Xylocopa amethystina*, Friese, *Deutsch. Ent. Zeitschr.*, p. 88, No. 8. ♀.
1918. *Xylocopa amethystina*, Friese, *Zool. Jahrbücher Abt. Syst.* XLI, p. 496, No. 40 and p. 510.
1919. *Xylocopa sigiriana*, Cockerell, *Ann. Mag. Nat. Hist.* (9) III, p. 193.
1921. *Xylocopa amethystina*, *X. amethystina signiana* (*misprint*), and *X. amethystina sigiriana* Ramakrishna Aiyar, *Journ. Bombay Nat. Hist. Soc.* XXVII, pp. 98 and 102.
1922. *Xylocopa amethystina*, Dover (in part), *Rec. Ind. Mus.* XXIV, p. 87.
1922. *Xylocopa amethystina*, Dover (in part), *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.
1925. *Xylocopa ignita sigiriana*, Dover, *Ann. Mag. Nat. Hist.* (9) XV, p. 223.
1927. *Xylocopa amethystina*, Frére, *Journ. Bombay Nat. Hist. Soc.* XXXII, pp. 225-228, figs.

The following additional points may be supplemented to Maidl's re-description of the female.

♀.—Face punctate in first-degree density, most densely so at regions lateral to frontal keel and in ocellar triangle. Supraclypeal region



TEXT-FIG. 7.—Dorsal view of the ♂ genitalia of *Xylocopa amethystina amethystina* (Fab.). ×30. *c.* cardo ; *s.* sagitta ; *sp.* spatha ; *st.* stipes.

punctate in second-degree density. Frontal keel narrow, basally without V-shaped basin. Tentorial pits deep, elongate. Mandibles with one

strong emargination on inner margin; basal triangular area shallowly depressed, strongly punctate. Genae sometimes with 1-2 shallow punctures. Postgenae and vertex punctate in second-degree density. Vein M_{1+2} (2nd section) about 2/3 as long as M or M_{1+2} (1st section). Lower projections of knee-caps broader and much sharper than the upper. Abdomen deeply punctate; tergites I-IV medially unpunctate. Hypopygium with a strong median keel.

Measurements.—♂, length of body 12-14 mm.; anterior wing 12·0—12·5 mm.; breadth of head 5·0—5·5 mm.; thorax (incl. tegulae) 6-7 mm.; II abdominal segment 6-7 mm. ♀, length of body 13-15 mm.; anterior wing 13-15 mm.; breadth of head 5·5—6·0 mm.; thorax (incl. tegulae) 7-8 mm.; II abdominal segment 7-8 mm.

Types.—Fabricius's original example, probably the type, 1 ♀, in the Copenhagen Museum. Types of *X. ignita* F. Sm., ♀, from Bombay, Canara, and Tarancore (probably a misprint for Travancore), and that of *X. amethystina* subsp. *sigiriana* Ckll., ♂♀, from Sigiri, N. W India, all in the British Museum (Natural History), London.

Distribution.—I have studied specimens of this species from the following localities :—

United Provinces : Dehra Dun, 1 ♀. Bombay : Castle Rock, 1 ♀; Bombay, 2 ♂, 2 ♀; Boreoli, Bombay Dist., 1 ♂, 2 ♀ (1 ♂ and 1 ♀ compared with type of *X. amethystina sigiriana* Ckll. and that of *X. ignita* F. Sm. respectively by Meade-Waldo); Bassein, Bombay, 3 ♀. Goa : Soccorro, 7 ♂, 5 ♀. Mysore : Bangalore, ca. 3,000′, 1 ♀. Travancore : Shasthancottah, 12 miles N. N. E. of Quilon, 1 ♂. Madras : Vizagapatam Dist., Golgonda Forest, 1 ♂; Nilgiris, 1,500′, 1 ♂; Chitteri, 3,000′, Chitteri Hills, Salem Dist., 1 ♀; Vempali, Cuddapah Dist., 1 ♀; Nagalur, 9 miles N. of Yercaud, 3,000′, western border of Shevaroy Hills, overlooking the plains, Salem Dist., 1 ♀; Kuttur, 2,110′, Yelagiri Hills, 1 ♀. Ceylon : Niroddumunai, E. P., 2 ♂ 1 ♀; M. Iluppala, N. Ceylon, 1 ♂ (*det.* Friese); " Ceylon," 1 ♀ (*det.* Friese).

Remarks.—The exact status of *X. amethystina* (Fab.) has long been in dispute. It was originally described from " India orientali " and " Italia " (1793). In Systema Piezatorum (1804), " India orientali " is its only habitat. Unfortunately there is no positive proof for the specimens determined by Fabricius in Kiel and Copenhagen as being the original types. I sent one of my specimens to Copenhagen for comparison with Fabricius's specimen and the specimen was found to be identical. I have also studied the original examples of Gribodo's *X. amethystina* and *X. cyanescens* (1 ♂, 2 ♀) (all from Susa, Piedmont, Italy) and found that they are typical *X. cyanescens* Brullé. Fabricius's original series of *Apis amethystina* is most probably composed of *X. amethystina* from India and *X. cyanescens* from Italy.

The specimens recorded as *X. amethystina* (Fab.) by Lepeletier (1841), F. Smith (1879), Gribodo (1893-94), Maidl (1912), Annandale (1912) and Cockerell (1919) are *X. stadelmanni* Vach., *X. nasalis* West. subsp.?, *X. cyanescens Brullé*, *X. collaris* Lepel. subspp., *X. fenestrata* (Fab.) and *X. ramakrishnai*, nom. nov. respectively and not of *X. amethystina*

The type of *X. ignita* and *X. amethystina sigiriana* in the British Museum (Natural History), London, were, at my request, compared with a typical specimen of *X. amethystina* and found to be conspecific with it.

Attention may be directed to an apparent *lapsus calami* in Bingham's description of the ♂, where *apex* of labrum is used in place of *base* of labrum.

Xylocopa amethystina phanerocephala (Ckll.).

1920. *Xylocopa phanerocephala*, Cockerell, *Ann. Mag. Nat. Hist.* (9) VI, p. 203, ♂.

♂.—Median unpunctate band of clypeus about 1/5 as broad as apical clypeal margin. Basal unpunctate band of labrum black, subtriangular, strongly elevated. Mandibles without pale markings. Vein *M* subequal to or slightly longer than M_{1+2} (1st section). Knee-caps extending to basal 1/3 of tibial length. Inner surface of posterior metatarsi basally unpunctate, slightly swollen. Punctures on abdominal tergites of third-degree density.

Measurements.—♂, length of body 17 mm.; anterior wing 13-15, mm.

Type.—♂, from Ootacamund, Madras, 7,500′, in the British Museum (Natural History), London.

Distribution.—I have examined only two specimens of this subspecies : Bababuddin Hills, 4,000-4,500′, Mysore, 1 ♂ ; Kotagiri, Nilgiris, Madras, 1 ♂.

Remarks.—The integument of this subspecies is darker than in the typical form, the inter-orbital distance is longer and the venter of posterior femora broader. It appears to be more primitive than the typical form.

Xylocopa nigrotarsata, sp. nov.

♂.—Labrum without pale marking. Face, vertex, anterior legs and I abdominal tergite covered with purely black hairs. Median unpunctate band of clypeus about 1/11 as broad as apical margin of the latter. Supraclypeal region medially unpunctate. Basal unpunctate band of labrum triangular. Inner marginal suture of mandibles interrupted by emargination on inner margin. Vein *M* about one and a half times as long as M_{1+2} (1st section), which is 2/3 as long as M_{1+2} (2nd section). Knee-caps apically sharply pointed, extending to basal 1/3 of tibial length. Inner surface of posterior metatarsi basally unpunctate, slightly swollen. Abdominal tergites without median unpunctate band.

♀.—Epistomal suture upwardly curved. Veins *M* and M_{1+2} (2nd section) subequal and both about 1·5 times as long as M_{1+2} (1st section). Knee-caps extending to basal 1/2 of tibial length.

Measurements.—♂, length of body 15 mm. ; anterior wing 12·5 mm. ♀, length of body 13·5 mm. ; anterior wing 12 mm.

Type.—Holotype, ♂, no. 1756/H3, allotype, ♀, no. 1757/H3, in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—Guduholli, Bombay, 1 ♂, 1 ♀.

Remarks.—This species is very closely related to the preceding species, but can be distinguished by its black-haired anterior legs (♂), shorter knee-caps and wing venation (♀). Its inter-orbital distance is comparatively longer than that of *X. amethystina*, indicating that it is probably more primitive than *X. amethystina*.

Xylocopa remota sp. nov.

1922. *Xylocopa amethystina*, Dover (in part), *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.

♀.—Inter-orbital distance and vertico-clypeal distance subequal. Upper orbital distance distinctly much longer than (very weakly perceptibly so in the two preceding species) lower orbital distance. Frontal keel weak, basally with a distinct V-shaped basin. Clypeus without any trace of median keel or unpunctate band. Supraclypeal region medially distinctly more elevated than clypeus and with a broad unpunctate band. Vertex evenly punctate. Inter-ocellar distance distinctly shorter than ocello-ocular distance. Antennal segment III about two thirds as long as segments IV-VI. Knee-caps strong, narrow, extending to basal 3/5 of tibial length ; lower projection narrower than the upper. Punctures on abdominal tergites evenly distributed.

Measurements.—♀, length of body 14 mm. ; anterior wing 12 mm.

Type.—Holotype, ♀, no. 1782/H3, in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—I have studied only a single specimen of this species, bearing no locality label but it is probably from South India.

Remarks.—This new species can be readily distinguished from other members of this subgenus by the remoteness of its inner orbits and by the punctuation of its clypeus.

Subgenus **Zonohirsuta,** nov.

1912. *Xylocopa amethystina*-Gruppe, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 290.

Body of medium size. Integument mainly black, usually with certain amount of bluish, greenish or purplish metallic lustre ; ♂ with pale face markings. Pubescence of ♂ usually dominantly pale yellow, that of ♀ dominantly black. Inner orbits of ♂ straight and weakly convergent at their upper extremities. Frontal keel weak. Base of ocellar triangle about one and one-third (♂) or one and a half times (♀) as long as the lateral sides. Labrum of ♀ weakly rugose, shagreened. Mandibles bidentate. Disc of mesonotum sparsely punctate. Anterior and posterior portions of scutellum almost perpendicular to each other, but the posterior margin not sharply marked off and not covering any portion of postscutellum. Vein R_5 weakly curved and forming obtuse interior angles with M_{1+2}. Knee-caps simple, sometimes bifurcate in ♀. Inner and outer teeth of claws divergent. Submedian processes of epipygium of ♀ widely separated, not parallel. Hypopygium keeled in ♀ only.

Type.—Xylocopa collaris Lepel. (1841).

This subgenus is represented in India by the type-species *X. collaris* and three subspecies, based apparently on geographical races.

Key to Indian subspecies of X. collaris. ♂.

1. Pale hairs extending to III abdominal tergite .. *collaris binghami* Ck ll.
   Pale hairs not extending beyond posterior margin of II abdominal tergite .. .. 2.
2. Median unpunctate band of clypeus about 1/10 as broad as the apical clypeal margin; inner orbits comparatively strongly convergent .. .. *collaris penangensis* Ckll.
   Median unpunctate band of clypeus about 1/3 as broad as apical clypeal margin; inner orbits less strongly convergent .. .. *collaris bhowara, subsp. nov.*

Key to Indian subspecies of X. collaris. ♀.

1. Thorax without white collar; clypeus and supraclypeal region medially unpunctate .. *collaris bhowara, subsp. nov.*
   Thorax anteriorly with a very distinct white collar: clypeus and supraclypeal region without median unpunctate band .. .. .. 2.
2. Scutellum posteriorly with few white hairs .. *collaris penangensis* Ckll.
   Scutellum without white hairs .. .. .. *collaris binghami* Ckll.

Xylocopa collaris binghami Ckll.

1841. *Xylocopa collaris*, Lepeletier (in part), *Hist. Nat. Insect. Hymen.* II, p. 189, No. 26, ♀.
1854. *Xylocopa collaris*, F. Smith (in part), *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 357, No. 47.
1873. *Xylocopa collaris*, F. Smith (in part), *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 393, No. 11.
1874. *Xylocopa collaris*, F. Smith (in part), *Trans. Entomol. Soc. London*, p. 270, No. 46, ♀ (excl. ♂).
1896. *Xylocopa collaris*, Dalla Torre (in part), *Cat. Hymen.* X, p. 208.
1897. *Xylocopa collaris* var. Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 543, No. 953, ♂.
1904. *Xylocopa collaris* var. *binghami*, Cockerell, *Ann. Mag. Nat. Hist.* (7) XIV, p. 30, ♂.
1911. *Xylocopa collaris* var. *binghami*, Cockerell, *Proc. U. S. Nat. Mus.* XXXIX, p. 638, ♂.
1912. *Xylocopa collaris*, Paiva (in part), *Rec. Ind. Mus.* VIII, p. 79, No. 13.
1912. *Xylocopa (Xylocopa) collaris*, Maidl (in part), *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 292.
1921. *Xylocopa collaris* var. *binghami*, Ramakrishna Aiyar, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 98.
1922. *Xylocopa collaris*, Dover (in part), *Rec. Ind. Mus.* XXIV, p. 87.
1922. *Xylocopa collaris*, Dover (in part), *Journ. Bombay Nat. Hist., Soc.* XXVII, p. 962.
1924. *Xylocopa (Xylocopa) collaris*, Dusmet (in part), *Trab. Mus. Nat. Cien. Nat. Madrid, Zool.* XLIX, p. 30, No. 47.
1925. *Xylocopa collaris binghami*, Dover, *Ann. Mag. Nat. Hist.* (9) XV, pp. 224 and 225, ♂.

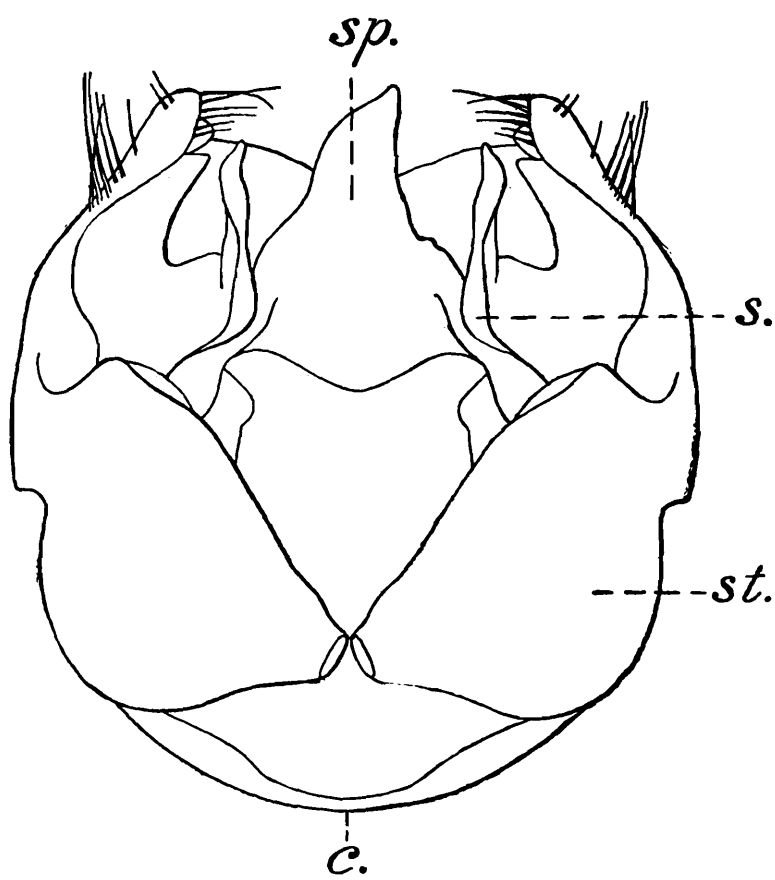
I give below a description of the female of this subspecies which has not been described so far.

♀.—*Integument.*—Scape and II flagellar segment of antennae black, I and III-XI flagellar segments testaceous below. Wings basally subhyaline, a little darker than those of the ♂.

Pubescence.—Black; face with a mixture of pale and black hairs; anterior portion of thorax dorsally and laterally with a collar of white pubescence; apex of abdomen with some ferruginous hairs.

Structure.—Inter-orbital distance slightly shorter than vertico-clypeal distance. Face flat, heavily punctate in first-degree density. Clypeus punctate in second-degree density, without median unpunctate band. Labrum weakly rugose, shagreened. Mandibles with flat basal triangular

area ; inner margin emarginated. Genae occasionally with 1-2 shallow punctures. Coronal suture weak. Inter-ocellar distance about 3/4 as long as ocello-ocular distance. Punctures on dorsum of thorax a little sparser than those of ♂, those on disc of mesonotum and on anterior portion of scutellum of third-degree density. Knee-caps bifurcate, with distinct upper margin, lower projection usually narrower and longer than the upper. Inner teeth of posterior claws about 1/4 as long as the outer. Submedian processes of epipygium very weak, narrow. Median unpunctate band of abdominal sternites interrupted ; hypopygium apically with a median keel.



Text-fig. 8.—Dorsal view of the ♂ genitalia of *Xylocopa collaris binghami* Ckll. ×30.
c. cardo ; *s.* sagitta ; *sp.* spatha ; *st.* stipes.

Measurements.—♂, length of body 16-21 mm. ; anterior wing 14-17 mm. ; breadth of head 5·5-6·5 mm. ; thorax (incl. tegulae) 7·5-9·5 mm. ; II abdominal segment 7·5-9·5 mm. ♀, length of body 16-21 mm. ; anterior wing 14-15 mm. ; breadth of head 6·5-7·0 mm. ; thorax (incl. tegulae) 8·0-8·5 mm. ; II abdominal segment 7·5-9·5 mm.

Type.—Holotype, ♂, from Khasi Hills, Assam, in the U. S. National Museum, Washington, D. C., allotype, ♀, no. 1783/H3 ; in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—I have studied specimens of this subspecies from the following localities :—

United Provinces : Nakronda, Dehra Dun, *ex.* unknown wood, 2 ♂, 3 ♀ ; Dehra Dun, 1 ♀. Bengal : Singla, Darjeeling Dist., 1,500′, 8 ♂, 88 ♀ (1 ♀ selected as allotype) ; Sevook, Darjeeling Dist., 2 ♂ ; Sukna, 1,000′, Darjeeling Dist., 1 ♂ ; Teesta, near

Siliguri, ca. 1,000′, 2 ♀ ; Darjeeling, 2 ♀ (*det.* Maidl as *X. collaris* Lepel.) ; Samsing, 1,800′, Kalimpong, 1 ♂, 1 ♀ ; Riijang, 1 ♀ ; Between Shamdong and Rangpo, 1 ♂ ; Below Singla Bazar, 1 ♀. Sikkim, 7 ♂, 7 ♀ (2 ♂, 1 ♀ *det.* Maidl as *X. collaris* Lepel.). Assam : Sibsagar, 1 ♂, 3 ♀ ; Naga Hills, 2 ♂ 3 ♀ ; Margherita, 1 ♀ ; Sadiya, 1 ♀ ; " Assam ", 4 ♂. Khamba Jong, Tibet, 2 ♂, 5 ♀.

Xylocopa collaris penangensis Ckll.

1878. *Xylocopa collaris*, F. Smith (*nec* Lepeletier), *Journ. Asiat. Soc. Bengal* XLVII (ii), p. 168, No. 15.
1912. *Xylocopa collaris*, Paiva (in part), *Rec. Ind. Mus.* VIII, p. 79, No. 13.
1912. *Xylocopa* (*Xylocopa*) *collaris*, Maidl (in part), *Ann. K. K. Naturhist. Homfus. Wien* XXVI, p. 292.
1918. *Xylocopa collaris* subsp. *penangensis*, Cockerell, *Ann. Mag. Nat. Hist.* (9) II, p. 384, ♂♀.
1929. *Xylocopa collaris*, Dover (in part), *Bull. Raffles Mus.* II, p. 59, No. 15.

♂.—Differs from the preceding subspecies in the following characters :—

Pubescence.—Inner and outer surfaces of intermediate tibiae with black hairs ; intermediate metatarsi dominantly covered with black hairs, except a narrow stripe of pale hairs on dorsal surface. Posterior metatarsi, abdominal tergite III and posterior margin of tergite II with black hairs.

Structure.—Inner orbits more strongly converging at their upper extremities. Upper orbital distance about 19/30 as long as the lower. Punctures on pale face markings except supraclypeal region of third-degree density. Epistomal suture straight. Antennal segment III slightly longer than segments IV-VI.

♀.—According to Cockerell's original description : " the white thoracic collar is narrower and less conspicuous than in *X. collaris* Lep.[1] and sends only a small and feeble extension to the pleurae." My specimens from Tenasserim are in a poor condition and cannot be compared with *X. collaris binghami* but I found a few white hairs on scutellum posteriorly and its vein *M* is also slightly shorter than M_{1+2} (1st section). The pubescence of all my Burmese specimens is as follows : Face with dominant white hairs ; thoracic collar more extensive and thicker than that of *X. collaris binghami* ; lateral margin of I abdominal tergite with a small patch of white hairs.

Variation.—The male specimen from Toungoo has a few scattered black hairs on anterior portion of scutellum and the pale pubescence extends to the posterior margin of II abdominal tergite. The occiput, scutellum and I abdominal tergite of my Burmese ♀ specimens have very few white hairs ; but in the Malayan ♀ specimens, the occiput has very few while the scutellum and I abdominal tergite are without any white hairs.

Types.—♂♀, from Penang, Malaya, in the U. S. National Museum, Washington, D. C.

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[1] Apparently *X collaris*, s. s. and subsp. *binghami* Ckll. ♀.

Distribution.—I have examined only a few specimens of this subspecies from the following localities:

Burma: Mergui, 1 ♂; Upper Tenasserim, 1 ♀ (*det.* F. Smith as *X. collaris* Lep.); Moulmein, 1 ♀ (*det.* Maidl as *X. collaris* Lep.); Tenasserim, Thaungyin Valley, 1 ♂ (*det.* Maidl as *X. collaris*); Hlebwe, Katha Division, 1 ♀; Bondaung, S. Toungoo, 1 ♂, 1 ♀. Malaya: Kwala Kangsar, Perak, 1 ♂, 1 ♀ (*det.* Maidl as *X. collaris*); Johore, 1 ♂ (*det.* Bingham as *X. collaris*).

Remarks.—Lepeletier's *X. collaris* ♀ was originally described from Bengal and Sumatra, and his *X. dejeanii* ♂ from Java. The name *X. dejeanii* is now usually considered to be a synonym of *X. collaris*. Cockerell gave Sumatra as the type-locality of the typical *X. collaris*, designating the Sikkimese, Malayan and Javanese races as *binghami*, *penangensis* and *bryanti* respectively. It seems that *dejeanii* should have priority over *bryanti*. Further the only ♂ example from Sumatra that I have seen is not separable from Malayan examples, and thus the validity of *penangensis* is rather doubtful.

Xylocopa collaris bhowara, subsp. nov.

1896. *Xylocopa collaris* (*nec* Lepeletier) and *X. nigrocaerulea* (*nec* F. Smith), Bingham, *Proc. Zool. Soc. London*, p. 456, Nos. 327 and 457, No. 330.
1897. *Xylocopa nigrocaerulea* (*nec* F. Smith) and *X. collaris* (in part), Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 539, No. 944, ♀ and p. 543, No. 953, ♂ (excl. ♀).
1912. *Xylocopa collaris*, Paiva (in part), *Rec. Ind. Mus.* VIII, p. 79, No. 13.
1912. *Xylocopa* (*Xylocopa*) *amethystina* (*nec* Fabricius) and *X.* (*X.*) *collaris* Maidl, (in part), *Ann. Naturhist. K. K. Hofmus. Wien* XXVI, pp. 291 and 292, pl. 4, fig. 11, ♀.
1913. *Xylocopa collaris* (*nec* Lepeletier) and *X. amethystina* (*nec* Fabricius), Strand, *Arch. Naturgesch.* LXXIX A, 2, p. 146.
1925. *Xylocopa collaris nigrocaerulea*, Dover (in part), *Ann. Mag. Nat. Hist.* (9) XV, pp. 224 and 225, ♂.

X. collaris bhowara differs from *X. collaris binghami* in the following characters:—

♂.—*Integument.*—Face markings reddish yellow, not pale yellow.

Pubescence.—Greenish tints of pale hairs more prominent. Inner surface of intermediate tibiae and metatarsi, posterior femora except extreme apical portion, posterior tibiae except outer surface, posterior metatarsi and III and posterior $\frac{3}{4}$ of II abdominal tergites all with black or brownish black hairs.

Structure.—Pale face markings thoroughly and finely punctate in third-degree density. Supraclypeal region very weakly elevated. Epistomal suture straight. Median unpunctate band of clypeus about $\frac{1}{3}$ as broad as apical clypeal margin. Vein *M* slightly shorter than M_{1+2} (1st section).

♀.—Punctures on lower half of front in second-degree density. Clypeus and supraclypeal region medially unpunctate. Thorax without white hairs. Vein *M* slightly shorter than M_{1+2} (1st section).

Measurements.—♂♀, length of body 15-18 mm.; anterior wing 13-15 mm.

Type.—Holotype, ♂, no. 1784/H3, allotype, ♀, no. 1785/H3, in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—I have studied specimens of this new subspecies from the following localities :—

Bombay : Kalutara, 1 ♀ ; Castle Rock, 1♂ ; Yakambi, in dead wood, 2 ♀, nesting in rotten tree, 2 ♂. Travancore : Trivandrum, 2 ♂ ; Tenmalai, 2 ♂. Cochin : Mooply Valley, 1 ♂. Ceylon : Kandy, 1 ♀ ; Niroddumunai, near Trincomalee, E. P., 2 ♀ ; Colombo, 1 ♀ (*det.* Maidl as *X. collaris* Lepel.) ; Anuradhapura, 2 ♂ (*det.* Maidl as *X. collaris*) ; Matale, 1 ♀ (*det.* Maidl as *X. amethystina* Fab.) ; Badurelia, 1 ♀ (*det.* Rohl as *X. amethystina*), 1 ♂, 1 ♀ (*det.* Kohl as *X. amethystina* Fab.) ; Palypitiya, N. W P., 1 ♂. Andamans : Hope Town (Pani Ghat), 1 ♀.

Remarks.—There has been a considerable amount of confusion in regard to this subspecies. Bingham (1896 and 1897) called it *X. nigrocaerulea* F. Sm. but added (1896) : " one specimen[1] which with some doubt I refer to this species ; agrees fairly well with Smith's description, so far as this goes." *X. nigrocaerulea* is, however, quite a distinct subspecies of *X. collaris* occurring in Celebes ; it is not identical with *X. collaris bhowara*, subsp. nov. Maidl (1912) relying on Gribodo's redescription of *X. amethystina* (Fab.), called it *X. amethystina* (Fab.) Grib. with *X. fuliginata* J. Per. as a synonym, but Fabricius's species belongs to another subgenus *Nodula* ; while *X. fuliginata* which is another distinct subspecies of *X. collaris* is confined to the Philippine Islands. There is thus no name for this Southern Indian form ; and to avoid further confusion, I have suggested for it the name *bhowara*, which is based on the vernacular name of *Xylocopa* species in Karnara Range, South India (*vide Ind. Mus. Notes*, IV, p. 38, 1896).

Subgenus **Orbitella,** nov.

1912. *Xylocopa confusa-Gruppe*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 298.

Body of medium or large size. Integument black, ♂ usually with pale face markings and subhyaline wings, ♀ usually with dark fuscous and brilliantly violaceous wings. Pubescence of ♂ usually dominantly yellow or yellowish, that of ♀ usually dominantly yellow or yellowish on thorax only, remaining parts of the body covered with black hairs. Inner orbits of ♂ curved and weakly divergent at their upper extremities. Frontal keel usually weak. Base of ocellar triangle about two and a half times as long as the lateral sides. Labrum strongly tuberculated in ♀. Mandibles bidentate. Disc of mesonotum unpunctate. Scutellum or postscutellum posteriorly sharply marked off and covering anterior portion of the succeeding segments. Veins *r-m* and M_{1+2} forming obtuse interior angles. Knee-caps weak, usually simple ; sometimes bifurcate in ♀. Inner and outer teeth of claws of ♂ weakly divergent. Anterior margin of dorsum of I abdominal tergite sharply marked off ; centre of the anterior surface of the tergite of ♀ usually with a very deep, rounded depression. Submedian processes of epipygium of ♀ invisible. Hypopygium medially strongly keeled.

Type.—*Xylocopa confusa* J. Per. (1901).

[1] From Pundaloya, Ceylon.

The members of this subgenus often exhibit strong superficial and sometimes even structural resemblance to one another, and in a few cases, the females of some closely related species are not easily separated.

Altogether 8 species are known to occur in the Indian area.

Key to Indian species. ♂.

1.	Median line of posterior femora ventrally with a sharp ridge or spine-like process at the base ..	2.
	Median line of posterior femora without any ridge or process ventrally	4.
2.	Process not spine-like, forming a very narrow and strong ridge	*flavo-nigrescens* F. Sm.
	Process spine-like ..	3.
3.	Spine-like process of posterior femora apically very sharply pointed	*confusa* J. Per.
	Spine-like process of posterior femora apically a little blunt	*verticalis* Lepel.
4.	Posterior femora without any unpunctate area ventrally, median line strongly keeled . .	5.
	Posterior femora ventrally with a distinct unpunctate area near the base, median line very weakly keeled	6.
5.	Apical margin of supraclypeal region very flat and at the same level with basal portion of clypeus; anterior metatarsi with dominant black hairs	*leucothorax* (de Geer).
	Apical margin of supraclypeal region distinctly elevated; anterior legs with only reddish yellow hairs	*minor* Maidl.
6.	Median line of posterior femora ventrally subtuberculated at the base; legs and abdominal tergites without black hairs	*ceylonica* Cam.
	Median line of posterior femora ventrally very smooth at the base, without any tuberculation; posterior legs and posterior abdominal tergites with numerous black hairs	*hafizii*, sp. nov.

Key to Indian species. ♀.

1.	Orbits with a very deep groove lying along the outer margins	5.
	Orbits without any such groove	2.
2.	Supraclypeal region and clypeus very flat and lying on the same slope; vein R_4 curved in its mid-way ..	*leucothorax* (de Geer).
	Supraclypeal region and clypeus more or less distinctly elevated near their junction; vein R_4 curved beyond its half	3.
3.	Thorax dorsally covered with blue hairs ..	*abbotti* (Ckll.).
	Thorax dorsally covered with yellow hairs	4.
4.	Frontal keel and its median fovea apically very weak, neither broadened nor flattened; postscutellum with very few scattered yellow hairs ..	*confusa* J. Per.
	Frontal keel and its median fovea apically greatly broadened and flattened; postscutellum medially with a small patch of yellow hairs	*verticalis* Lepel.
5.	Frontal keel weak; occiput, postscutellum and thoracic pleurites without, or, at most, with very few scattered yellow hairs	*viridissima* (Ckll.) (?)
	Frontal keel apically strong; occiput, postscutellum and thoracic pleurites with many yellow hairs	6.
6.	Median unpunctate band of clypeus broad and not elevated; epistomal suture medially usually somewhat deep and distinct	*ceylonica* Cam.
	Median unpunctate band of clypeus narrow and distinctly elevated; epistomal suture very weak ..	7.
7.	Yellow pubescence with very little greenish tints; postgenae with deep yellow hairs	*hafizii*, sp. nov.

Xylocopa minor Maidl.

1912. *Xylocopa* (*Koporthosoma*) *minor*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 304, figs. 47-48, ♂.
1921. *Xylocopa minor*, Ramakrishna Aiyar, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 98.

The following points may be noted in addition to Maidl's description of the species.

♂.—*Pubescence.*—Venter of anterior and intermediate legs with bright reddish hairs. Abdominal sternites with only reddish yellow hairs.

Structure.—Frontal keel narrow, strong. Apical margin of supraclypeal region and basal margin of clypeus distinctly elevated. Median unpunctate band of clypeus narrow. Mandibles elongate ; inner margin without emargination. Antennal segment III longer than segments IV-VI. Vein *M* longer than M_{1+2} (1st section). Venter of posterior femora punctate in first-degree density on outer and very shallowly punctate in third-degree density on inner half. Punctures on abdominal tergites of first-degree density.

Type.—♂, from Sikkim, in the Vienna Museum (*ex* Bingham's collection in the Berlin Museum).

Distribution.—Known from the type-locality only. I have studied only one of the co-types.

Remarks.—This is a very distinct species. I have not found any specimens of it in Dudgeon's extensive collection from Sikkim and it appears probable that it is not an Indian species. In the case of *X. confusa* J. Per., which is definitely not a Sikkimese insect, Cockerell (1918) has mentioned : " *X. confusa* was received from the Berlin Museum, labelled ' *Sikkim, Bingham* ' It is unfortunate that some assistants at the Berlin Museum put ' Sikkim ' labels on numerous bees which never came from that region."

Xylocopa leucothorax (de Geer).

1758. *Apis aestuans*, Linné, *Syst. Nat.* (10th edit.) I, p. 579, No. 37, ♀.
1764. *Apis aestuans*, Linné, *Mus. Ludov. Ulric.*, p. 416, No. 5, ♀.
1767. *Apis aestuans*, Linné, *Syst. Nat.* (12th edit.) I, 2, p. 961, No. 53, ♀.
1773. *Apis leucothorax*, de Geer, *Mém. Hist. Insect.* III, p. 573, No. 4, pl. 28, fig. 7, ♀.
1775. *Apis aestuans*, Fabricius, *Syst. Entomol.*, p. 382, No. 24, ♀.
1775. *Apis aestuans*, Ph. L. Müller, *Linné Vollst. Natursyst.* V, 2, p. 906, No. 53, ♀.
1780. *Apis leucothorax*, Göze, *de Geer, Abh. Gesch. Insect.* III, p. 370, No. 4, pl. 28, fig. 7, ♀.
1781. *Apis aestuans*, Fabricius, *Spec. Insect.* 1, p. 479, No. 29, ♀.
1783. *Apis leucothorax*, Retzius, *Gen. and Spec. Insect.*, p. 61, No. 214, ♀.
1787. *Apis aestuans*, Fabricius, *Mant. Insect.*, p. 301, No. 33, ♀.
1789. *Apis aestuans*, Olivier, *Encycl. Méthod. Insect.* IV, p. 67, No. 26.
1790. *Apis aestuans*, Gmelin, *Linné Syst. Nat.* (13th edit.) I, 5, p. 2784, No. 53, ♀.
1791. *Apis aestuans*, Christ, *Naturg. d. Insect.*, p. 122, pl. 5, fig. 5, ♀.
1793. *Apis aestuans*, Fabricius, *Entomol. Syst.* II, p. 323, No. 41, ♀.
1807. *Xylocopa aestuans*, Jurine, *Nouv. Method. Class. Hymen.*, p. 256, ♀.
1807. *Xylocopa aestuans*, Klug, *Mag. Insectenkunde* VI, p. 226.
1808. *Xylocopa aestuans*, Klug, *Mag. Ges. Naturf. Freunde Berlin* II, p. 56, No. 84.
1809. *Xylocopa aestuans*, Latreille, *Gen. Crust. and Insect.* IV, p. 159.
1825. *Xylocopa aestuans*, Lepeletier, *Encycl. Méthod. Insect.* X, p. 792, No. 1.

1838. *Xylocopa pubescens* (Klug *in litt.*), Spinola, *Ann. Soc. Ent. France* VII, p. 518, No. 64 and p. 519, No. 64D, ♂.
1841. *Xylocopa aestuans*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 193, No. 36, pl. 17, fig. 3, ♀ ♂.
1844. *Apis aestuans*, Forster, *Descr. Anim.* (1772), p. 20.
1854. *Xylocopa ruficornis* (*nec* Fabricius) and *X. aestuans*, F. Smith, *Cat. Hymen. Insects. Colln. Brit. Mus.* II, p. 354, Nos. 42 and 48.
1870. *Xylocopa aestuans*, Horne, *Trans. Zool. Soc. London* VII, p. 180.
1874. *Xylocopa aestuans*, F. Smith (in part), *Trans. Entomol. Soc. London*, p. 273, No. 54, ♀ ♂.
1881. *Xylocopa aestuans*, Gribodo, *Ann. Mus. Civ. Stor. Nat. Genova* XVI, p. 230, No. 2, ♀ ♂.
1881. *Xylocopa aestuans*, Kirby, *Proc. Zool. Soc. London*, p. 649.
1884. *Xylocopa aestuans*, Gribodo, *Ann. Mus. Civ. Stor. Nat. Genova* (2) I, p. 278, No. 2.
1884. *Xylocopa aestuans*, Magretti, *Ann. Mus. Civ. Stor. Nat. Genova* (2) I, p. 628, No. 183.
1892. *Xylocopa aestuans*, Saussure, *Grandidier Hist. Phys. Natur. and Polit. Madagascar*, p. 31, No. 1, ♀ ♂.
1894. *Koptorthosoma aestuans*, Gribodo, *Bull. Soc. Ent. Ital.* XXVI, p. 272.
1896. *Xylocopa aestuans*, Dalla Torre, *Cat. Hymen.* X, p. 203.
1897. *Xylocopa aestuans*, Bingham (in part), *Faun. Brit. Ind. Hymenoptera* I, p. 540, No. 948, ♀ ♂.
1899. *Xylocopa aestuans*, Vachal, *Misc. Entomol.* VII, pp. 28 and 34, ♀ ♂.
1901. *Xylocopa aestuans*, Friese, *Bien. Eur.* VI, p. 225, No. 27, ♂ ♀.
1901. *Xylocopa aestuans*, J. Perez, *Actes Soc. Linn. Bordeaux* LVI, p. 39, ♀ ♂.
1912. *Xylocopa* (*Koptorthosoma*) *leucothorax*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, pp. 261 and 277, fig. 16, ♂.
1922. *Xylocopa aestuans*, Dover (in part), *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.
1924. *Xylocopa* (*Koptorthosoma*) *aestuans*, Dusmet, *Trab. Mus. Nac. Cien. Nat, Madrid Zool.* XLIX, p. 17, No. 22.
1925. *Xylocopa aestuans*, Dover (in part), *Ann. Mag. Nat. Hist.* (9) XV, p. 223.

Variation.—In the female, postscutellum, abdominal tergites I-II and sometimes even occiput with some very scattered yellow hairs, which never form a patch. The vein R_5 of one ♀ from Mysore (left wing only) basally suppressed.

Measurements.—♂, length of body 15-21 mm.; anterior wing 14·0—17·5 mm.; breadth of head 5·0—7·5 mm.; thorax (incl. tegulae) 7-9 mm.; II abdominal segment 8·0—10·5 mm. ♀, length of body 18—22 mm.; anterior wing 16—18 mm.; breadth of head 7·0—7·5 mm.; thorax (incl. tegulae) 8·5—9·0 mm.; II abdominal segment 9·0—10·5 mm.

Type.—Type of *Apis leucothorax* de Geer, ♀, from Egypt, probably lost.

Distribution.—I have studied specimens of this species from the following localities :—

N. W. Frontier Province : Tauk, 1 ♀. Baluchistan : Pasni, Mekran Coast, 3 ♂, 6 ♀; " Baluchistan ", 1 ♀. Punjab : Khewra, Salt Range, 5 ♂; Karor Range, E. Rawalpindi, 1 ♂; Low hills near Sohawa, E. extremity of Salt Range, 1 ♂; Choa, 10' miles from Khewra, Salt Range, 1 ♀; Shahpur, 2,469', small rocky stream close to Dak Bungalow, 1 ♀; Lahore, 1 ♂; Delhi, 1 ♀. United Provinces : Dehra Dun, 2 ♂; Kichha, Naini Tal District, 1 ♀; Maldhan, Naini Tal District, 1 ♀; Mana, 1 ♀; Oncha Gaon, Naini Tal District, 1 ♀; Amangnar, Bijnor District, 2 ♀; Meerut, 1 ♀; Manikaur, 1 ♀; Dubhalwala, Dehra Dun, 1 ♀; Central Provinces : Basha Ghat (Bergi), 1 ♀; Hoshangabad, 1 ♀. Bombay : Neighbourhood of Dhupdal and Gokak, Belgaum District, 1 ♂; Poona, 2 ♂; Bassein, 4 ♂;

Nasik, 1 ♀. Sind : Karachi, 4 ♂, 2 ♀. Goa : Andheri, Salsette, 1 ♂, 1 ♀. Mysore : Bangalore, 5 ♂, 2 ♀. Madras : Vempali, Cuddapah District, 1 ♀ ; Razampeta, 500′, Cuddapah District, 1 ♀ ; Palnis, 1 ♂, 1 ♀ ; Barkuda Island, Chilka Lake, Ganjam District, boring into dead log, 1 ♀ ; Nadur, ca. 1800′, Javadi Hills, 1 ♀ ; Coimbatore, 2 ♂, 1 ♀ ; N. Vellore Division, C. Circle, 2 ♂ ; Cumbum, Madura District, 1 ♂ ; Kurnool, Thippanur, 1 ♀ ; Madras 1 ♀. Bihar : Raxaul, Nepal Frontier, 1 ♀ ; On the sand bank of Ganges River, Bhagalpur, 1 ♂ ; Pusa, 2 ♂ ; Taljhari, Santal Parganas, found boring in the beam of Dak Bungalow, 1 ♀. Bengal : Santiniketan, Birbhum District, 2 ♂, 4 ♀. Nepal : Kangra Valley, 4,500′, 2 ♀ ; Chatri Gouri, Nepal Terai, 1 ♂.

This species is also known to occur in Egypt, Arabia, Sokotra, Senegal and Tanganyika.

Remarks.—The name " *X. aestuans* (Linné.) " has been employed by many authors for several different species of this subgenus, but its true status has not been settled. In order to avoid confusion and as I have not been able to get any definite information about the Linnean specimens, I follow Maidl's arrangement by adopting *X. leucothorax* (de Geer) as the name for the species. The latter was described from Egypt ; while *X. aestuans* (Linné.) was described from " regionibus calidis ", and thus its type-locality can either be Tropical Africa or Tropical Asia.

Dover's original series of *X. aestuans* is a mixture of *X. leucothorax* (de Geer), *X. ceylonica* Cam. and *X. verticalis* Lepel.

Xylocopa ceylonica Cam.

1867. *Xylocopa aestuans*, Sichel (in part), *Reise Novara Zool.* II, 1, p. 255.
1896. *Xylocopa bryorum*, Bingham (*nec* Fabricius), *Proc. Zool. Soc. London*, p. 457, No. 331.
1901. *Xylocopa ceylonica*, Cameron, *Proc. Zool. Soc. London*, p. 32, ♂.
1912 *Xylocopa* (*Koptorthosoma*) *confusa* ♀ var. (in part) and *X.* (*K.*) *clavicrus*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 297, pl. 4, fig. 13, ♀ and p. 305, figs. 49-50, ♂.
1913. *Xylocopa clavicrus* and *X. confusa* var., Strand, *Arch. Naturgesch.* LXXIX, A, 2, p. 146.
1917. *Mesotrichia clavicrus*, Cockerell, *Philippine Journ. Sci.* XII, D, p. 347.
1918. *Xylocopa verticalis*, Friese (*nec* Lepeletier), *Zool. Jahrbücher Abt. Syst.* XLI, p. 495, No. 33.
1921. *Xylocopa ceylonica*, Ramakrishna Aiyar, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 98.
1930. *Mesotrichia* (*Koptorthosoma*) *clavicrus* Cockerell, *Philippine Journ. Sci.* XLIII, p. 269.

♂.—Basal portion of labrum, ocellar triangle, two small spots immediately anterior to median ocellus and big spot posterior to lateral ocelli yellow. Frontal keel narrow, strong. Clypeus basally convex. Transverse ridge of labrum weak. Mandibles slender. Veins *M* and M_{1+2} (1st section) subequal ; vein *r-m* sometimes complete. Posterior trochanters posteriorly rounded. Venter of posterior femora basally polished and unpunctate along inner margin ; median line keeled, interrupted, basally subtuberculated. Pubescence on inner surface of posterior tibiae and median stripes beyond knee-caps bright ferruginous. Inner teeth of anterior claws almost parallel to the outer.

I give below a description of the female of the species which has not been described so far.

♀.—*Pubescence.*—Black hairs on face and on postscutellum mixed with some yellow ones ; postgenae, vertex, occiput and upper half of thoracic pleurites with dominant yellow hairs. I and II abdominal tergites sometimes with very scattered yellow hairs.

Structure.—Outer orbits with a deep groove closely along the upper portion. Crescent-shaped unpunctate markings laterad to median ocellus absent. Frontal keel uniformly narrow, sharply ended. Supraclypeal region distinctly much more elevated than clypeus. Lateral frontal regions slightly less elevated than clypeus. Tentorial pits weak. Median unpunctate band of clypeus narrow, weakly elevated. Apical emargination of labrum shallow, broad. Mandibles elongate, strongly convex. Postgenae scatteredly punctate in second-degree density. Vein R_4 curved at basal $\frac{3}{4}$ of its length ; vein *r-m* basally suppressed. Knee-caps obliquely truncated. Punctures on abdominal tergites III-V distinctly much sparser than those on I and II, many of them being of third-degree density. Median furrow of epipygium narrow, weak.

Measurements.—♂, length of body 25—27 mm.; anterior wing 21—24 mm. ♀, length of body 20—27 mm.; anterior wing 19-23 mm.

Types.—Holotype, ♂, from Ceylon, in the British Museum (Natural History), London ; allotype, ♀, no. 1786/H3, in the Zoological Survey of India (Indian Museum), Calcutta. Types of *X. clavicrus* Maidl, ♂, from Ceylon and the Philippines, in the Vienna Museum.

Distribution.—I have studied specimens of this species from the following localities :—

Mysore : Bangalore, 1 ♀ (*det.* Dutt as *X. verticalis* Lepel.). Madras : Barkuda Island, Chilka Lake, Ganjam District, 4 ♂, 7 ♀ (1 ♂ *det.* Dover as *X. tranquebarica* Fab.) (1 ♀ selected as allotype) ; Ganjam, 1 ♂ ; Madras, 1 ♀. Ceylon : Bandaravela, 1 ♂ (*det.* Maidl as *X. clavicrus* Maidl) ; Anuradhapura, 1 ♀ (*det.* Maidl as *X. confusa* J. Per. var.) ; Murunkan, N. P., 1 ♀ ; " Ceylon ", 1 ♂ (type of *X. clavicrus* Maidl).

This species has been recorded from Luzon, Philippine Islands.

Remarks.—Cameron (1901), in describing this species, compared it with *X. rufescens* F. Sm., which he considered to belong to *Koptorthosoma*. *X. rufescens* F. Sm., however, does not belong to the subgenus *Koptorthosoma* and is quite distinct from the present species. At my request, Dr. Richards compared one of my ♂ specimens with the type of *X. ceylonica* Cam. in the British Museum with the following results : " I think certainly the same species though in Cameron's specimen the pale markings of the clypeus and vertex are light brown not yellow."

Maidl's " *X. confusa* J. Per. ♀ var." from Madras, Ceylon, Annam, Siam, Java, Celebes and Australia (?) is certainly a composite species. Bingham's *X. bryorum* (nec Fabricius) (1897) is also presumably a composite species based on *X. ceylonica* Cam., *X. flavo-nigrescens* F. Sm. and *X. hafizii*, sp. nov.

The female of this species resembles *X. leucothorax* in colouration of the integument and pubescence. In *X. leucothorax*, the size is smaller, clypeal and supraclypeal regions very flat, outer orbits without a deep groove and vein R_4 angulates at basal half of its length.

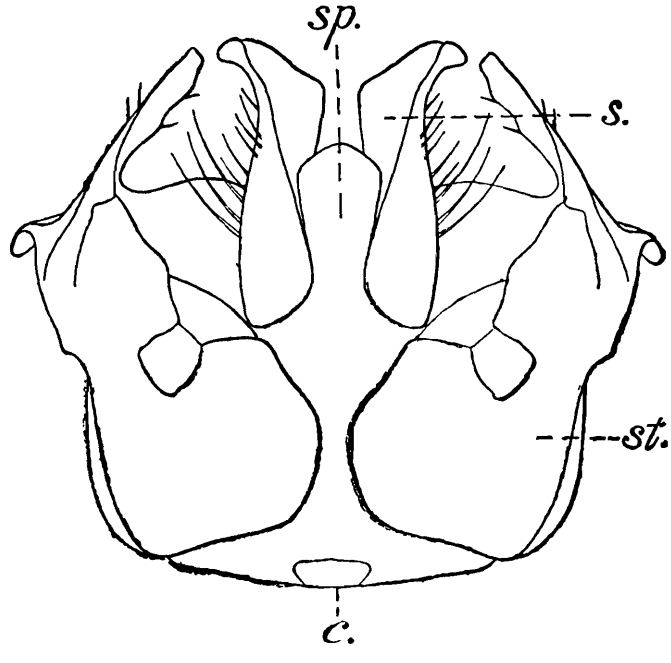
Xylocopa hafizii, sp. nov.

1902. ? *Xylocopa aestuans*, Cameron (*nec* Linné), *Faun. Geogr. Mald.— Laccad. Archip.* I, *Hymenoptera*, p. 62, No. 23.
1922. *Xylocopa verticalis*, Dover (*nec* Lepeletier) (in part), *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.
1922. *Xylocopa bryorum*, Dover (*nec* Fabricius) (in part), *Rec. Ind. Mus.* XXIV, p. 87.

♂.—*Integument.*—A big spot posterior to lateral ocelli, median band and apical marginal area of clypeus yellow; scape and II flagellar segment of antennae very dark, with a narrow yellow band. Wings very dark.

Pubescence.—Greenish yellow. Lateral and ventral surfaces of thorax with a mixture of pale yellow and black hairs. Anterior legs mainly with hairs concolorous with those on dorsum of thorax, but tibiae and tarsi, especially inner surface, mixed with few ferruginous and black hairs. Intermediate tibiae with a mixture of black and yellow hairs; dorsal and outer surfaces of metatarsi mainly with black hairs, inner surface with dominant rufous brown hairs. Posterior legs covered with black hairs, outer surface of tibiae with 2 narrow yellow stripes along the entire length; in some cases the stripes extend only up to the basal half or may even be less extensive. Pubescence of abdominal tergites prominently yellowish black; II-VII tergites dorsally and laterally with some black hairs. Lateral corners on posterior margins of II-V abdominal sternites with deep yellow hairs.

Structure.—Median longitudinal ridge of labrum very weak. Clypeus with a distinct median unpunctate band; basal margin elevated. Supraclypeal region centrally depressed, with sparse and fine punctures. Outer teeth of mandibles broad and sharp. Antennal segment III slightly shorter than segments IV-VI. Vein R_4 roundly curved; vein



TEXT-FIG. 9.—Dorsal view of the ♂ genitalia of *Xylocopa hafizii*, sp. nov. ×20.
c. cardo; *s.* sagitta; *sp.* spatha; *st.* stipes.

r-m basally suppressed. Median line of posterior femora ventrally curved, without tuberculation. Knee-caps apically narrow and rounded.

♀.—*Pubescence.*—Occiput, postscutellum and anterior portion of thoracic pleurites with dominant yellow hairs. Outer surface of anterior tibiae with a few yellow hairs. I abdominal tergite with black and yellow hairs, the latter more numerous, except on the lateral corners and posterior marginal area.

Structure.—Supraclypeal region with a broad median unpunctate band ; apical margin ridged. Basal margin and median band of clypeus also distinctly ridged. Vein *M* about one and one-fourth as long as M_{1+2} (1st section) ; vein *r-m* usually complete ; vein R_4 slightly curved near the apex. Knee-caps apically pointed.

Variation.—The yellow patch beneath the wing-bases of the female in many cases mixed with blackish hairs.

Measurements.—♂, length of body 22-25 mm.; anterior wing 20-22 mm. ♀, length of body 20-23 mm.; anterior wing 19-21 mm.

Types.—Holotype, ♂, no. 1787/H3, allotype, ♀, no. 1788/H3, in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—I have studied specimens of this new species from the following localities :—

Bombay : Karwar, 1 ♂, Jog, N. Kanara District, 3 ♀ ; Mahableshwar, 1 ♂ ; Streams on Jog-Gersoppa road, N. Kanara District, 1 ♀ ; Castle Rock, 4 ♀ ; Goa : Soccorro, 1 ♀. Malabar, 1 ♀(*det.* Friese as *X. verticalis* Lepel.). Mysore : Sagar, Shimoga District, 4 ♀. Coorg : Sidapuy, 3,000′ 1 ♂ (*det.* Dutt as *X. bryorum* Fab.) ; Pollibetta, C. Coorg, 1 ♀ (*det.* Dutt as *X. bryorum*) ; " Coorg ", 1 ♂ (*det.* Dover as *X. flavo-nigrescens* F. Sm.). Travancore : Nagercoil, 1 ♂ ; Trivandrum, 2 ♂, 3 ♀ (♀ *det.* Dover as *X. bryorum* and *X. flavo-nigrescens*) ; Maddathoray, Western base of Western Ghats, 1 ♂, 1 ♀ (Holotype and Allotype) ; Tenmalai, Western Ghats (W. side), at light, 1 ♀.

Remarks.—*X. hafizii* is closely allied to *X. ceylonica.* The frontal keel, labrum, posterior legs (except femora) of the male, and outer orbital groove, punctuation on postgenae and on abdomen of the female of the two species are closely similar, but the structure of the posterior femora and the genitalia of the male is quite different.

Xylocopa flavo-nigrescens F. Sm.

1854. *Xylocopa flavo-nigrescens,* F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 354, No 52, ♂.
1873. *Xylocopa flavo-nigrescens,* F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 393, No. 15.
1874. *Xylocopa flavo-nigrescens,* F. Smith, *Trans. Entomol. Soc. London,* p. 277, No. 63, ♂.
1896. *Xylocopa flavo-nigrescens,* Dalla Torre, *Cat. Hymen.* X, p. 211.
1897. *Xylocopa flavo-nigrescens,* Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 544, No. 956, ♂.
1901. *Xylocopa malayana,* Cameron, *Proc. Zool. Soc. London* I, p. 32, ♂.
1912. *Xylocopa (Koptorthosoma) flavo-nigrescens,* Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 301, figs. 35-36, ♂.
1914. *Xylocopa flavo-nigrescens,* Meade-Waldo, *Ann. Mag. Nat. Hist.* (8) XIV, p. 404.
1918. *Xylocopa flavo-nigrescens,* Cockerell, *Entomologist* LI, p. 104.
1922. *Xylocopa flavo-nigrescens,* Dover (in part), *Rec. Ind. Mus.* XXIV, p. 87.
1929. *Mesotrichia flavo-nigrescens,* Cockerell, *Ann. Mag. Nat. Hist.* (10) IV, p. 303.
1933. *Xylocopa (Mesotrichia) flavo-nigrescens,* Pagden, *Stylops* II, pp. 77 and 79, fig. 1, ♂ ♀.

Variation.—The median band and lateral area of clypeus at the apex yellow, sometimes purely black. The number of yellow hairs on posterior tibiae of the male is variable.

Measurements.—♂, length of body 22-23 mm.; anterior wing 20-22 mm. ♀, length of body 23-24 mm.; anterior wing 20-22 mm.

Types.—Holotype, ♂, from Sylhet, Assam, in the British Museum (Natural History), London. Type of *X. malayana* Cam., ♂, from Singapore, in the British Museum (Natural History).

Distribution.—I have studied only a few specimens of this species from the following localities :—Sikkim, 1,800′, 1 ♂. Andaman Islands, 1 ♂. Malaya : Singapore, 1 ♂.

This species has also been recorded from the Indo-Chinese Subregion.

Remarks.—*X. flavo-nigrescens* is closely allied to *X. hafizii*. The structure of the posterior legs and the genitalia of the male in the two species is, however, quite different.

Xylocopa viridissima (Ckll.) (?).

1878. *Xylocopa aestuans*, F. Smith (*nec* Linné), *Journ. Asiat. Soc. Bengal* XLVII (ii), p. 168, No. 14.

1918. *Mesotrichia confusa* subsp. *viridissima*, Cockerell, *Ann. Mag. Nat. Hist.* (9) II, p. 385, ♀ ♂.

♂.—Cockerell in the reference cited above remarks : " Differing from *confusa* J. Per. : yellow hair on thorax above brighter ; second submarginal cell a little longer."

♀.—Differs from that of *X. confusa* J. Per. in the following characters :—Orbits with a deep groove lying along the outer margins. Occiput with a few scattered yellow hairs. Basal portion of wings usually with more or less violaceous tints, apical portion with a little golden iridescence ; cell R_5 distinctly shorter ; vein M about one and a half times as long as M_{1+2} (1st section). I abdominal tergite with a few scattered yellow hairs.

Measurements.—♀, length of body 23-25 mm.; anterior wing 20-22 mm.

Types.—♀ ♂, from Penang, Malaya, in the British Museum (Natural History), London.

Distribution.—I have studied only 2 specimens probably belonging to this species from the following localities :—Burma : Tavoy, 1 ♀ ; Upper Tenasserim, 1 ♀ (*det.* F. Smith as *X. aestuans* Linn.).

The species was described from Malaya and Siam.

Remarks.—I have not seen any males of this species. It is a distinct species and not a subspecies of *X. confusa* J. Per. The original description is incomplete and as my specimens are poorly preserved, I have not been able to identify them with certainty. But as Prof. Cockerell informs me, the ♀ characters mentioned above are identical with those of the type.

This species is more closely related to *X. flavo-nigrescens* than to *X. confusa*.

Xylocopa confusa J. Per.

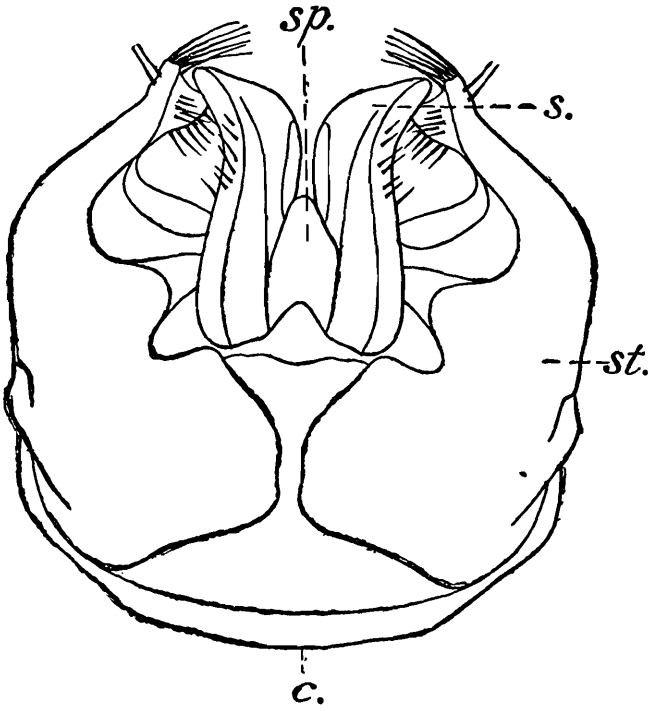
1838. ? *Xylocopa olivacea* (Klug, *in litt.*), Spinola, *Ann. Soc. Ent. France* VII, p. 519, ♂.

1857. *Xylocopa aestuans* and *X. verticalis* (*nec* Lepeletier), F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* II, p. 47, No 3 and p. 48, No. 4.

1871. ? *Xylocopa aestuans*, Radoszkowsky, *Horae Soc. Ent. Ross.* VIII, p. 196,

1873. *Xylocopa (Apis) aestuans*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 393, No. 13.
1876. *Xylocopa olivacea*, Ritsema, *Tijdschr. Entomol.* XIX, p. 63.
1890. *Xylocopa bryorum*, Bingham (*nec* Fabricius) (in part), *Journ. Bombay Nat. Hist. Soc.* V, p. 251, No. 25, ♀ ♂.
1897. *Xylocopa bryorum*, Bingham (*nec* Fabricius) (in part), *Faun. Brit. Ind. Hymenoptera* I, p. 541, No. 950, ♀ ♂.
1901. *Xylocopa confusa*, J. Perez, *Actes Soc. Linn. Bordeaux* LVI, pp. 39 and 57, ♀ ♂.
1901. *Xylocopa aestuans*, Friese (in part), *Bien. Eur.*, VI, p. 255, No. 27, ♀ ♂.
1901. *Koptorthosoma aestuans*, Cameron, *Proc. Zool. Soc. London*, p. 34.
1911. *Xylocopa confusa*, Cockerell, *Proc. U. S. Nat. Mus.* XXXIX, p. 638.
1912. *Xylocopa (Koptorthosoma) confusa*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 297, figs. 28-29, ♂.
1917. *Mesotrichia confusa*, Cockerell, *Philippine Journ. Sci.* XII, D, pp. 346 and 348.
1918. *Mesotrichia confusa*, Cockerell, *Entomologist* LI, p. 104.
1924. *Xylocopa (Koptorthosoma) confusa*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid Zool.* XLIX, p. 40, No. 64.
1929. *Xylocopa aestuans*, Dover (in part), *Bull. Raffles Mus.* II, p. 59, No. 22.
1930. *Mesotrichia (Koptorthosoma) confusa*, Cockerell, *Philippine Journ. Sci.* XLIII, pp. 270 and 271.
1933. *Xylocopa (Koptorthosoma) confusa*, Schulthess, *Result. Sci. Voy. Ind. Orient. Neerl. Leopold* IV, 5, 3, p. 36.
1935. *Xylocopa confusa*, Friese in Schulthess, *Rev. Suisse Zool.* XLII, p. 295.
1937. *Xylocopa (Koptorthosoma) confusa*, Ma, *Entomol. and Phytopath.* V, p. 363, No. 6.

Types.—♂ ♀, from Java, Sumatra, Amboina, Singapore, Lahore (probably a misprint for Johore), Saigon, in the Paris Museum.



TEXT-FIG. 10.—Dorsal view of the ♂ genitalia of *Xylocopa confusa* J. Per. ×20.
c. cardo; *s.* sagitta; *sp.* spatha; *st.* stipes.

Distribution.—I have studied specimens of this species from the following localities:—Burma: Mergui, 1 ♀. Malaya: Singapore, 3 ♂, 5 ♀. Sumatra: Anei Kloof, West coast of Sumatra, 500 M., 1 ♂ (*det.* E. Jacobson); Fort de Kock, 920 M., 1 ♀ (*det.* E. Jacobson). Java: Lambreth, Buitenzorg, 2 ♀ (*det.* Maidl.); Batavia, 1 ♂ (*det.* Maidl). Borneo, 1 ♂ (*det.* Maidl).

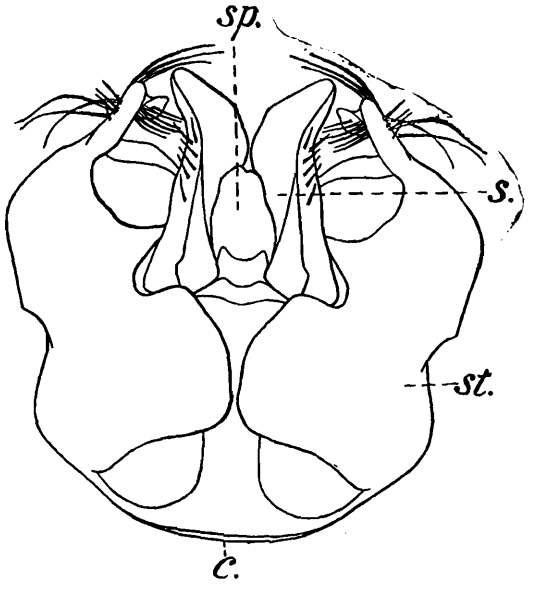
This species has also been recorded from Celebes and Siam.

Xylocopa verticalis Lepel.

1841. *Xylocopa verticalis*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 195, No. 38, ♂ (excl. ♀).
1854. *Xylocopa verticalis*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 352, No. 39.
1873. *Xylocopa verticalis*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 393, No. 4.
1874. *Xylocopa verticalis*, F. Smith (in part), *Trans. Entomol. Soc. London*, p. 274, No. 55, ♂ (excl. ♀).
1896. *Xylocopa verticalis*, Dalla Torre, *Cat. Hymen.* X, p. 219.
1897. *Xylocopa verticalis*, Bingham (in part), *Faun. Brit. Ind. Hymenoptera* I, p. 541, No. 949, ♂ (excl. ♀).
1899. ? *Koptorthosoma verticalis*, Perkins, *Entomol. Month. Mag.* XXXV, p. 37.
1901. ? *Xylocopa confusa* ♀ var., J. Perez, *Actes Soc. Linn. Bordeaux* LVI, p. 58, ♀.
1901. *Xylocopa separata*, J. Perez, *Actes Soc. Linn. Bordeaux* LVI, p. 60, ♂.
1907. *Xylocopa verticalis*, Cockerell, *Bull. Amer. Mus. Nat. Hist.* XXIII, 10, p. 228.
1907. *Xylocopa aestuans*, Paiva (*nec* Linné), *Rec. Ind. Mus.* I, p. 16.
1912. *Xylocopa* (*Koptorthosoma*) *separata*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 297, fig. 30, ♂.
1921. *Xylocopa aestuans*, Dover (in part), *Rec. Ind. Mus.* XXII, p. 390.
1922. *Xylocopa bryorum*, Dover (*nec* Fabricius) (in part), *Rec. Ind. Mus.* XXIV, p. 87.
1924. ? *Xylocopa* (*Xylocopa*) *verticalis*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid, Zool.* XLIX, p. 11, No. 12.

I give below a description of the female of the species which has not been described so far.

♀.—*Pubescence.*—Postgenae with a few whitish hairs. Postscutellum with a small patch of pure yellow hairs in the centre; hairs on propleuron extending downwards a little beyond the level of wing-base. Anterior tibiae with a few yellow hairs on outer surface.



TEXT-FIG. 11.—Dorsal view of the ♂ genitalia of *Xylocopa verticalis* Lepel. ×15.
c. cardo; *s.* sagitta; *sp.* spatha; *st.* stipes.

Structure.—Frontal keel apically broadened, very slightly elevated. Apical margin of supraclypeal region weakly ridged; basal margin and median band of clypeus also weakly ridged. Clypeal suture very weakly curved, not L-shaped. Tentorial pits weak. Labrum weakly tuberculated, with shallow apical emargination. Vein *M* slightly longer than M_{1+2} (1st section); vein *r-m* basally weak or suppressed.

Variation.—Occiput and I abdominal tergite sometimes with a few scattered yellow hairs. Vein *r-m* sometimes complete and strong.

Measurements.—♂ ♀, length of body 19-25 mm.; anterior wing 17-20 mm.

Types.—♂, from " Inde ", probably now in the Turin Museum. Type of *X. separata* J. Per., ♂, from Cochinchina, in the Paris Museum.

Distribution.—I have studied specimens of this species from the following localities :—

Kashmir (?) : Chashma Shahi, Srinagar, 2 ♀; Madras : Barkuda Island, Chilka Lake, Ganjam District, boring in dead log, 9 ♂, 16 ♀; Cheria Island, Chilka Lake, 1 ♂. Orissa : Puri, 1 ♀. Bihar : Dalkhola, Purneah District, 3 ♀; Kierpur, Purneah District, 2 ♂, 1 ♀. Bengal : Calcutta, 4 ♂, 11 ♀ (1 ♀ *det.* Friese as *X. aestuans* Linn.-*X. confusa* J. Per.); Calcutta Timber Yard, ex *Terminalia procera*, 1 ♂; Murshidabad, 1 ♂; Siliguri, 3 ♀; Lillooah Saw Mills, ex *Duabanga sonneratoides*, 2 ♀; Comilla, 1 ♂, 1 ♀; Jalpaiguri, 1 ♀; Government Timber Depot, Siliguri, *ex* seasoned *Michelia champaca*, 1 ♀; Mangpu, 2 ♀. Sikkim, 1,800′, 2 ♂, 4 ♀ (1 ♂ *det.* Bingham as *X. aestuans* Linn.). Malaya : Kwala Kangsar, Perak, 1 ♂ (*det.* Maidl as *X. separata* J. Per.). Sumatra : Medan, 1 ♂.

This species has also been recorded from the Andamans.

Remarks.—There has been a considerable amount of confusion in regard to this species. Lepeletier's ♂ and ♀ of this species are probably not conspecific. His description of ♀ as " Caput antice nigro villosum, vertice et lateribus luteo hirsutum. Thorax dorso et lateribus luteo villosum. Abdomen nigro ciliatum." is more applicable to the ♀ of *X. ceylonica* Cam.

This species is very closely related to *X. confusa*, but the posterior legs and genitalia of the ♂, the frontal keel and postscutal pubescence of the ♀ are quite distinctive. The males are somewhat similar to those of *X. ceylonica* Cam., while the females resembles those of *X. leucothorax* (de Geer).

Xylocopa abbotti (Ckll.).

1897. *Xylocopa coerulea*, Bingham (*nec* Fabricius), *Faun. Brit. Ind. Hymenoptera* I, p. 544, No. 955, pl. 4, fig. 8, ♀.
1909. *Mesotrichia abbotti*, Cockerell, *Proc. U. S. Nat. Mus.* XXXVI, p. 415, ♀.
1912. *Xylocopa* (*Koptorthosoma*) *abbotti*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 296.
1914. *Xylocopa* (*Koptorthosoma*) *abbotti*, Meade-Waldo, *Ann. Mag. Nat. Hist.* (8) XIV, p. 453, ♀.

Cockerell described the species as follows : " Differing from *M. caerulea* as follows : Smaller ; anterior wing not over 16 mm. long. Three complete submarginal cells, the first transverso-cubital nervure strong. First abdominal segment sparsely and inconspicuously clothed with blue hairs ; sides of second without blue. Wings darker, the purple stronger. Supraclypeal ridge less prominent."

♀.—Black hairs on face and vertex erect and coarse, of *IV*-type. Median band of supraclypeal region weakly keeled. Punctuation of basal triangular area of mandibles mostly of third-degree density.

Grooves along outer orbits inconspicuous. Median portion of vertex punctate in first-degree density. Coronal suture absent. Inter-ocellar distance about 2/3 as long as ocello-ocular distance. Antennal segment III much shorter than segments IV-VI. Posterior margin of scutellum not elevated. Wings with very slight bluish tints; vein *M* about one and one-third times as long as M_{1+2} (1st section). Knee-caps simple and V-shaped.

Type.—♀, from Trong, Lower Siam, in the U. S. National Museum, Washington, D. C.

Distribution.—I have studied one of the co-types kindly sent to me by Prof. Cockerell; it is now deposited in the collections of the Zoological Survey of India. Besides the type-locality, it has been recorded from Tenasserim.

Remarks.—The co-type which I have studied is without the abdomen.

The systematic position of this species cannot be settled until the male is discovered. Le Veque[1] considered it to be a *Cyaneoderes*, while Maidl[2] recently suggested that *X. tumida* Friese (1903), *C. dormeyeri* Enderl. (1909) and *M. abbotti* Ckll. are probably synonymous. The two former species are true *Cyaneoderes*. On account of the general shape of the head and the wing-venation of *X. abbotti*, I, however, assign it to the subgenus *Orbitella*. Evidently it appears to be the connecting link between the two subgenera.

Subgenus **Cyaneoderes** Ashm.

1899. *Cyaneoderes*, Ashmead, *Trans. Amer. Ent. Soc.* XXVI, p. 70.

Body of medium size. Integument black, ♂ sometimes with pale face markings. Pubescence with more or less greenish or bluish tints. Head of ♂ much narrower than thorax. Inner orbits of ♂ weakly curved and strongly convergent at their upper extremities. Frontal keel prominent. Base of ocellar triangle about two and a half times as long as the lateral sides. Labrum of ♀ strongly tuberculated. Mandibles bidentate. Disc of mesonotum unpunctate. Posterior margin of scutellum sharply marked off and overlapping anterior portion of postscutellum. Vein *r-m* very weak or absent. Knee-caps weak, simple. Inner and outer teeth of claws of ♂ almost parallel. Anterior margin of dorsum of I abdominal tergite sharply marked off; anterior surface of this tergite with a very deep and rounded depression. Submedian processes of epipygium of ♀ absent. Hypopygium of ♂ medially keeled.

Type.—*Cyaneoderes fairchildi* Ashm. (manuscript name) (=*X. caerulea* Fab.).

Key to Indian species. ♂.

Clypeus apically without a sharp median emargination; posterior femora ventrally without any spine-like projection .. .. .. *caerulea* (Fab.).

Clypeus apically with a sharp median emargination; posterior femora ventrally with a spine-like strong projection .. .. *acutipennis* Sm.

[1] Le Veque, N. *Amer. Mus. Novitates* no. 479, p. 11, 1931.

[2] In a personal communication.

Key to Indian species. ♀.

Postgenae heavily punctate and thickly pubescent; dorsum of thorax with bright blue hairs	*caerulea* (Fab.).
Postgenae very sparsely punctate and almost nude; dorsum of thorax with black hairs	*acutipennis* F. Sm.

Xylocopa caerulea (Fab.).

1804. *Bombus caeruleus*, Fabricius, *Syst. Piez.*, p. 345, No. 9, ♀.
1806. *Bombus caeruleus*, Illiger, *Mag. Insectenkunde* V, p. 172 (*nec Xylocopa caerulea*, Illiger, *op. cit.*, p. 150, No. 3).
1821. *Xylocopa semiarmenia*, Latreille, *Wiedemann Mag. f. Entomol.* IV, p. 421.
1841. *Xylocopa caerulea*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 200, No. 46, ♀.
1854. *Xylocopa caerulea*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 357, No. 61.
1857. *Xylocopa caerulea*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* II, p. 48, No. 5.
1864. *Xylocopa caerulea*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* VIII, p. 93.
1867. *Xylocopa caerulea*, Sichel, *Reise Novara Zool.* II, 1, *Hymenoptera*, p. 155.
1873. *Xylocopa caerulea*, F. Smith, *Jour. Proc. Linn. Soc. London, Zool.* XI, p. 394, No. 20.
1874. *Xylocopa caerulea*, F. Smith, *Trans. Entomol. Soc. London*, p. 269, No. 45, ♀♂.
1879. *Xylocopa caerulea*, Taschenberg, *Zeitschr. Naturwiss.* LII, p. 599, No. 34, ♀.
1894. *Koptorthosoma caerulea*, Gribodo, *Bull. Soc. Ent. Ital.* XXVI, p. 272.
1896. *Xylocopa caerulea*, Dalla Torre, *Cat. Hymen.* X, p. 207.
1899. *Cyaneoderes fairchildi* (*nom. nud.*) and *C. caerulea*, Ashmead, *Trans. Amer. Ent. Soc.* XXVI, p. 70.
1901. *Koptorthosoma caeruleum*, Cameron, *Proc. Zool. Soc. London* I, p. 34.
1905. *Xylocopa caerulea*, Bingham, *Fasc. Malay. Zool.* III, p. 57, No. 160.
1909. *Mesotrichia caerulea*, Cockerell, *Proc. U. S. Nat. Mus.* XXXVI, p. 415, ♀♂.
1912. *Xylocopa* (*Koptorthosoma*) *caerulea*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 295, fig. 27, ♂.
1914. *Xylocopa* (*Koptorthosoma*) *caerulea*, Meade-Waldo, *Ann. Mag. Nat. Hist.* (8) XIV, pp. 453 and 455.
1914. *Xylocopa caerulea*, Friese, *Tijdschr. Entomol.* LVII, pp. 7 and 33, pl. 2.
1916. *Xylocopa* (*Koptorthosoma*) *caerulea*, Meade-Waldo, *Ann. Mag. Nat. Hist.* (8) XVII, p. 465.
1918. *Xylocopa caerulea*, Friese, *Zool. Jahrbücher Abt. Syst.* XLI, p. 495, No. 31.
1918. *Mesotrichia* (*Cyaneoderes*) *caerulea*, Cockerell, *Entomologist* LI, pp. 137 and 138.
1922. *Xylocopa caerulea*, Dover, *Rec. Ind. Mus.* XXIV, p. 87.
1924. *Xylocopa* (*Koptorthosoma*) *caerulea*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid, Zool.* XLIX, p. 39, No. 63.
1929. *Xylocopa caerulea*, Dover, *Bull. Raffles Mus.*, II, p. 59, No. 21.
1933. *Xylocopa* (*Koptorthosoma*) *caerulea*, Schulthess, *Result. Sci. Voy. Ind. Orient. Neerl. Leopold* IV, 5, 3, p. 36.
1933. *Xylocopa* (*Mesotrichia*) *caerulea*, Pagden, *Stylops* II, p. 78, ♂♀.
1935. *Xylocopa caerulea*, Friese in Schulthess, *Rev. Suisse Zool.* XLII, p. 295.

Distribution.—*X. caerulea* has been recorded from Ceylon, Malaya, Indo-China, Sumatra, Java, Borneo, New Caledonia (?). I have not seen any Indian material but have examined examples of both sexes from Java and a few females from Sumatra.

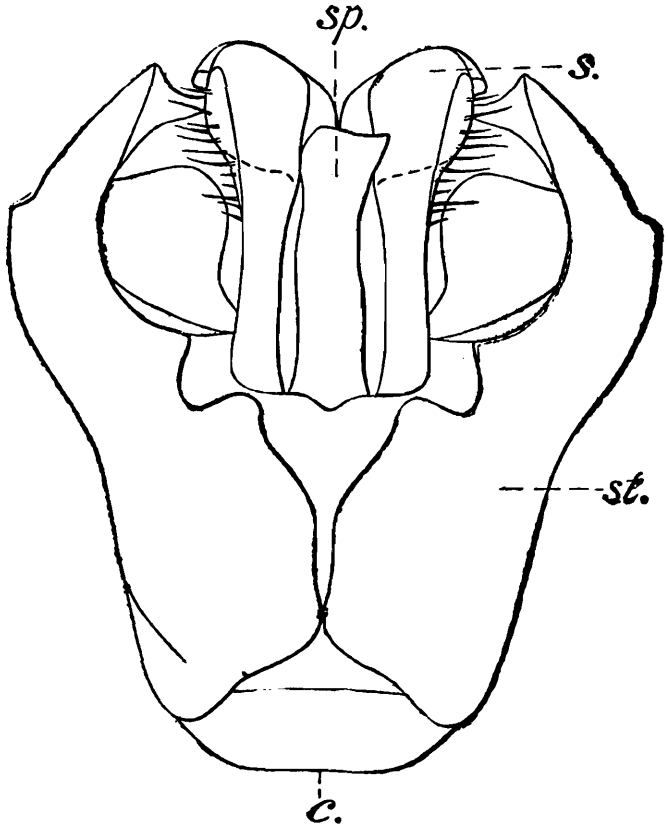
Xylocopa acutipennis F. Sm.

1854. *Xylocopa acutipennis*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 355, No. 53, ♂.
1873. *Xylocopa acutipennis*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* p. 393, No. 16.
1874. *Xylocopa acutipennis*, F. Smith, *Trans. Entomol. Soc. London*, p. 277, No. 64, ♂.
1896. *Xylocopa acutipennis*, Dalla Torre, *Cat. Hymen.* X, p. 202.
1897. *Xylocopa acutipennis*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 537, No. 940, ♀♂.
1901. *Xylocopa acutipennis*, J. Perez, *Actes Soc. Linn. Bordeaux* LVI, p. 51, ♂♀.
1907. *Xylocopa acutipennis*, Paiva, *Rec. Ind. Mus.* I, p. 16.
1922. *Xylocopa acutipennis*, Dover (in part), *Rec. Ind. Mus.* XXIV, p. 85.
1922. *Xylocopa acutipennis*, Dover, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.

Type.—♂, from Sylhet, Assam, in the British Museum (Natural History), London.

Distribution.—I have studied specimens of this species from the following localities :—

Bengal : Singla, Darjeeling Dist., 1,500′, 1 ♂ ; Sevook, Darjeeling Dist., 2 ♂ ; Kalimpong, Darjeeling Dist., 4,500′, 1 ♀ ; Sitong, DarjeelingDist., 3,500′, 2 ♀ ; Pashok, Darjeeling Dist., 5,000′, 1 ♀ ; Tindharia, Darjeeling Dist., 2,822′, 1 ♀ ; Mangpu,



TEXT-FIG. 12.—Dorsal view of the ♂ genitalia of *Xylocopa acutipennis* F. Sm. ×20.
c. cardo; *s.* sagitta ; *sp.* spatha ; *st.* stipes.

Darjeeling Dist., 3 ♀. Nepal : Katmandu, 3 ♀ ; Nayorkorte, 1 ♂ ; Nepal Valley, 4,500-6,500′, 3 ♀. Sikkim, 1,800′, 2 ♂, 3 ♀. Assam : N. Khasi, 1 ♂ ; Above Tura, Garo Hills, 3,500-3,900′, 1 ♂ ; " Assam ", 1 ♀. Burma : Dwana Hills, 2 000-3,000′, Lower Burma, 1 ♂.

This species has also been recorded from Tenasserim.

Remarks.—*X. acutipennis* occupies an intermediate position between the subgenera *Cyaneoderes* and *Platynopoda*, but the structure of its inner orbits, anterior metatarsi, posterior tibiae and wing-venation seem to indicate that it is more of a *Cyaneoderes* than a *Platynopoda*. Its nearest ally appears to be *X. splendidipennis* Rits. from Sumatra.

Subgenus **Platynopoda** Westw.

Body of large size. Integument black. Pubescence dominantly black, very sparse. Head of ♂ much narrower than thorax and usually with more or less pale markings. Inner orbits very strongly converging at their upper extremities. Frontal keel distinct but never very strong. Base of ocellar triangle about thrice (♂) or two and a half times (♀) as long as the lateral sides. Labrum of ♀ strongly tuberculated. Mandibles bidentate. Disc of mesonotum unpunctate. Scutellum anteriorly weakly curved and posteriorly sharply marked off and elevated. Veins *r-m* and M_{1+2} forming obtuse interior angles. Knee-caps simple ; major apical spur of posterior tibiae and anterior and posterior metatarsi greatly flattened. Antenna-cleaners with very short apical projection. Anterior margin of dorsum of I abdominal tergite sharply marked off ; anterior surface of this tergite with a very deep and round depression. Submedian processes of epipygium of ♀ absent. Hypopygium sometimes keeled.

Type.—*Apis latipes* Drury (1773).

Key to Indian species. ♂.

1.	Scape of antennae cylindrical throughout	2.
	Scape of antennae apically greatly flattened ..	3.
2.	Anterior metatarsi not S-shaped, lateral margin very slightly curved, about 4 times as broad as long ; intermediate tibiae ventrally without S-shaped keel ..	*perforator* F. Sm.
	Anterior metatarsi S-shaped, about thrice as broad as long ; intermediate tibiae ventrally with a very strong S-shaped keel	*tenuiscapa* Westw.
3.	Outer teeth of mandibles apically pointed ; major apical spur of posterior tibiae simple	*magnifica* (Ckll.).
	Outer teeth of mandibles apically blunt ; major apical spur of posterior tibiae apically weakly bifurcate ..	*latipes* (Drury).

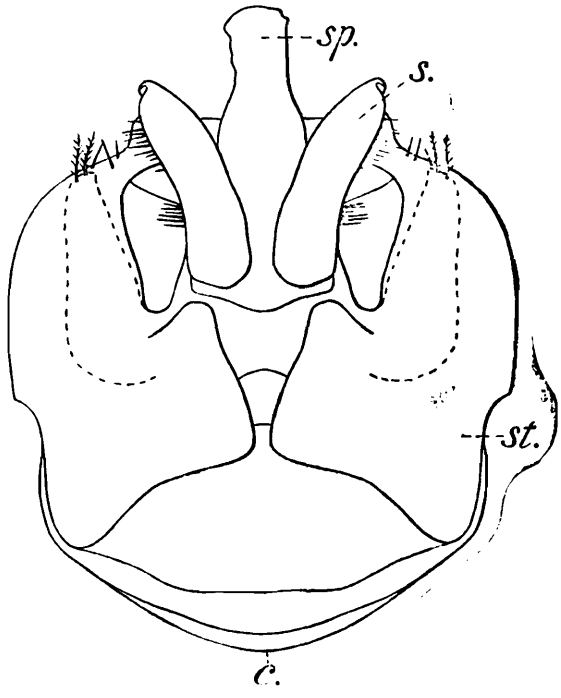
Key to Indian species. ♀.

1.	Antennal segment III distinctly longer than segments IV-VI	2.
	Antennal segment III shorter than or as long as segments IV-VI	3.
2.	Wings basally with greenish purple iridescence ; abdominal tergites III-IV medially heavily punctate ..	*perforator* F. Sm.
	Wings basally with bluish or greenish iridescence ; abdominal tergites III-IV medially finely punctate ..	*tenuiscapa* Westw.
3.	Wings apically with strong golden iridescence ..	*magnifica* (Ckll.).
	Wings apically with strong purple and greenish iridescence	*latipes* (Drury).

Xylocopa perforator F. Sm.

1861. *Xylocopa perforator*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* VI, p. 61, No. 4, ♀♂.
1863. *Xylocopa perforator*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* VII, p. 48, No. 1.
1873. *Xylocopa perforator*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 394, No. 32.
1874. *Xylocopa perforator*, F. Smith, *Trans. Entomol. Soc. London*, p. 272, No. 51, ♂.
1896. *Xylocopa perforator*, Dalla Torre, *Cat. Hymen.* X, p. 216.
1912. *Xylocopa (Koptorthosoma) perforator*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 295, ♂♀.
1914. ?*Xylocopa tenuiscapa*, Friese, *Tijdschr. Entomol.* LVII, p. 7, No. 41.
1918. ?*Xylocopa tenuiscapa*, Friese, *Zool. Jahrbücher Abt. Syst.* XLI, p. 495, No. 35.
1925. *Xylocopa perforator*, Alfken, *Entomol. Mitt.* XIV, p. 374, ♀ and p. 375, ♂.

Maidl recorded the occurrence of this species in Ceylon, but I have not seen any Indian material. I have, however, examined 1 ♂ from



TEXT-FIG. 13.—Dorsal view of the ♂ genitalia of *Xylocopa perforator* F. Sm. ×15.
c. cardo; *s.* sagitta; *sp.* spatha; *st.* stipes.

Medan, Sumatra (*det.* Alfken), 1 ♂ from Buitenzorg, Java (*det.* Maidl) and 1 ♀ without locality label (*det.* Maidl). It has also been recorded from Lombok.

Types.—♂♀, from Ternate, Sunda Islands, in the British Museum (Natural History), London.

Xylocopa tenuiscapa Westw.

1840. *Xylocopa (Platynopoda) tenuiscapa*, Westwood, *Duncan Nat. Hist. Bees*, p. 271, pl. 23, fig. 2, ♂ (*nec.* ♀).
1841. *Xylocopa viridipennis* (Latreille *in litt.*) and *X. latreillei*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 205, No. 54, ♀ and p. 206, No. 55, ♀♂.
1844. *Xylocopa lativentris*, *Blanchard, Jacquemont Voy. dans l'Inde, etc.* IV, p. 30, No. 37, ♀.

1854. *Xylocopa viridipennis* and *X. tenuiscapa*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 352, No 40 and p. 353, No. 41.
1861. *Xylocopa tenuiscapa*, Walker, *Tennant Nat. Hist. Ceylon*, p. 545.
1861. *Xylocopa tenuiscapa*, Tennant, *Nat. Hist. Ceylon*, p. 418.
1863. *Xylocopa tenuiscapa*, Motschulsky, *Bull. Soc. Imp. Nat. Moscou*, p. 25.
1867. *Xylocopa albofasciata*, *X. latipes* (in part) and *X. tenuiscapa* (in part), Sichel, *Reise Novara Zool.* II, 1, *Hymenoptera*, p. 154, ♀ and p. 155.
1873. *Xylocopa viridipennis* and *X. tenuiscapa*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 393, Nos. 5 and 6.
1874. *Xylocopa tenuiscapa* and *X. albofasciata*, F. Smith, *Trans. Entomol. Soc. London*, p. 268, No. 41, ♂♀ and No. 42, ♀.
1876. *Xylocopa lativentris*, Ritsema, *Tijdschr. Entomol.* XIX, p. 63.
1878. *Xylocopa tenuiscapa*, Anderson, *Anat.-Zool. Result. Exped. W. Yunnan*, p. 917.
1879. *Xylocopa latipes*, Taschenberg (*nec* Drury), *Zeitschr. Naturwiss.* LII, p. 591, No. 26 and p. 898, ♀ (excl. ♂).
1896. *Xylocopa albofasciata*, *X. lativentris* and *X. tenuiscapa*, Dalla Torre, *Cat. Hymen.* X, pp. 204, 210 and 219.
1896. *Xylocopa tenuiscapa* and *X. albofasciata*, Bingham, *Proc. Zool. Soc. London*, p. 456, No. 325 and p. 457, No. 328.
1897. *Xylocopa tenuiscapa* and *X. albofasciata*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 537, No. 937, ♀♂ and p. 542, No. 952, ♀.
1900. *Xylocopa auripennis*, de Niceville (*nec* Lepeletier), *Journ. Bombay Nat. Hist. Soc.* XIII, p. 174, pl. EE, fig. 23, ♂.
1901. *Xylocopa tenuiscapa*, J. Perez, *Actes Soc. Linn. Bordeaux* LVI, p. 50, ♂♀.
1902. *Xylocopa tenuiscapa*, Cameron, *Faun. Geogr. Mald.-Laccad. Archip.* I, *Hymenoptera*, p. 61, No. 21.
1904. *Platynopoda tenuiscapa*, Ashmead, *Journ. New York Ent. Soc.* XII, p. 3, No. 26.
1904. *Platynopoda tenuicornis* (misprint), Ashmead, *Proc. U. S. Nat. Mus.* XXVIII, p. 149.
1906. *Platynopoda tenuiscapa*, Brown, *Philippine Journ. Sci.* I. p. 686.
1907. *Xylocopa tenuiscapa*, Paiva, *Rec. Ind. Mus.* I, p. 16.
1907. *Xylocopa tenuiscapa*, Cockerell, *Bull. Amer. Mus. Nat. Hist.* XXIII, 10, p. 228.
1912. *Xylocopa* (*Koptorthosoma*) *tenuiscapa*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 294.
1912. *Xylocopa tenuiscapa*, Paiva, *Rec. Ind. Mus.* VIII, p. 79, No. 12.
1913. *Xylocopa tenuiscapa*, Strand, *Arch. Naturgesch.* LXXIX, A, 2, p. 146.
1917. *Mesotrichia* (*Platynopoda*) *tenuiscapa*, Cockerell, *Philippine Journ. Sci.* XII, D, p. 349.
1919. ?*Mesotrichia tenuiscapa*, Cockerell, *Proc. U. S. Nat. Mus.* LV, p. 171.
1921. *Xylocopa tenuiscapa*, Dover (in part), *Rec. Ind. Mus.* XXII, p. 389.
1922. *Xylocopa tenuiscapa*, Dover (in part), *Rec. Ind. Mus.* XXIV, p. 85.
1922. *Xylocopa tenuiscapa*, Dover, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 961.
1924. *Xylocopa* (*Koptorthosoma*) *tenuiscapa*, Dusmet (in part), *Trab. Mus. Nac. Cien. Nat. Madrid Zool.* XLIX, p. 42, No. 69.
1925. *Xylocopa tenuiscapa*, Alfken, *Entomol. Mitt.* XIV, p. 374, ♀ and p. 375 ♂.
1929. *Mesotrichia tenuiscapa*, Cockerell, *Ann. Mag. Nat. Hist.* (10) IV, p. 302.
1930. *Mesotrichia* (*Platynopoda*) *tenuiscapa*, Cockerell, *Philippine Journ. Sci.* XLIII, p. 268.
1935. *Xylocopa tenuiscapa*, Friese in Schulthess, *Rev. Suisse Zool.* XLII, p. 295.
1937. *Xylocopa* (*Koptorthosoma*) *tenuiscapa*, Ma, *Entomol. & Phytopath.* V, p. 364, No. 7.

Variation.—Alfken (1925) regarded the position and shape of the yellow markings of the clypeus in the ♂ of *X. tenuiscapa* as highly distinctive of the species, but I find these markings very variable in position, shape and extent. Out of 39 examples, 33 have two small spots, one on each side of the apex, 5 are entirely black and 1 has a transverse apical yellow band. The median unpunctate band of the clypeus is

sometimes basally interrupted and strongly keeled. The wing-colour of this species is also very variable.

Types.—♂, in the Hope Museum, Oxford University. Types of *X. viridipennis* Lepel., ♀, from India, probably in the Turin Museum; that of *X. latreillei* Lepel., ♀♂, from Bengal, in the Hope Museum, Oxford University; that of *X. albofasciata* Sich., ♀, from Ceylon, in the Vienna Museum; that of *X. lativentris* Blanch., ♀, from Kashmir, in the Paris Museum.

Distribution.—I have studied specimens of this species from the following localities:—

Kashmir: Chashma Shahi, Srinagar, 1 ♂. United Provinces: Saharanpur, 1 ♀; Dehra Dun, 1 ♂, 1 ♀; Thano, Dehra Dun, found in bamboo, 1 ♂; Sat Tal, Kumaon, 1 ♀. Central Provinces: Nagpur, 2 ♀. Bombay: Ambaoli, Ratnagiri Dist., 1 ♀; Mahabaleshwar, Satara, ca. 4,200′, 1 ♀; Satara, Sangli, 1 ♂; Bombay, 4 ♂ (1 ♂ *det.* Friese), 1 ♀ (compared with type of *X. latipes* Drury by Meade-Waldo); Tavargatti, Belgaum Division, ex *Adina cordifolia*, 1 ♀; Karwar, 1 ♂, 1 ♀; Bassein, 1 ♀ Goa: Marmagao, 1 ♂; Soccorro, 1 ♂. Mysore: Shimoga, at light, 1 ♀; Bangalore, ca. 3,000′, 3 ♂, 4 ♀. Travancore: Peermade, Trivandrum, 1 ♂. Madras: Kodaikanal, 6,700-7,000′, Palni Hills, 1 ♀; Barkuda Island, Chilka Lake, Ganjam Dist., 3 ♀; Muliar below Kodaikanal, ca. 5,000′, Palni Hills, 1 ♀; Kodaikanal Road Station, foot of Palni hills, 1 ♀; Bellary, 2 ♂; Forest around Chelama, 1,075′, Nallamalai Hills, 3 ♀; Tummalabanu, ca. 2,500′, Palkonda Hills, 2 ♀; Kangumaduga, ca. 3,000′, Seshachalama, Cuddapah Dist., 2 ♀; Vempali, Cuddapah Dist., 4 ♀; Nadur, ca. 1,800′, Javadi Hills, 3 ♂, 2 ♀; Denkanikota, 3,000′, Salem Dist., 10; Nagalur, 9 miles North of Yercaud, 3,000′, Western border of Shevaroy Hills, overlooking the plains, Salem Dist., 14 ♀; Forest around Pullalamadagu, 1,500′, Palkonda Hills, 1 ♀; Podanore, Coimbatore, boring into bamboo, 1 ♂; Coimbatore, 2 ♀; Madras, 2 ♂, 2 ♀; Nagalapuram Hills, ca. 500-24,00′, Chingleput Dist., 1 ♂; S. Malabar, 2 ♂; Hills near Methiapalli, adjoining Craigmore Road, ca. 3 miles from Yercaud, 4,500′ Shevaroy Hills, Salem Dist., 2 ♂; Kuttur, 2,110′, Yelagiri Hills, 3 ♂; Kombuthi Estate, 6 miles from Yercaud, 4,600′, Shevaroy Hills, 7 ♂; St. Thomas Mount, 1 ♂; Cumbun, 1 ♀; Anamalai Hills, 2,400′, 2 ♀; Trichinopoly, 1 ♂; Palnis, 7,000′, Kodaikanal, 1 ♀; Odugathur, Vellore Division, boring into timber, 1 ♀. Orissa: Barkul, 0-1,000′, 1 ♂, 1 ♀; Gopkuda Island, Chilka Lake, 1 ♀; Balighai, near Puri, 2 ♀. Bihar: Purneah, 1 ♀; Ranchi, 1 ♀; on the sides of the R. Gumani, near Kusma, Santal Parganas, 1 ♀; Champaran, Bettiah, 1 ♀. Bengal: Balasan Forest, ca. 400-500′, 3 ♂, 2 ♀; Calcutta, 4 ♂, 14 ♀ (1 ♂, 1 ♀ *det.* Friese); Mariambari Tea Estate, Pankhabari, E. Himalayas, 1 ♀; Panighata, 1 ♂; Dakhindari Salt Lake, near Calcutta, 2 ♀; Murshidabad, 4 ♀; Santiniketan, Birbhum Dist., 6 ♂, 33 ♀; Tindharia, Darjeeling Dist., 2,822′, 3 ♂,

2 ♀; Pulta, near Barrackpore, 2 ♀; Saraghat, 1 ♀; Samsing, 1,800′, Kalimpong, 1 ♀. Nepal: Monda, 1 ♂. Sikkim, 1,800′, 1 ♂, 3 ♀. Assam: Companyganj, 1 ♂, 3♀; between Therriaghat and Mahadeo, Khasi Hills, 1 ♀; Margherita, 1 ♀. Ceylon: Nalanda, 1 ♂ (*det.* Maidl); Bandaravela, 1 ♂, 1 ♀ (*det.* Maidl); Negombo, 1 ♂, 1 ♀ (*det.* Maidl); Peradeniya, 1 ♂, 1 ♀; Niroddumunai, near Trincomalee, E. P., 1 ♀; Horawpotana, 1 ♂; "Ceylon", 1 ♀. "South India", 1 ♂.

This species has also been recorded from the Andamans, China (W. Yunnan), Siam (Chiengmai); Timor (?) and Java (?).

Remarks.—De Niceville's illustration (1900) of *X. auripennis* Lepel. is without doubt that of a typical male of *X. tenuiscapa* Westw.

Xylocopa magnifica (Ckll.).

1929. *Mesotrichia latipes* var. *magnifica*, Cockerell, *Ann. Mag. Nat. Hist.* (10) IV, p. 302, ♀.

I give below a description of the male of this species which has not been described so far.

♂.—Outer teeth of mandibles sharp and slender. Inter-antennal distance distinctly shorter than upper orbital distance. Wings coloured as those of *X. tenuiscapa* Westw. but apically with a little amount of rosy tints. Median depression of ventral surface of anterior femora weak. Breadth of anterior metatarsi half as long as the length. Major apical spur of posterior tibiae broadly rounded and S-shaped. Hypopygium without median keel. Venter of squamae of genitalia very flat and without any longitudinal ridge.

♀.—Differs from *X. tenuiscapa* Westw. in the following points:—Supraclypeal region medially unpunctate and not more elevated than clypeus. Antennal segment III slightly shorter than segments IV-VI. Knee-caps weak, upper margin apically distinct. Abdominal tergites III-IV without median unpunctate band.

Measurements.—♂, length of body 28-30 mm.; anterior wing 27-29 mm. ♀, length of body 28-29 mm.; anterior wing 26-29 mm.

Types.—Holotype, ♀, from Doi Sutep, near Chiengmai, Siam, in the U. S. National Museum, Washington, D. C.; allotype, ♂, No. 1789/H3, in the Zoological Survey of India (Indian Museum), Calcutta.

Distribution.—I have studied specimens of this species from the following localities:—Bengal: Balasan Forest, E. Himalayas, 400-500′, 1 ♀; Maini Mukh, Chittagong Hills Tracts, 5 ♂, 2 ♀ (1 ♂ selected as allotype).

Remarks.—My determination of the ♀ of this species has been confirmed by Prof. Cockerell.

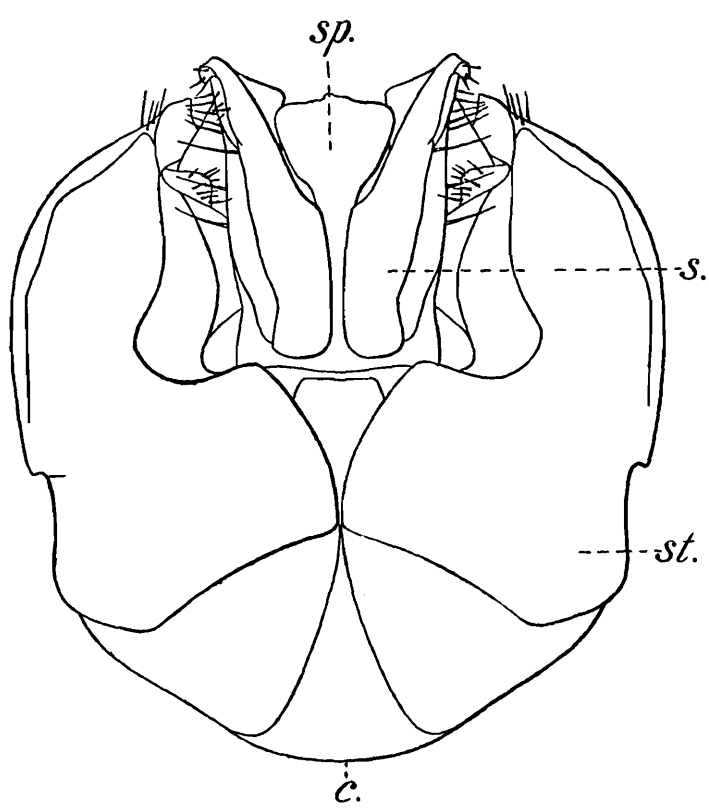
The length of flagellar segments, anterior metatarsi, abdominal punctuation and ♂ genitalia of this species are quite similar to those of *X. latipes* (Drury), while its mandibles, major apical spur of posterior tibiae of ♂ and hypopygium of ♀ are very similar to those of *X. tenuiscapa* Westw. It appears therefore to be an intermediate species between *X. tenuiscapa* and *X. latipes*, and not merely a variety of the latter.

Xylocopa latipes (Drury).

1773. *Apis latipes*, Drury, *Illustr. Nat. Hist.* II, p. 87, pl. 48, fig. 2, ♂.
1773. *Apis gigas*, de Geer, *Mém. Hist. Insect.* III, p. 576, No. 10, pl. 28, fig. 15, ♂.
1775. *Apis latipes*, Fabricius, *Syst. Entomol.*, p. 378, No. 1, ♂.
1780. *Apis gigas*, Göze, *de Geer Abh. Gesch. Insect.* III, p. 273, No. 10, pl. 28, fig. 15, ♂.
1781. *Apis latipes*, Fabricius, *Spec. Insect.* I, p. 1781, pl. 475, No. 1, ♂.
1783. *Apis gigas*, Retzius, *Gen.-Spec. Insect.* I, p. 62, No. 220.
1787. *Apis latipes*, Fabricius, *Mant. Insect.* I, p. 299, No. 1, ♂.
1789. *Apis latipes*, Olivier, *Encycl. Méthod. Insect.* IV, p. 63, No. 1, pl. 107, fig. 6 and pl. 382, fig. 9, ♂.
1790. *Apis latipes*, Gmelin, *Linné Syst. Nat.* (13th edit.) I, 5, p. 2780, No. 100.
1791. *Apis latipes*, Christ, *Naturgesch. Insect.*, p. 117, pl. 4, figs. 1-3, ♀♂.
1793. *Apis latipes*, Fabricius, *Entomol. Syst.* II, p. 314, No. 1, ♂.
1804. *Xylocopa latipes*, Fabricius, *Syst. Piez.*, p. 337, No. 1, ♂.
1806. *Xylocopa latipes*, Illiger, *Mag. Insectenkunde* V, p. 150, No. 7, ♀.
1807. *Xylocopa latipes*, Jurine, *Nouv. Méthod. Class. Hymen.*, p. 256, ♂.
1808. *Xylocopa latipes*, Klug, *Mag. Ges. Naturf. Freunde Berlin* II, p. 56, No. 83.
1817. *Xylocopa latipes*, Lamarck, *Hist. Nat. Anim. s. Vert.* IV, p. 65, No. 2.
1825. *Xylocopa latipes*, Lepeletier, *Encycl. Méthod. Insect.* X, p. 792, No. 7, ♀♂.
1835. *Xylocopa latipes*, Lamarck, *Hist. Nat. Anim. s. Vert.* (2nd edit.) IV, p. 283, No. 2.
1837. *Xylocopa latipes*, Westwood, *Drury Illustr. Nat. Hist.* (2nd edit.) II, p. 98, pl. 48, fig. 2, ♂.
1840. *Xylocopa* (*Platynopoda*) *latipes*, Westwood, *Duncan Nat. Hist. Bees*, p. 274, pl. 23, fig. 1, ♂.
1841. *Xylocopa latipes*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 203, No. 51, ♀♂.
1854. *Xylocopa latipes*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 353, No. 43.
1857. *Xylocopa latipes*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* II, p. 47, No. 1.
1861. *Xylocopa latipes*, Walker, *Tennant Nat. Hist. Ceylon*, p. 454.
1863. *Xylocopa latipes*, Motschulsky, *Bull. Soc. Imp. Nat. Moscou*, p. 25.
1864. *Xylocopa latipes*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* VIII, p. 93.
1873. *Xylocopa latipes*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 392, No. 1.
1874. *Xylocopa latipes*, F. Smith, *Trans. Entomol. Soc. London*, p. 267, No. 40, ♂♀.
1878. *Xylocopa latipes*, F. Smith, *Journ. Asiat. Soc. Bengal* XLVII, (ii), p. 168, No. 13.
1879. *Xylocopa virescens* (*nec* Lepeletier) and *X. latipes*, Taschenberg, *Zeitschr. Naturwiss.* LII, p. 591, No. 25, ♀, p. 592, No. 26, ♂ (excl. ♀) and p. 898.
1894. *Koptorthosoma latipes*, Gribodo, *Bull. Soc. Ent. Ital.* XXVI, p. 272.
1896. *Xylocopa latipes*, Dalla Torre, *Cat. Hymen.* X, p. 213.
1897. *Xylocopa latipes*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 536, No. 938, pl. 4, fig. 7, ♀♂.
1901. *Xylocopa latipes*, J. Perez, *Actes Soc. Linn. Bordeaux* LVI, p. 50, ♂♀.
1901. *Koptorthosoma latipes*, Cameron, *Proc. Zool. Soc. London* I, p. 34.
1902. *?Xylocopa latipes*, Cameron, *Faun. Geogr. Mald.-Laccad. Archip.* I, *Hymenoptera*, p. 62, No. 24.
1904. *Platynopoda latipes*, Ashmead, *Journ. New York Ent. Soc.* XII, p. 3, No. 25.
1904. *Platynopoda latipes*, Ashmead, *Proc. U. S. Nat. Mus.* XXVIII, p. 149.
1905. *Xylocopa latipes*, Bingham, *Fasc. Malay. Zool.* III, p. 56, No. 157.
1906. *Platynopoda latipes*, Brown, *Philippine Journ. Sci.* I, p. 686.
1907. *Xylocopa latipes*, Cockerell, *Bull. Amer. Mus. Nat. Hist.* XXIII, 10, p. 228.
1907. *Xylocopa latipes*, Paiva, *Rec. Ind. Mus.* I, p. 16.
1911. *Xylocopa latipes*, Cockerell, *Proc. U. S. Nat. Mus.* XXXIX, p. 637.
1912. *Xylocopa* (*Koptorthosoma*) *latipes*, Maidl, *Ann. K. K. Naturhist. Hofmus. Wien* XXVI, p. 294, ♂♀.

1912. *Xylocopa latipes*, Paiva (in part), *Rec. Ind. Mus.* VIII, p. 79, No. 12.
1914. *Xylocopa latipes*, Friese, *Tijdschr. Entomol.* LVII, p. 7, No. 40.
1915. *Mesotrichia latipes*, Cockerell, *Ann. Mag. Nat. Hist.* (8) XV, p. 262.
1917. *Mesotrichia (Platynopoda) latipes*, Cockerell, *Philippine Journ. Sci.* XII, D, pp. 347 and 349.
1918. *Xylocopa latipes*, Friese, *Zool. Jahrbücher Abt. Syst.* XLI, p. 495, No. 34.
1920. *Mesotrichia latipes*, Cockerell, *Ann. Mag. Nat. Hist.* (9) VI, p. 146.
1924. *Xylocopa (Koptorthosoma) latipes*, Dusmet, *Trab. Mus. Nac. Cien. Nat. Madrid, Zool.* XLIX, p. 40, No. 65.
1925. *Xylocopa latipes*, Alfken, *Entomol. Mitt.* XIV, p. 374, ♀ and p. 375, ♂.
1926. *Mesotrichia latipes*, Cockerell, *Ann. Mag. Nat. Hist.* (9) XVIII, p. 223.
1929. *Xylocopa latipes*, Dover, *Bull. Raffles Mus.* II, p. 60, No. 24.
1930. *Mesotrichia (Platynopoda) latipes*, Cockerell, *Philippine Journ. Sci.* XLIII, pp. 268 and 269.
1933. *Xylocopa (Koptorthosoma) latipes*, Schulthess, *Result. Sci. Voy. Ind. Orient. Nerrl. Leopold* IV, 5, 3, p. 36.
1935. *Xylocopa latipes*, Friese in Schulthess, *Rev. Suisse Zool.* XLII, p. 295.

Variation.—The yellow markings on clypeus of ♂ vary greatly both in shape and extent, but I have never found any examples with entirely a yellow or entirely black clypeus. Out of 25 males that I have studied the supraclypeal region in 15 specimens is more or less yellow. The labrum of ♂ is sometimes evenly punctate, without any trace of ridge or tubercle; the V-shaped transverse ridge is sometimes feeble and even sometimes strong and serrate; apical marginal area usually concealed under this ridge but sometimes exposed and lying almost



TEXT-FIG. 14.—Dorsal view of the ♂ genitalia of *Xylocopa latipes* (Drury). ×15.
c. cardo; *s.* sagitta; *sp.* spatha; *st.* stipes.

on the same level with the basal area. Pubescence on outer surface of anterior metatarsi varies from purely brownish yellow to a mixture of brownish yellow and blackish brown. Wings in a few cases with certain amount of golden and bluish tints.

Types.—I have in spite of extensive enquiries not been able to trace the types of the species in any collection.

Distribution.—I have studied specimens of this species from the following localities :—

Bengal : Pankhabari, 1 ♂ ; Singla, Darjeeling, 1500′, 1 ♂, 2 ♀ ; Kalimpong, 4500′, Darjeeling Dist., 5 ♀ ; Calcutta (?), 1 ♀ ; Balasan Forest, E. Himalayas, 2 ♀ ; Mangpu, 1 ♀. Sikkim, 1800′, 3 ♂. Assam : Shillong, 1 ♀ ; Naga Hills, 1 ♀ ; Therria Ghat, Khasi Hills, 190′, 2 ♀ ; Sibsagar, 2 ♀. Burma : Logae, Tavoy, Tenasserim, 1 ♂ ; Upper Tenasserim, 3000′, 5 ♂, 4 ♀ (*det.* F. Smith) ; Mergui, Tenasserim, 1 ♀ ; Tavoy, Tenasserim, 1 ♀ ; Mekane, 90 km. E. of Moulmein, 200M., 1 ♀ ; Hopin, Myitkyina Dist., Upper Burma, 1 ♂ ; Maymyo, Shan Plateau, 3000′, 1 ♀. Malaya : Johore, 2 ♀ ; Perak, 4 ♂, 2 ♀ ; Hills near Taiping, Perak, 1 ♂ ; Singapore, 1 ♀. Sumatra : Fort de Kock, 920M., 1 ♂, 1♀ (*det.* Jacobson). Borneo : Kapit, Sarawak, 2 ♂, 1 ♀ ; Sandakan, 2 ♀ ; Sintong, 1 ♀ ; " Borneo ", 1 ♀.

This species has also been recorded from China, Siam, Java, Amboina and the Philippines.

Remarks.—Lepeletier (1841) specially referred to the structural difference between the posterior coxae of the female of *X. latipes* (Drury) and *X. latreillei* Lepel. (=*X. tenuiscapa* Westw.). I, however, find that the posterior coxae in both these species and in *X. magnifica* (Ckll.) to be very similar ; the breadth of the posterior coxae is about twice as long as the length in ventral view and not " valde elongatis " The emargination of the outer half of posterior margin, in ventral view of *X. latipes*, is, however, a little stronger than in *X. tenuiscapa* or in *X. magnifica*, but this does not mean " Subspinosus " and " obtusus " as described by Lepeletier.

Fabricius (1804) regarded *Apis gigas* de Geer as a synonym of *X. violacea* (Linné).

Xylocopa chrysoptera Illig.

1806. *Xylocopa chrysoptera*, Illiger, *Mag. Insectenkunde* V, p. 150, No. 5.
1876. *Xylocopa chrysoptera*, Ritsema, *Tijdschr. Entomol.* XIX, p. 64.
1896. *Xylocopa chrysoptera*, Dalla Torre, *Cat. Hymen.* X, p. 208.

Illiger recorded this species from Bengal, but did not publish any description.

The following three species from " Ostindien " have never been described and I am unable to recognise them.

Xylocopa chalcoptera Illig.

1806. *Xylocopa chalcoptera*, Illiger, *Mag. Insectenkunde* V, p. 150, No. 16.
1876. *Xylocopa chalcoptera*, Ritsema, *Tijdschr. Entomol.* XIX, p. 64.
1896. *Xylocopa chalcoptera*, Dalla Torre, *Cat. Hymen.* X, p. 208.

Xylocopa helvola Illig.

1806. *Xylocopa helvola*, Illiger, *Mag. Insectenkunde* V, p. 151, No. 15.
1876. *Xylocopa helvola*, Ritsema, *Tijdschr.* Entomol. XIX, p. 64.
1896. *Xylocopa helvola*, Dalla Torre, *Cat. Hymen.* X, p. 212.

Xylocopa leonina Illig.

1806. *Xylocopa leonina*, Illiger, *Mag. Insectenkunde* V, p. 151, No. 16.
1876. *Xylocopa leonina*, Ritsema, *Tijdschr. Entomol.* XIX, p. 64.
1896. *Xylocopa leonina*, Dalla Torre, *Cat. Hymen.* X, p. 214.

Xylocopa ferruginea Lepel.

1841. *Xylocopa ferruginea*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 187, No. 22, ♀.
1854. *Xylocopa ferruginea*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 353, No. 45.
1873. *Xylocopa ferruginea*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 393, No. 9.
1876. *Xylocopa ferruginea*, Ritsema, *Tijdschr. Entomol.* XIX, p. 62.
1896. *Xylocopa ferruginea*, Dalla Torre, *Cat. Hymen.* X, p. 212.
1897. *Xylocopa ferruginea*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 543 (footnote).

This species was described from Bengal but has not since been recorded from India. From the description, *X. assimilis* Rits. (1880. *Notes Leyden Mus.* II, p. 221) from Sumbawa, Sunda Islands appears to be identical with it.

Xylocopa orichalcea Lepel.

1841. *Xylocopa orichalcea*, Lepeletier, *Hist. Nat. Insect. Hymen.* II, p. 181, No. 11, ♀.
1854. *Xylocopa orichalcea*, F. Smith, *Cat. Hymen. Insects Colln. Brit. Mus.* II, p. 354, No. 50.
1873. *Xylocopa orichalcea*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* XI, p. 393, No. 14.
1876. *Xylocopa orichalcea*, Ritsema, *Tijdschr. Entomol.* XIX, p. 63.
1896. *Xylocopa orichalcea*, Dalla Torre, *Cat. Hymen.* X, p. 213.

This species was described from " Ile de Fer ? " and F. Smith (1854 and 1873) recorded it from Bengal and China. Its identity is still very doubtful, and the name has not been employed by any recent authors except Cockerell, who uses it for the typical *X. pictifrons* F. Sm. from Chusan and Formosa.

Xylocopa provida F. Sm.

1864. *Xylocopa provida*, F. Smith, *Journ. Proc. Linn. Soc. London, Zool.* VII, p. 48, ♀♂.
1874. *Xylocopa provida*, F. Smith, *Trans. Entomol. Soc. London*, p. 274, No. 57, ♀♂.
1897. *Xylocopa provida*, Bingham, *Faun. Brit. Ind. Hymenoptera* I, p. 541 (footnote).

This species was described from Mysol and Waigiou, Sunda Islands and was recorded from Northern India by F. Smith (1874). Its occurrence in India is, however, most improbable.

Kylocopa divisa Klug.

1807. *Xylocopa divisa*, Klug, *Mag. Ges. Naturf. Freunde Berlin* I, p. 266, ♀.
1874. *Xylocopa divisa*, F. Smith, *Trans. Entomol. Soc. London*, p. 259, No. 18, ♀♂.
1896. *Xylocopa divisa*, Dalla Torre, *Cat. Hymen.* X, p. 210.

This is an African species but Dalla Torre added India to its distribution. In fact, it has never been found in any part of Asia.

Xylocopa esica Cam.

1902. *Xylocopa esica*, Cameron, *Faun. Geogr. Mald.-Laccad. Archip.* I, *Hymenoptera*, p. 61, No. 22, ♀.
1921. *Xylocopa esica*, Ramakrishna Aiyar, *Journ. Bombay Nat. Hist. Soc.* XXVII, p. 98.

This species was described from the Maldives (Mamaduwari, Mahlos Atoll). The type is in the British Museum (Natural History), London.

Xylocopa serripes Hed.

1938. *Xylocopa serripes*, Hedicke, *Deutsch. Ent. Zeitschr.*, p. 189, fig. 1, ♀.

The holytype of this species, ♀, from Bushire, Iran, is in Hedicke's collection, Berlin. Another female was recorded by Hedicke from Nepal; this locality for the species seems, however, very improbable.

MGIPC—M—III-8-5—21-9-38—400.