

RECORDS, NOTES AND DESCRIPTIONS OF *BREMUS* FROM
ASIA (BREMIDAE : HYMENOPTERA).

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This paper is a report concerning material mostly sent to me for study and identification by Dr. Hem Singh Pruthi of the Zoological Survey of India, Indian Museum, Calcutta, India. In addition to the material from the Indian Museum I have incorporated some records and descriptions based upon specimens sent to me for study by the United States National Museum, Washington, D. C., and upon material in my own collection.

Holotypes of six new varieties and two new species are deposited in the collection of the Indian Museum. Holotypes of three new species and two new varieties are deposited in the United States National Museum because the descriptions are based upon their material. Paratypic specimens of some of the new species and varieties are deposited in the collection of the author.

My thanks are again due to Dr. Hem Singh Pruthi and the Indian Museum for the loan of most of this material, to the United States National Museum for the loan of the other material included in this paper, to Dr. O. W. Richards, Oxford, England, for numerous comparisons of typic material in the British Museum and other information, and to Dr. Carl Mohr, Associate Entomologist, Illinois State Natural History Survey, for making the drawings.

PART I.

NOTES ON SOME TYPES AND DETERMINATIONS OF FREDERICK SMITH.

Among the specimens sent to me by the Indian Museum for study were ten specimens in very poor condition which are without doubt a part of the material described and recorded by Frederick Smith (1878a) in his paper dealing with Hymenoptera in the "Scientific Results of the Second Yarkand Mission" and one specimen undoubtedly one of the cotypic specimens described in his paper (1878b) entitled "List of Hymenoptera obtained by Mr. Ossian Limborg east of Maulmain, Tenasserim Provinces, during the months of December, 1876, January, March and April, 1877, with descriptions of new species."

Since the records and status of some of these species have been in doubt, I deem it worthwhile to publish the following notes.

***Bremus tunicatus* (Smith).**

1878. *Bombus vellestris* (in part), Smith, *Sci. Res. 2nd Yarkand Miss., Hymenoptera*, p. 8.

1 worker, "Yark. Exp., Sind Valley, 122-F. S., Sind, 3474-10, S"; no doubt one of the specimens originally included by Smith (1878a)

in his description of *vallestris*. No determination label now on pin with specimen. Labelled as paratype of *B. vallestris*.

1 worker, "Yark. Exp., Sind Valley, 125-F. S., Sind, 3438-10, S, *Bombus vallestris* Smith." No doubt another specimen of typic series of *vallestris* Smith (1878a) and I have marked it as *lectotype* because specimen is associated with determination label.

Tunicatus Smith has priority over *vallestris* Smith.

***Bremus oculatus* var. *haemorrhous* (Richards).**

1878. *Bombus vallestris* (in part), Smith, *Sci. Res. 2nd Yarkand Miss.*, Hymenoptera, p. 8.

1 worker, "Yark. Exp., Sind Valley, 127-F. S., Sind, 3473-10 S, *Bombus vallestris* Smith." No doubt one of the typic specimens of *vallestris*. Smith's type series of *vallestris* was a mixture of *oculatus* var. *haemorrhous* Richards and *tunicatus* Smith. Worker synonymous with *tunicatus* selected by author as *lectotype* (see above) to eliminate further confusion. Head of this specimen is too long to agree with statements in original description of *vallestris* and therefore precludes making this worker the *lectotype*. Worker of *tunicatus* does fit the "head-sub-rotundate" of original description. Specimen labelled, however, as a paratype of *vallestris*.

***Bremus longiceps* (Smith).**

1 queen, "Leh, 2489-10, F. S.-663, S., *Bombus longiceps* Smith." This is a valid species and Richards (1928, p. 334) has been correctly using this name. Specimen selected and marked as *lectotype* of *longiceps*.

1 worker, "Yark. Exp., Leh, 3475-10, F. S.-633, S." Marked as *Lectomorphotype* worker of *B. longiceps*. Agrees in structural characters with queen but not selected as *lectotype* because queen has associated with it a determination label.

1 male, "Yark. Exp., Leh, 3478-10, F. S.-633, S." I consider this a true male of *longiceps* and have marked specimen as *lectoallotype*. There is no doubt this is the male mentioned in the original description.

Dover (1922) mentions one of these types.

B. oshanini Skorikov (1928-1933) is certainly very closely related if not identical with *longiceps* but I hesitate to place *oshanini* into synonymy because Asiatic bumblebees are so poorly known at the present time. The genitalia of the male seems to be identical with the figure given by Skorikov (1931). It should be mentioned here that Skorikov first used the name of *oshanini* in 1922 but did not actually describe this species, next in 1931 he figured the male claspers and finally in 1933 published a short description. I believe original date of description must date from 1931, but in any case if *oshanini* is identical with *longiceps*, as I believe, the latter name would have priority

***Bremus montivagus* (Smith).**

1 queen, "Upper Tenass., 8386-4, Moolae, 3-6,000 ft., S, *Bombus montivagus* Smith." This specimen agrees well with the original description and without doubt is one of the cotypic specimens. I am informed by Dr. Richards that another queen of the cotypic series is in the British Museum. Richards' concept of *montivagus*, based upon the specimen in the British Museum, is the same as for this specimen.

***Bremus melanurus* subsp. *subdistinctus* (Richards).**

1878. *Bombus altaicus* (in part), Smith, *Sci. Res. 2nd Yarkand Miss. Hymenoptera*, p. 9.

1 male, "Yark. Exp., Pangkong Valley, 3497-10, F. S.-783, S. *Bombus altaicus* ♂ Eversm." In exceedingly poor condition with part of thorax, entire head and most of legs missing. Genitalia seem to be identical with illustration of Skorikov (1931, p. 232) for *melanurus*. There seem to be a few black hairs on mesonotum between bases of wings. Wings light colored. Seems to agree best with the subspecies *subdistinctus* Richards. Male is of medium size.

1 male, "Yark. Exp., Pangkong Valley, 3491-10, F. S.-783, S." Another specimen of the series determined by Smith (1878a) as *B. altaicus*. Genitalia, as in preceding specimen, is apparently identical with *melanurus* as figured by Skorikov (1931, p. 232). Specimen in very poor condition. There seems to be a few black hairs on the mesonotum between the bases of the wings. Wings are rather light in color. Male is very small.

1 worker, "Yark. Exp., Leh, 3490-10, F. S.-663, S, *Bombus altaicus* Eversm." Without doubt one of the specimens recorded by Smith (1878a) as *altaicus*. The exact locality of "Leh" is not mentioned in the original description but is referred to in the same article as in Ladak, a name which is mentioned in the original description.

PART II.

GENERAL SYSTEMATIC ACCOUNT.

Genus **BREMUS** Jurine (1801).

Subgenus **SIBIRICOBOMBUS** Vogt (1911).

***Bremus longiceps* (Smith).**

2 workers, Karakal, Bumboret Valley, Chitral, N. W. F. Prov., 22-25.VII.29 (B. N. Chopra).

Subgenus **LAPIDARIOBOMBUS** Vogt (1911).

***Bremus flavothoracicus* (Bingham).**

1 queen, Onari, Garhwal, W. Himalayas, 11,000 ft., 27-VI-14 (Tytler); 2 queens, Onari, Garhwal, W. Himalayas, 11,000 ft., 20-VI-14 (Tytler).

The placement of this species in this subgenus does not rest upon characters of males, which are unknown, and, therefore, this assignment may be erroneous.

Bremus miniatus (Bingham).

1 worker, Ramnee, 21-X-07; 1 worker, Kanaul, British Garhwal, W. Himalayas, 18-X-07; 1 worker, Andaroun, Garhwal, W. Himalayas, 11,000 ft., VI-14 (Tytler).

Bremus oculatus var. **crassus**, nov.

Male.—Structurally similar to the male of *B. oculatus* as described by Frison (1933). Differs in coloration in that the pubescence on the thorax and first two abdominal tergites is dull yellow instead of hoary or whitish as in typical *oculatus*.

B. oculatus was placed originally by mistake in the subgenus *Sibiricobombus*. It belongs, however, to *Lapidariobombus* in its broadest sense.

Holotype.—Male, Simla Hills ($\frac{4953}{10}$). *Paratype*.—Male, Simla Hills ($\frac{4956}{10}$). Holotype deposited in the collection of the Indian Museum, Calcutta, India. Paratype deposited in the collection of the author.

Bremus semenovianus (Skorikov).

1 worker, Karakal, Bumboret Valley, Chitral, N. W. F. Prov., 22-25.VII-29 (B. N. Chopra); 2 workers, Ustui Gol, Rambhur Valley, Chitral, N. W. F. Prov., 8.VII.29 (B. N. Chopra); 1 worker, Mastuj, Chitral, N. W. F. Prov., 20-30.VIII.29 (B. N. Chopra).

Subgenus **PRESSIBOMBUS**, nov.

This new subgenus is proposed on the basis of characters presented by the male sex. The female is unknown or at present cannot be associated with its male.

The distinctive characters of the male genitalia (Fig. 1*b*) are as follows: head of sagitta (Figs. 1*b* and 1*c*) sickle-shaped when seen from above, but in addition considerably swollen and forming a secondary projection at lower outer angle, arm or stem of sagittae with a small projection on lower surface; when seen from above the squama (Fig. 1*b*) appears as a finger-like inward pointing projection and practically fused as one piece with the stipes, when seen from the front (Fig. 1*d*) the squama appears to have a smaller more rounded hump at base of finger-like projection; the volsellae (Fig. 1*b*) are peculiar because of their shortness and pointedness. Uncus of medium width tapering to apex. Inner and outer spathae not so distinctive and shaped as in figures 1*f* and 1*e*, respectively.

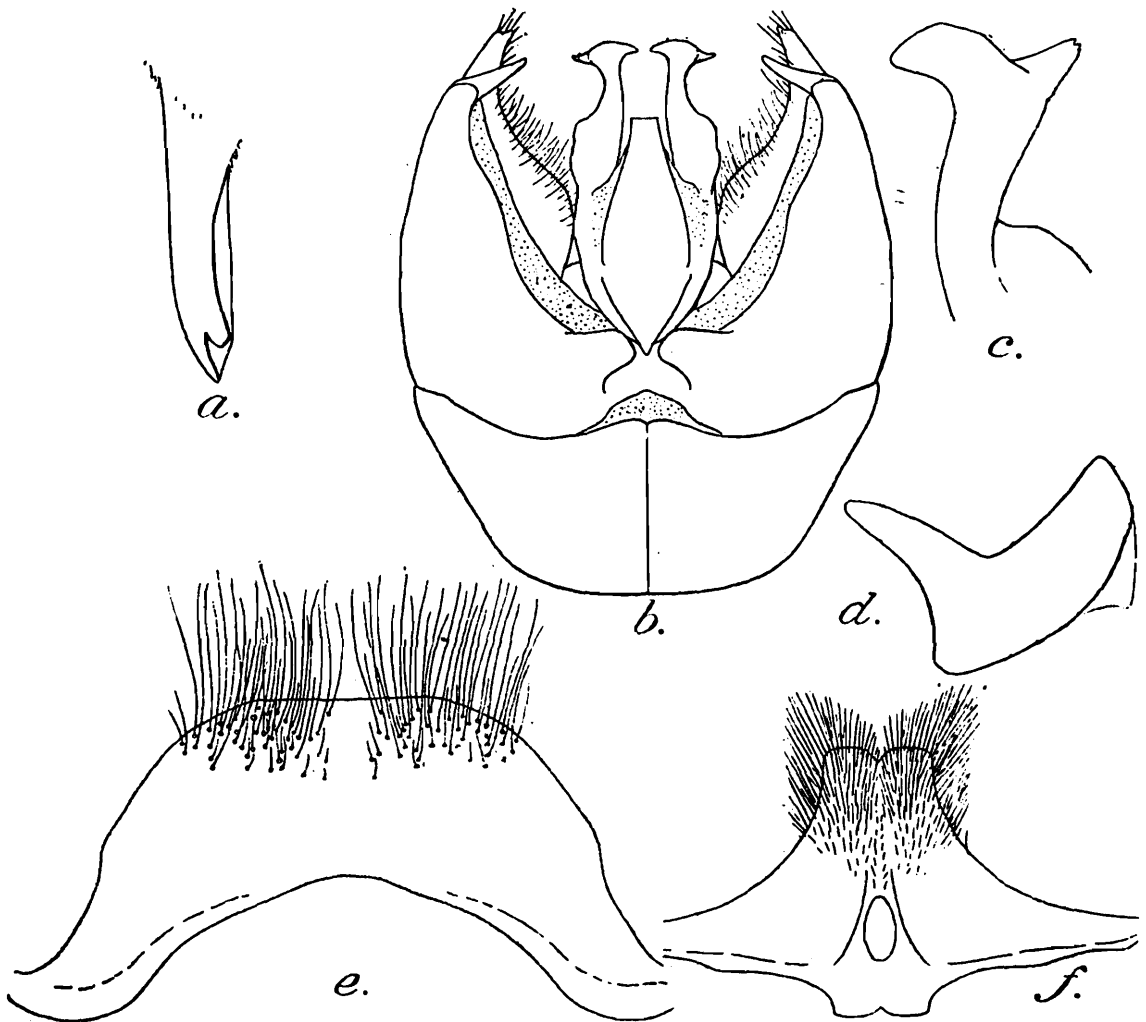
Mandibles two toothed. Malar space of medium length. Eyes normal. (Antennae are missing in type and hence proportions cannot be given).

Type: *Bremus pressus*, sp. nov. (Original designation and monobasic) as described in this paper.

Bremus pressus, sp. nov.

Male.—Pubescence coloured as follows: Face, occipital orbits and occiput with dense yellow hairs, a few of the longer hairs are black; sides and dorsum of thorax yellow, except for a black band between bases of wings; abdominal tergites with first yellow, second dominantly

yellow but with an admixture of black hairs, third and fourth segments brownish-black, fifth with basal portion brownish-black and posterior portion dull ferruginous, sixth and seventh segments dull ferruginous. Coxae, trochanters and femora with long yellow hairs, remaining segments with black, brownish or golden hairs, corbicular fringes brownish or golden in color. Ventral segments of abdomen mostly with long yellow hairs.



TEXT-FIG. 1.—*Bremus pressus*, sp. nov. a. mandible showing two teeth; b. dorsal view of male genitalia; c. head of sagitta of male genitalia; d. squama of male genitalia as seen from the front; e. outer spatha of male; f. inner spatha of male.

Malar space of medium length, slightly longer than width at articulation of mandibles, polished, impunctate. Area between lateral ocelli and inner margin of compound eye with outer half weakly punctate and with some short depressed hairs, inner half polished and impunctate. Mandibles two toothed (Fig. 1a). Eyes normal. Wings in general hyaline, but with apical portions slightly stained with brown. Metabasitarsus over three times as long as greatest width and broadest at middle. Corbicular space well developed, convex and with very long hairs fringing sides, integument dark.

Genitalia as in figure 1b. Inner and outer spathae as in figures 1f and 1e. Also see statements under description of subgenus.

Length, 13 millimeters; spread of wings, 27 millimeters; width of abdomen at second segment, 5 millimeters.

Holotype.—Male, N. of Sandakphu, 11,000 ft., 1-X-06 (I. H. Burkill). The antennae are lacking. Deposited in the collection of the Indian Museum.

The genitalia of *pressus* is so distinct from that of any other male I know that I have considered it advisable to erect a new subgenus for its reception. The combination of greatly reduced squamae intimately fused with the stipes, the short and pointed tips of the volsellae, and the peculiar heads of the sagittae are apparently unique. In some respects this new subgenus is closest to *Lapidariobombus* Vogt in its broadest sense, but the characters of the genitalia just mentioned are very different from any species I know belonging to this complex.

Subgenus **HORTOBOMBUS** Vogt (1911).

Bremus religiosus, sp. nov.

Queen.—Similar in general morphological characters with females of the subgenus *Hortobombus* Vogt (1911). The pubescence is colored as follows: face, occipital orbits and occiput with dark hairs, a few hairs bordering sides of disk of clypeus are golden; thorax with pronotum and metanotum yellow, the yellow of pronotum extending down on sides of thorax well below bases of wings and with a strong tendency to become whitish, a broad black band between bases of wings, black to greyish on sides of meso- and metathorax; first abdominal tergite mostly yellow but with a tendency towards black hairs in the middle, second tergite dominantly black except for two well separated small patches of yellow on anterior margin and connecting with yellow on first tergite; third tergite black, fourth tergite white, fifth and sixth tergites essentially black and with some whitish hairs. Hairs on legs black, except on coxae and trochanters where many are somewhat whitish; integument dark. Wings brown, without a violaceous tinge.

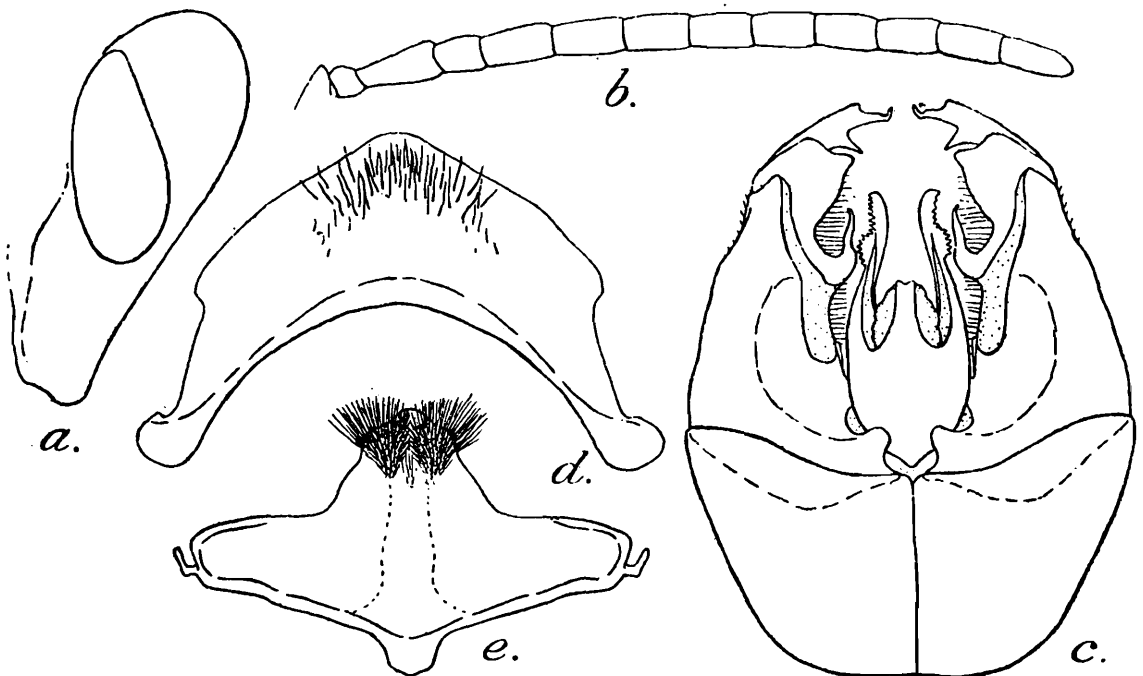
Malar space very long, about two and one-half times as long as width at articulation of mandibles, polished, impunctate. Clypeus strongly convex, polished, large punctures restricted to sides and apical angles, disk with punctures very faint, integument dark. Labrum with tubercle-like areas well developed and separated by cleft, shelf-like structure slightly rounded on anterior margin. Area between lateral ocelli and inner margin of compound eyes with outer half closely punctate, inner half polished and impunctate. Antennae with third segment about as long as fourth and fifth taken together, fourth much shorter than fifth. Mesobasitarsus with a very long and prominent sharp spine-like projection.

Length, 19 millimeters; spread of wings, 41 millimeters; width of abdomen at second segment, 9 millimeters.

Worker.—Similar to the queen in structure and in essential details of color pattern. Differs mainly in smaller size. Most workers show no traces of yellow pubescence on second abdominal tergites and sides of thorax and apical abdominal tergites sometimes with more greyish or whitish hairs.

Varying in size from 10 to 17 millimeters in length and other measurements in proportion.

Male.—Similar in general structure to most males of the genus *Hortobombus* Vogt (1911). The pubescence is colored in general about as in females and as follows: face and occipital orbits with long dark hairs and short yellowish ones intermixed, occiput mainly yellow but with some long dark hairs; dorsum of thorax yellow except for a definite black band between bases of wings, sides of thorax yellow; abdominal tergites with first and basal middle portion of second yellow, remainder of second and third black with some whitish tipped hairs; fourth and lateral margins of fifth whitish-yellow, remainder of fifth as well as sixth and seventh tergites black. Basal segments of legs with long whitish or yellowish hairs, corbicular fringes and hairs on remaining segments golden. Wings brownish without a violaceous tinge.



TEXT-FIG. 2.—*Bremus religiosus*, sp. nov. a. head of male from a side view; b. antenna of male; c. dorsal view of male genitalia; d. outer spatha of male; e. inner spatha of male.

Malar space (Fig. 2a) very long, about two and one-half times as long as width at articulation of mandibles, polished, impunctate. Mandibles two-toothed. Eyes normal. Area between lateral ocelli and inner margin of compound eyes with outer half punctate and inner half polished and impunctate. Antennae (Fig. 2b) long, third segment slightly longer than fifth, fifth much longer than fourth.

Genitalia as in figure 2c. Inner and outer spathae as in figures 2e and 2d, respectively.

Length, 20 millimeters and other measurements in proportion.

Holotype.—Male, Gieh Yin Temple, Mt. Omei, China, 9,500 ft. alt., Aug. 10-11, 1925. *Allotype*.—Queen, Mt. Omei, China, 11,000 ft. alt. *Morphotype*.—Worker, Mt. Omei, Szechuen, China, 9,000-10,000 ft. alt., July 20, 1931 (Frison collection). *Paratypes*.—4 workers, Shin Kai Si, Mt. Omei, Szechuen, China, 4,400 ft. alt., Sept. 1-10, 1922;

1 worker, near Mupin, Szechuen, China, 2-8,000 ft., July, 1929; 6 workers and 9 males, Yachow, Szechuen, China, 2,200-5,000 ft. alt., Aug. 21-24, 1930; 2 workers, Gieh Yin Temple, Mt. Omei, China, 9,500 ft. alt., Aug. 10, 1925; 1 worker, Wa Si Geo, China-Tibet border, 5-6,000 ft. alt., Aug. 18, 1930; 2 workers, Da Shiang Lin Pass, China-Tibet border, 4,960 ft., Aug. 23, 1930; 1 worker, Washuan, Szechuen, China, alt. 11,000, July 25, 1925; 1 worker, Songpan, Szechuen, China, 8,000-9,500 ft. alt., July 12, 1924; between Yachow and Da Shiang Lin Pass, 6,000 ft. alt., Aug., 1923; 2 workers, Mt. Omei, Szechuen, China, 11,000 ft. Aug. 20, 1921; Szechuen, China, Aug. 1928; 1 male, near Washuan, Szechuen, China, 6,000 ft. alt., July 27, 1925; 1 male, Tatsienlu, China-Tibet border, 8-9,000 ft. alt., Aug. 16, 1930; 1 worker, same data as *morphotype* (Frison collection). All collected by D. C. Graham except those indicated as in Frison collection.

Holotype, allotype and numerous paratypes deposited in the collection of the United States National Museum. Morphotype and several paratypes deposited in the collection of the author. Two paratypes, male and worker, deposited in the collection of the Indian Museum.

In color this new species is very suggestive of *hortorum* (L.), but differs in the females in having the black band between the bases of the wings less sharply defined, the tendency for whitish or greyish hairs on sides of thorax, and the black hairs on fifth and sixth abdominal tergites. Furthermore the malar space is longer and the clypeus has less large punctures.

The male differs in its genitalia from such species as *supremus* (Mor.), *portschinskyi* (Rad.), and *saltuarius* (Skor.) as figured by Skorikoy (1931) in the shape of volsellae and squamae. The large development of the inner spine at the tip of the volsellae is sufficient to separate the males of this new species from any other described form known to me.

***Bremus securus*, sp. nov.**

Queen.—In general similar in morphological characters with the subgenus *Hortobombus* (Vogt).

Pubescence colored as follows: head with long hairs mostly black and an admixture of shorter yellowish ones; thorax on sides and dorsum yellow, except for a broad black band between bases of wings; abdominal tergites with first yellow, second with yellow dominating on sides and posterior margin and black in middle, third mostly black except for yellow posterior margin, fourth yellow, fifth essentially yellow but with a few black hairs in middle, sixth with hairs short and golden; legs with some long yellowish hairs on basal segments, remaining segments black or tinged with golden, corbicular fringes golden and integument dark.

Malar space very long, at least twice as long as width at articulation of mandibles, polished, impunctate. Clypeus strongly convex, polished, large punctures confined to apical angles and extreme sides, disk with numerous fine punctures. Labrum with tubercle-like areas well separated, shelf-like ridge with anterior margin slightly curved. Area between lateral ocelli and inner margin of compound eyes with outer third punctate and inner two-thirds polished and impunctate. Antennae

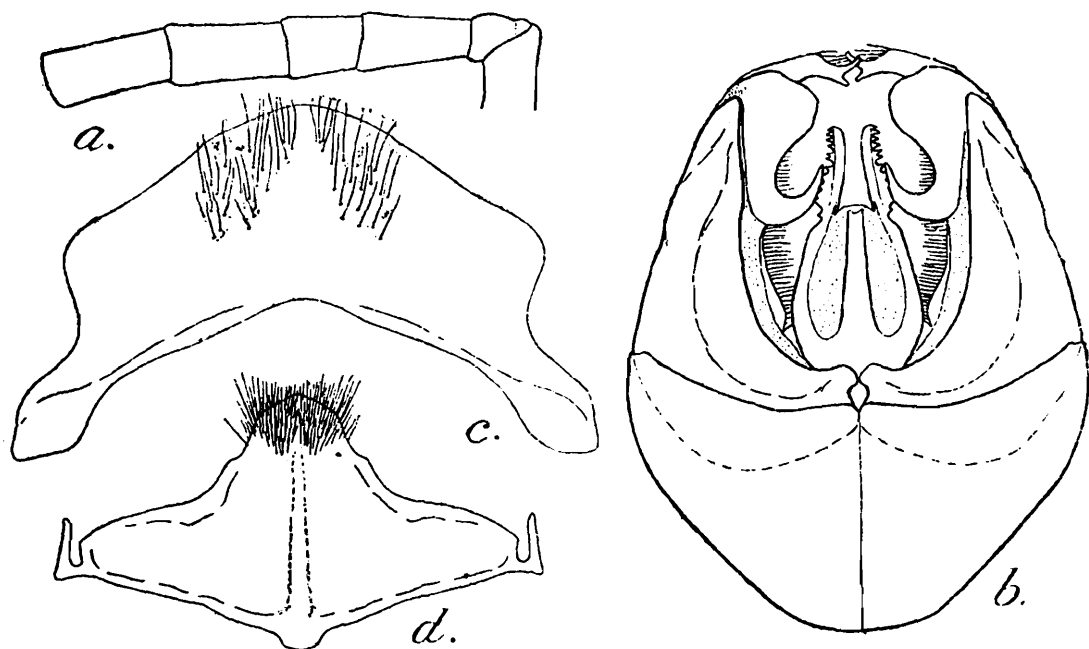
with third segment almost as long as fourth and fifth together, fifth segment much longer than the fourth, the fourth scarcely longer than broad. Mesobasitarsus with a pronounced spine-like projection at outer apical angle. Wings brown, without a violaceous tinge.

Length, 20 millimeters; spread of wings, 36 millimeters; width of abdomen at second segment, 9 millimeters.

Worker.—Similar to the queen in color and structure except for smaller size. In a few specimens there is more black pubescence on the second and third abdominal tergites than in others.

Varying in size from 11 to 16 millimeters and other measurements in proportion.

Male.—In general similar to other males belonging to the subgenus *Hortobombus*. Malar space very long, about two and one-half times as



TEXT-FIG. 3.—*Bremus securus*, sp. nov. a. basal portion of antenna of male; b. dorsal view of genitalia of male; c. outer spatha of male; d. inner spatha of male.

long as width at articulation of mandibles, polished, impunctate. Mandibles two toothed. Eyes normal. Antennae (Fig. 3a) long, third and fifth segments about of equal length, fourth much shorter than either third or fifth.

Pubescence with colours and pattern about as in queen, except sixth and seventh abdominal tergites have long black hairs and corbicular fringe is very golden.

Genitalia as in figure 3b. Inner and other spathae as in figures 3d and 3c, respectively.

Length, 13 millimeters and other measurements in proportion.

Holotype.—Male, Yachow, Szechuen, China, 2,200-5,000 ft. alt., Aug. 21-24, 1930. *Allotype*.—Lu Ding Chiao, Szechuen, China, 4-9,000 ft. alt., July 12-14, 1930. *Morphotype*.—Ningyuenfu, China, 6,000-10,800 ft. alt., July 24-26, 1928. *Paratypes*.—1 worker, same data as holotype; 2 workers, Mowchow, Szechuen, China, 1,400-4,500 ft. alt.,

July 10, 1924; 3 workers, Suifu, Szechuen, China; 1 worker, same data as morphotype; 2 workers, near Tang-Gu, China-Tibet border, 14,000 ft., August 3-6, 1930; 1 worker, 9 miles SW of Tatsienlu, Szechuen, China, 8,500-13,000 ft., June 25-27, 1923; 1 worker, Yu-Long-Si, Tibet, 15,600 ft., July 31-Aug. 7, 1930; 1 worker, Suifu, Szechuen, China, Apr.-May, 1928. All specimens collected by D. C. Graham.

Holotype, allotype, morphotype and numerous paratypes deposited in the collection of the United States National Museum. Several paratypes deposited in the collection of the author and two in the collection of the Indian Museum.

The females of this new species bear some resemblance to *religiosus* but are readily separated because of the pronounced yellow pubescence covering sides of thorax and greater amount of yellow on abdominal tergites. The males differ most noticeably in the shape of the tip of the volsella of the genitalia which in *religiosus* has a very large inner lower tooth at tip and in *securus* is lacking. *B. securus* differs from males of *saltuarius*, *portschinskyi* and *supremus* in having the volsella of the genitalia narrow as in *hortorum* (L.). The squama of *securus* differs from that of *hortorum* (L.) by having its inner lower projection different in shape and more spine-like and by the narrower heads of the sagittae. The males likewise differ from *runderatus* Fabr., in these latter respects.

Subgenus **DIVERSOBOMBUS** Skorikov (1922).

Bremus mimeticus var. **gantokiensis** (Richards).

1 worker, Sikkim.

Bremus mimeticus var. **geminatus** (Richards).

1 queen, Naini Tal, Kumaon Hills, 6,500-8,000 ft., 1-9.V.30 (H. S. Pruthi); 3 workers, Dhobie Khud, below Sunny View, ca. 3 miles from Mussoorie, Dehra Dun dist., U. Provs., 21-27.VI.30 (B. N. Chopra); 1 worker, Naini Tal, 28-IX-07 (Mus. Coll.); 1 worker, Simla, W. Himalayas, 8,000 ft., 6-XII. 18 (Brunetti); 1 worker, Ramnee, British Garhwal, W. Himalayas, 20-X-07 (Mus. Coll.); 1 worker, Naini Tal, Kumaon, 6-7,000 ft., 08 (R. E. Lloyd); 1 worker, below Bhatta, 4 miles below Mussoorie, Dehra Dun dist., U. Provs., 16.VI.30, in Khud (B. N. Chopra); 1 worker, Company Khud, below Landour Bazar, Mussoorie, Dehra Dun dist., U. Provs., 18.VI.30 (B. N. Chopra); 3 workers and 1 male, Naini Tal, Kumaon, 6,400 ft. (N. Annandale); 1 worker, Round about Mussoorie, Dehra Dun dist., U. Provs., 15-16.VI-1-7.VII-30 (B. N. Chopra); 1 worker, Bhim Tal, Kumaon Hills, ca. 4,450 ft., cultivated fields, 18.V.30 (H. S. Pruthi); 1 worker, Kousanie, Dist. Almora, Kumaon Hills, ca. 6,000 ft., Forest round the P. W. D. Bungalow, 30.V-2.VI.30 (H. S. Pruthi); 1 worker, Bhim Tal, Kumaon, 4,500 ft., 22-27-IX-06 (N. Annandale).

Bremus mimeticus var. **insidiosus** (Richards).

2 queens, Mussoorie, U. Provs. alt. circ. 7,000 ft., 20-26.V.05 (Brunetti); 1 queen Saraiya Tal, U. Provs. 7.V.30 (H. S. Pruthi); 2 queens, Kangra Valley, 4,500 ft., May 1899 (Dudgeon); 1 queen, Ramnee, British Garhwal, W. Himalayas, 20-X-07 (Mus. Coll.); 2 workers, Bhim Tal, ca. 4,450 ft., cultivated fields, 18.V.30 (H. S. Pruthi); 1 worker, Simla, W. Himalayas (jungle), 6,000-7,000 ft. VIII-IX-25 (B. N. Chopra); 1 worker, Sabathu, 3,000 ft. (Indian Museum); 1 worker, Broyi Khad under bridge on road to Upper Dhamsala, 4,900 ft., Punjab, 29.V.26 (S. L. Hora); 1 worker, Kasauli, Simla Hills, 6,300 ft., 15.V.08 (N. Annandale); 1 worker, below Bhatta, 4 miles below Mussoorie, Dehra Dun dist., U. Provs., Annandale 16.VI.30 in khud (B. N. Chopra.); 1 worker, Bhim Tal, 4,500 ft., Kumaon, 19-22-IX-06 (N. Annandale).

***Bremus mimeticus* var. *turneri* (Richards).**

2 queens, Cherrapunji, Khasi Hills, Assam, 19-V-09 (B. Warren); 1 queen, Cherrapunji, Khasi Hills, Assam, 14-V-09 (B. Warren); 1 queen, Cherrapunji, Khasi Hills, Assam, 15-V-09 (B. Warren); 1 male, Nartiang, Khasi & Jaintia Hills district, Assam, 28-29.XI.30 (H. S. Rao).

Subgenus **SUBTERRANEOBOMBUS** Vogt (1911).

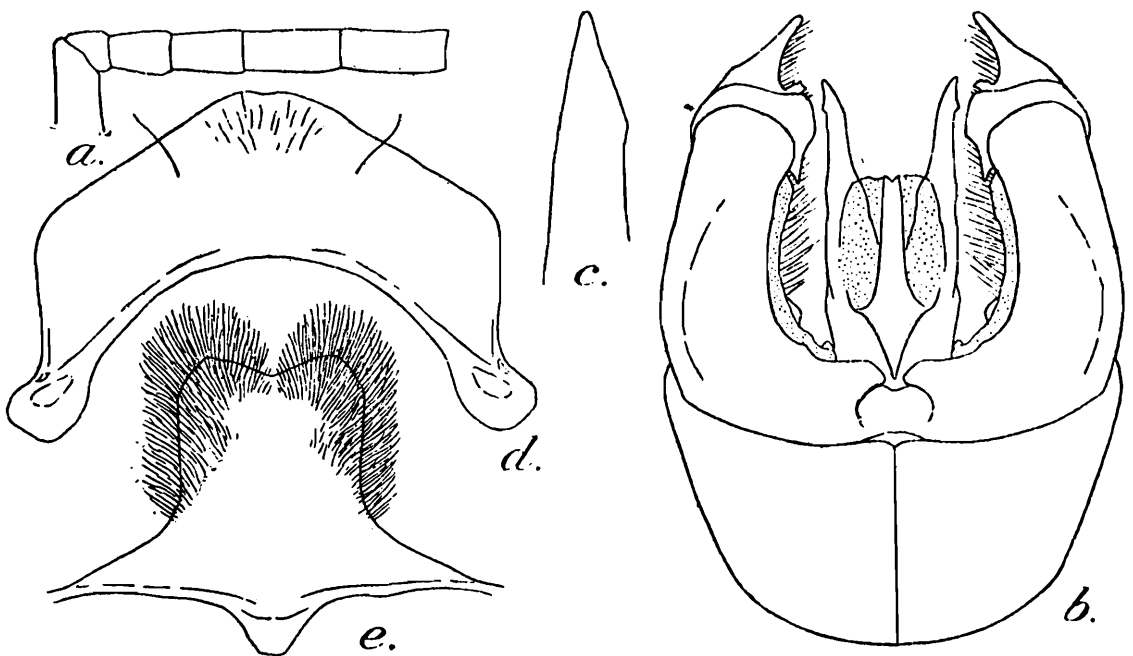
***Bremus melanurus* subsp. *subdistinctus* (Richards).**

1 worker, Karakal, Bumboret Valley, Chitral, N. W. F. Prov., 22-25.VII.29 (B. N. Chopra).

Subgenus **AGROBOMBUS** Vogt (1911).

***Bremus priscus*, sp. nov.**

Male.—Pubescence colored as follows: face and occipital orbits with dense yellow hairs and with a few long black hairs intermixed; occiput with both yellow and black patches, the yellow occupying the posterior and middle area and the black more as lateral patches; thorax with sides and dorsum dull yellow except for an indistinct black band between bases of wings; abdominal tergites with first and second segments dull yellow, third segment mostly yellow but with lateral patches of black, fourth, fifth, sixth and seventh segments dull yellow with a slight ferruginous tinge. Ventral abdominal segments with long yellow hairs. Legs mostly with yellow hairs, those surrounding corbicula are slightly ferruginous; integument of corbicula very dark reddish.



TEXT-FIG. 4.—*Bremus priscus*, sp. nov. a. basal portion of antenna of male; b. dorsal view of genitalia of male; c. head of sagitta of male genitalia; d. outer spatha of male; e. inner spatha of male.

Malar space long, about one and one-half times as long as width at articulation of mandibles, polished, impunctate. Area between ocelli

and inner margins of compound eyes mostly polished and smooth, punctures restricted to a narrow margin near compound eye. Mandibles two toothed. Eyes normal. Antennae (Fig. 4a) long, with the fifth segment much longer than the fourth, the fourth longer than third, fourth and third together longer than fifth; middle segments slightly bowed. Wings very light brown, with apical area darkest. Corbicular space well developed and convex. Metabasitarsus three times as long as broad, basal third widest.

Genitalia as in figure 4b. Inner and outer spathae as in figures 4e and 4d, respectively. The tips of the volsellae taper to a point and with a small toothed hump on middle inner margin; the squamae are somewhat transversely quadrate with a sharp backward direct point at inner lower angle; the arms of the sagittae (Fig. 4c) are long and narrow, the heads not well differentiated so that they appear as if broken off, lower surface with a tooth; uncus narrow and linear.

Length, 17 millimeters; spread of wings, 33 millimeters; width at second segment, 5 millimeters.

Holotype.—Male, Sandakphu, 10,500 ft., 2-10-06. Deposited in the collection of the Indian Museum. *Paratype*.—Male, Sikkim (Niceville). Deposited in the collection of the author. Both specimens are in poor condition.

This species belongs in that large complex of species belonging to the subgenera *Mucidobombus* Skorikov and *Agrobombus* Vogt. It differs, radically, however, from any species known to me. In some respects it comes closest to the species *mucidus* (Gerst.) of the subgenus *Mucidobombus* but it differs greatly and especially in the shape of the volsellae.

I should not be surprised if future studies of Asiatic bumblebees reveal that this species should be placed in a new subgenus. For the present, however, I leave it in the subgenus *Agrobombus* Vogt in its broadest sense.

Subgenus **BREMUS** Jurine, s.s. (1801).

Bremus tunicatus (Smith).

1 queen and 1 worker, Calcutta, 1920 (C. Dover); 4 queens, Sarol Garden, Chamba, Punjab, 20.V.27 (S. L. Hora); 1 queen, Matiana, Simla Hills, 9,300 ft., (N. Annandale); 1 queen and 4 workers, Phagu, Simla Hills, alt. 9,000 ft., 18-21.V.16 (N. Annandale); 2 queens, Theog, Simla Hills, c. 8,000 ft., 2.V.07 (N. Annandale); 1 queen, Phagu, Simla Hills, alt. 9,000 ft., 14-15.V.09 (N. Annandale); 1 queen, Theog, Simla Hills, c. 8,000 ft. (N. Annandale); 1 queen, Phagu, Simla Hills, alt. 9,000 ft., 12-V-09 (N. Annandale); 1 queen, Round about, Hurst Cottage, Bakrota Hill, Dalhousie, Punjab, 7,000 ft., V-VI.27 (S. L. Hora); 1 queen, Matiana, Simla Hills, 7,000 ft., 28-30.IV.17 (N. Annandale); 1 queen, Phagu, Simla Hill, 8,000 ft., 4-V.07 (N. Annandale); 1 queen, Trahbul Rd. to Gilgit, alt. 10,000 ft., 21.6.95; 1 worker, Mussoorie, 2 workers, Naini Tal, May and June 1893 (Lucknow Mus.); 1 worker, Mussoorie, U. Irovs, alt. circ. 7,000 ped, 20-24.VI-05 (Brunetti); 9 workers, Karakal, Bumboret Valley, Chitral, N. W. F. Prov., 22-25.VII.29 (B. N. Chopra); 1 worker and 1 male, Kufri, Simla Hills (jungle), ca. 7,000 ft., IX.25 (B. N. Chopra); 1 worker, Sinol Valley (F. S.); 1 male, Simla, W. Himalayas, 7-8,000 ft., IX-14 (Capt. Evans); 2 males, Baghi, Simla Hill States, 8,800 ft., 7-8.X.21 (S. W. Kemp); 2 males, Ramnee, British Garhwal, W. Himalayas, 20-X-07 (Mus. Coll.); 1 male, Ramnee, 21-X-07 (Mus. Coll.).

***Bremus ignitus* (Smith).**

1 queen, Kuanshien, Szechuen, China, 3,000 ft., 5.IV-8.V.30 (D. C. Graham); 2 workers nr. Mupin, Szechuen, China, 2-8,000 ft., 28-VI-1929 (D. C. Graham); 2 workers, Ningyuenfu, China, alt. 6,000-6,200 ft., Aug. 2-4-28 (D. C. Graham); 1 worker, Yachow, Szechuen, China, alt. 2,300-2,500 ft., 27.28-VIII-30 (D. C. Graham); 1 worker, Yachow to Mupin, Szechuen, China, 2,000-5,000 ft., June 23-27-1929 (D. C. Graham); 1 worker, W. of Yachow, Szechuen, China, alt. 2,000-7,500 ft., June 14-18, 1922 (D. C. Graham); 2 workers, near Yachow, Szechuen, China, alt. 400-5,000 ft., 2 to 8-VII-30 (D. C. Graham); 4 workers, Suifu, Szechuen, China, 1928 (D. C. Graham); 2 workers, Yachow, Szechuen, China, alt. 2,500 ft., 14-VII-28 (D. C. Graham); 1 worker, Suifu, Szechuen, China, IV-V.24 (D. C. Graham); 1 worker, bet. Yachow and Da Shiang Lin Pass, Szechuen, China, 3,500 ft., Aug. 1923 (D. C. Graham); 1 worker, Tatsienlu, China-Tibet border, alt. 8-9,000 ft., 16.VIII.30 (D. C. Graham); All collected by D. C. Graham, 1 worker, Hangchow, 24.V. 1923 (Frison collection); 1 worker, Hangchow, 25.V. 1923 (Frison collection); 1 worker, Yokohama, 20-V-1906 (Brunetti-Indian Museum).

The original description of *ignitus* was based upon the female sex and no males have ever been definitely associated with this species. The characters of the female suggest it is a member of the subgenus *Bremus* (*s. s.*) and it is possible that *speciosus* Smith (*Bremus s. s.*), known only from the males, is the male of *ignitus*.

Dover (1922) mentions a specimen of *orientalis* Smith from "Yokohama." The worker of *ignitus* from Yokohama mentioned above is probably this specimen as *orientalis* is not known from Japan (Yokohama).

***Bremus ignitus* var. *cancellatus*, nov.**

Worker.—Structurally similar to *B. ignitus* Smith (1869), a member of *Bremus s. s.* Differs in having some yellow pubescence upon the second abdominal tergites.

Holotype.—Worker, near Yachow, Szechuen, China, July 2-8, 1930, alt. 400-5,000 ft. *Paratypes*.—2 workers with same data as holotype; 1 worker, S. of Suifu, Szechuen, China, Aug. 1929; 1 worker, Suifu, Szechuen, China, 1928; 1 worker, Yachow to Mupin, Szechuen, China, June 23-27, 1929; 1 worker, nr. Mupin, Szechuen, China, 2-8,000 ft., June 28, 1929. All specimens collected by D. C. Graham.

Holotype and 3 paratypes deposited in the collection of the United States National Museum, 1 paratype in the collection of the Indian Museum and 2 paratypes in the collection of the author.

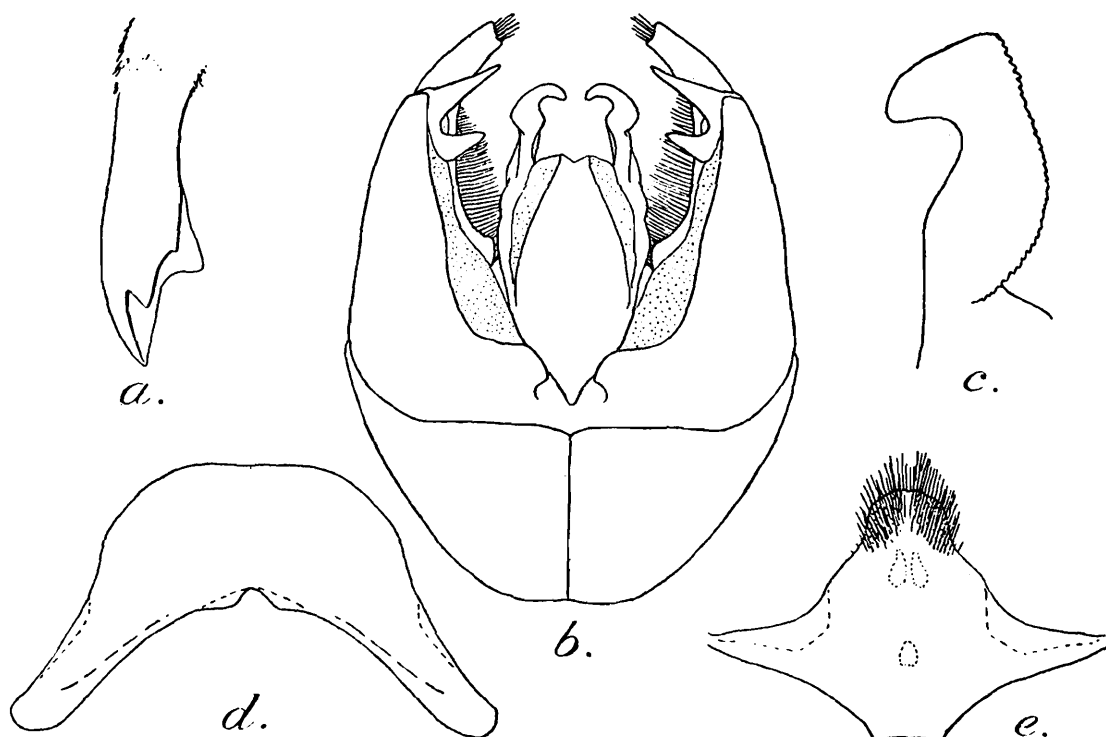
Differs from typical *ignitus* in having yellow pubescence upon second abdominal tergite and from *B. ignitus* var. *subcollaris* Skorikov (1914) in lack of yellow pubescence on prothorax and its presence upon second abdominal tergite. 1 paratypic worker has some yellow pubescence upon the first abdominal tergite.

Subgenus ALPIGENOBOMBUS Skorikov (1914).***Bremus dentatus* (Handl.).**

1 queen, Kalimpong, Darjiling dist., E. Himalayas, alt. 600-4,500 ft., 24. IV-10.V.15 (F. H. Gravely); 1 worker, Kanaul, British Garhwal, W. Himalayas, 18-X-07 (Mus. Coll.); 1 worker, Tindharia, alt. 2,822 ft.; 1 worker, Ghumti, Darjiling dist., E. Himalayas, alt. 1,800-3,500 ft., VII. 11 (F. H. Gravely); 1 worker, Siliguri, N. Bengal, 18-20.VII-07 (Mus. Coll.); 1 worker, Suifu, Szechuen, China, April-May 1928 (D. C. Graham); 1 worker, Yachow, China, 1928 (D. C. Graham); 1 worker, bet. Yachow and Ningyuenfu, China, July 14-28.28, alt. 2,500-10,000 (D. C. Graham).

Bremus dentatus var. **concinnus**, nov.

Queen.—Structurally similar to *dentatus* Handlirsch which is a member of *Alpigenobombus* Skorikov (1914). Pubescence colored as follows: head and dorsum of thorax black; sides of thorax a whitish yellow; first, second and basal portion of third abdominal tergites yellow; remainder of third and basal portion of fourth abdominal tergite black; apical part of fourth as well as fifth and sixth abdominal tergites deep ferruginous; legs black. Wings very dark; mandibles many toothed, malar space much shorter than long, third antennal segment much longer than fourth and somewhat longer than fifth. Mesobasitarsus without a sharp spine-like projection.



TEXT-FIG. 5.—*Bremus dentatus* var. *concinnus*, nov. a. mandible of male showing four teeth; b. dorsal view of male genitalia; c. head of sagitta of male genitalia; d. outer spatha of male; e. inner spatha of male.

Worker.—Same as queen except black pubescence covers fourth abdominal tergite, black is more extensive on third tergite and sometimes occurs on extreme basal position of fifth abdominal tergite.

Male.—Agrees well in coloration with the worker. Mandibles (Fig. 5a) and genitalia (Fig. 5b) in general as for subgenus *Alpigenobombus*. Fifth antennal segment about as long as fourth and third together, fourth slightly longer than third. Genitalia (Fig. 5b) close to that of male of *rufocognatus* (Cockerell), but differs in that lower-inner angle of volsella does not have such a prominent projection. Outer and inner spatha as in figures 5d and 5e, respectively. Head of sagitta as in figure 5c.

This variety differs from the typical *dentatus* Handlirsch, which I consider a valid species, in having the sides of the thorax whitish yellow instead of black.

Holotype.—Queen, Chandragiri, Nepal (1422-15). *Allotype*.—Male, Nartiang, Khasi and Jaintia Hills district, Assam, 28-20.XI.30 (H. S. Rao). *Morphotype*.—Worker, same data as Allotype. *Paratypes*.—2 workers and 1 male, same data as Allotype; 1 worker, Lamin, Assam (H. Rolle, American Mus. Nat. Hist.), formerly determined by Friese as "*B. channicus*" Holotype, allotype, morphotype and one paratype worker deposited in the collection of the Indian Museum. Two paratypic workers and 1 male deposited in the collection of the author and 1 worker in the collection of the American Museum of Natural History.

***Bremus dentatus* var. *surdus*, nov.**

Queen.—Structurally similar to *B. dentatus* Handlirsch (1888), but differs in the thorax being brownish black and the fourth abdominal tergite almost entirely ferruginous. The first and second abdominal tergites are yellow with some brown at sides of second, third tergite black. Corbicular area dark reddish brown, fringes and hairs on legs black. Malar space short and mandibles many toothed as all members of the subgenus *Alpigenobombus*. Wings slightly violaceous.

Holotype.—Queen, near Tatsienlu, Szechuen, China, June 18-July 12, 1923, alt. 5,000-8,500 ft., collected by D. C. Graham. Deposited in the collection of the United States National Museum.

***Bremus genalis* (Friese).**

1 queen, Darjiling, E. Himalayas, alt. 6,000-7,000 ft., 12.VI.14 (F. H. Gravely); 1 queen, Sureil Darjiling, (A. Alcock); 1 queen, Shillong; 1 worker Kurseong, E. Himalayas, alt. 6,000 ft., 15.VIII.09 (D'Abreu).

***Bremus grahami* var. *ordinatus*, nov.**

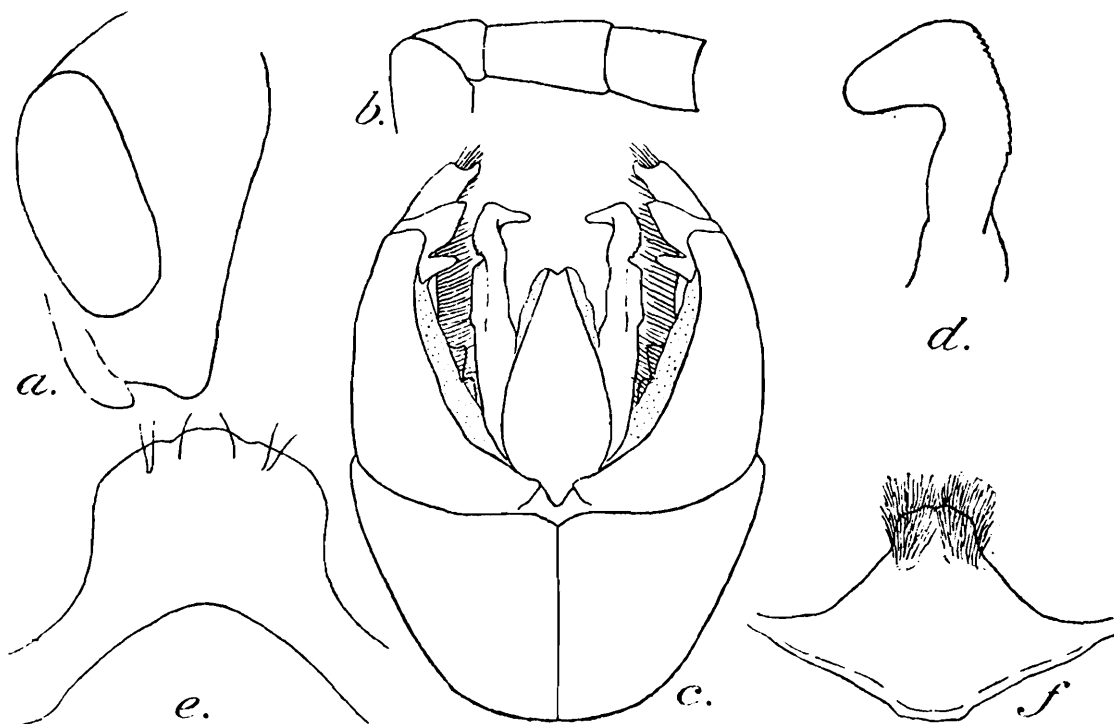
Male.—Pubescence colored as follows: face dull yellowish-grey, occiput brownish; dorsum of thorax brownish with traces of a lighter longitudinal stripe, particularly noticeable on pronotum; sides of thorax dull yellowish-white; first abdominal tergite yellowish-white, second dominantly yellowish-white but with an admixture of black hairs; third abdominal tergite black and fourth to seventh with ferruginous pubescence; corbicular fringe with a tinge of ferruginous.

Mandibles about as for other members of the subgenus *Alpigenobombus*. Third antennal segment (Fig. 6*b*) much longer than fourth (remainder missing). Genitalia as in figure 6*c*. Outer and inner spathae as in figures 6*e* and 6*f* respectively. Head of sagitta of male genitalia as in Fig. 6*d*.

Holotype.—Male, N. side of Tonglu, alt., 8,000-10,000 ft. 26.IX.06 (I. H. Burkill). Deposited in the collection of the Indian Museum.

This species was recently described by the author (1933) on the basis of the workers. The male differs in having less contrasting colors, and particularly in having so much dull yellowish white pubescence on the second abdominal tergite. As stated in the original description of this species, *grahami* is very suggestive of *funerarius* var. *lateritus* (Friese)

in the female sex. As yet the male of *funerarius* has not been described and accordingly no comparison can be given with it.



TEXT-FIG. 6.—*Bremus grahami* var. *ordinatus*, nov. a. head of male from a side view; b. basal portion of antenna of male; c. dorsal view of genitalia of male; d. head of sagitta of male genitalia; e. outer spatha of male; f. inner spatha of male.

The male genitalia is sufficient to separate *grahami* from such related species as *dentatus*, *orichalceus*, *rufocognitus* and *sikhimi*. The most important difference is the shape of the squama which in *grahami* does not have its upper inner angle so sharply pointed.

***Bremus orichalceus* (Friese).**

2 queens, Locha, Garhwal, W. Himalayas, alt. 5,000 ft., 17.IV.14 (Tytler); 1 worker, round about Mussoorie, Dehra Dun dist., U. Provs., 15-16.VI, 1-7. VII.30 (B. N. Chopra); 1 worker, Simla, W. Himalayas (jungle), alt. 6,000-7,000 ft., VIII-IX.25 (B. N. Chopra); 1 worker, Jabharket, on Mussoorie-Tehri Road, ca. 4 miles from Mussoorie, Dehra Dun dist., U. Provs., 20-25.VI.30 (B. N. Chopra); 1 worker, Kousanie, Kumaon, W. Himalayas, alt. 6,075 ft., 22.VII.14 (Tytler); 1 worker, Simla, W. Himalayas, alt. 8,000 ft., 6-VIII-18 (Brunetti); 1 worker, Dharampur, W. Himalayas, alt. 5,000 ft., 14.V.1913 (Phaku Ram); 1 male, Simla, W. Himalayas, alt. 7-8,000 ft., IX-14 (Capt. Evans).

It is possible that *orichalceus* may be but a color variety of *dentatus* Handlirsch. The structure of the male genitalia, as shown by the two new colour varieties described in this paper (*orichalceus* var. *conjunctus* and *dentatus* var. *concinus*), are very similar and perhaps should be considered as identical. The presence of a transverse band of black pubescence on the middle of the dorsum of the abdomen is the only character known to me for the separation of *orichalceus* and *dentatus*, the latter having priority. At the present time it seems best to consider *orichalceus* and *dentatus* as two species.

***Bremus orichalceus* var. *conjunctus*, nov.**

Male.—Mandibles similar to those of other members of the subgenus *Alpigenobombus*. Malar space short, not as long as width at articulation of mandibles. Antenna with fifth segment about as long as third and fourth together, fourth slightly shorter than third. Genitalia, as well as outer and inner spathae, very similar if not identical with those of *dentatus* var. *concinus* (Figs. 6c, d, e and f).

Color of pubescence as follows: face, occiput, sides of head, dorsum and sides of thorax greyish-white; first, second and most of third abdominal tergites yellow; sides of third abdominal tergite partly black; fourth, fifth, sixth and seventh abdominal tergites bright ferruginous; legs with dark hairs tipped with greyish; wings dark, slightly tinged with violaceous.

Worker.—Mandibles many toothed as in other members of the subgenus *Alpigenobombus*. Malar space shorter than width at articulation of mandibles. Antenna with third and fifth segments about the same length, fourth segment much shorter than either third or fifth. Labrum with tubercle-like areas widely separated; shelf-like projection prominent and about one-third width of labrum, with anterior transverse margin sharp and straight. Clypeus slightly convex with numerous scattered punctures. Mesobasitarsus without a sharp spine-like projection.

Color of pubescence as follows: that on head dark tipped with greyish; dorsum and sides of thorax dirty greyish-white; first, second and most of third abdominal tergites pale yellow; sides of third abdominal tergite with some black hairs; fourth, fifth and sixth abdominal tergites with ferruginous pubescence; legs with black hairs tipped with greyish. Corbicular space and clypeus with integument dark reddish-brown. Wings very dark, slightly violaceous.

Holotype.—Male, Mossy Nullah, below Barlowganj, ca. 3 miles from Mussoorie, Dehra Dun dist., U. Provs., 30. VI. 30, VII. 30 (B. N. Chopra). *Morphotype*.—Worker, Kousanie, Kumaon, W. Himalayas, alt. 6,075 ft., VII. 14 (Tytler). Deposited in the collection of the Indian Museum.

This variety may be separated from the typical *orichalceus* by the greyish-white dorsum and sides of the thorax. As already stated under *orichalceus*, this species may be but a color variety of *dentatus* Handlirsch. The genitalia of *orichalceus* var. *concinus* are very similar and perhaps the species should be considered identical, *conjunctus* being but a color variety of *dentatus*.

Subgenus **RUFIPEDIBOMBUS** Skorikov (1922).***Bremus eximius* (Smith).**

1 queen, Darjiling, E. Himalayas, 26.V-VI.16 (F. H. Gravely); 1 queen, Upper Tenasserim; 1 queen and 2 workers, no data; 1 queen, Chitlong, Nepal (Ind. Mus.); 2 queens, Khasi Hills; 1 queen, Moolai; 2 queens, Shillong, Khasi Hills, Assam, 3-9.VII.30 (H. S. Rao); 1 worker, Darjiling dist., Singla, alt. 1,500 ft., 1913 (Lord Carmichael's collection); 1 worker, Darjiling; Mong-wan Yunnan, W. China, 1909-10 (J. C. Brown); 1 queen and 5 workers, Upper Tenasserim; 1 worker, Shillong (Godwin-Austin); 1 worker, N. Khasi Hills (Godwin-Austin); 1 male, Kurseong, E. Himalayas, alt. 4,700-5,000 ft., 20.VI.10 (N. Annandale); a male, Darjiling, E. Himalayas (I. H. Burkill).

Bremus festivus (Smith).

3 queens, Uen Chuan, Szechuen, China, Aug. 7-14, 1924; 1 queen, Bet. Uen Chuan and Mowchow, alt. 4,500-5,500 ft., Aug. 5, 1924; 1 queen, Washan, Szechuen, China, July 23, 1925; 3 queens, Yachow, China, 1928; 1 queen, Da Shiang Lin Pass, China, Tibet Border, 4,960 ft., 23. VIII. 30; 2 queens, Dong Men Wei, 10 mi. W. Wei Chow-Szechuen, China, 5,600 ft. alt., 23. VIII. 1933; 1 queen, Wei Chow, 65 mi. N. W. Chengtu, Szechuen, China, 9,000-12,500 ft. alt., 15. VIII. 1933; all collected by D. C. Graham. 1 queen, Sides of the Deo-Gad stream and the Forests S. W. of Pinath, 7 miles from Kousanic (Almora dist.), Kumaon Hills, Sta. 62, I-VI-30 (H. S. Pruthi); 1 queen, Sarol Garden, Chamba, Punjab, Sta. 4, 20-V.27 (S. L. Hora); 1 queen, Naini Tal, May and June 1893 (Lucknow Mus.).

The male of this species has not been discovered but it is likely, judging from the females, that this beautiful black and white species belongs to this subgenus.

I have studied a worker of *B. melaleucus* Handlirsch, kindly loaned to me by the Natural History Museum, Wien, Austria, which is without doubt the type of this form. A study of this specimen has convinced me that *melaleucus* is merely a valid color variety of *festivus* Smith and differs in having hairs on the fourth abdominal tergite and on anterior and middle dorsal area of thorax dominantly black instead of greyish-white, the light colored hairs being very short and hence suppressed from view.

Subgenus **ORIENTALIBOMBUS** Richards (1929).**Bremus funerarius** (Smith).

1 worker, Kalipokri, 10,000 ft., Aconit 26-1-06 (I. H. Burkill); 1 worker, Calcutta (Mus. Coll.).

Bremus funerarius var. *lateritius* (Friese).

1 worker, Yachow, Szechuen, China, alt. 2,200-5,000 ft., 21-24. VIII. 30 (D. C. Graham); 1 worker, bet. Fu Yao Lin Pass and Da Shiang Lin Pass, Szechuen, China, 7,500 ft., Aug. 1923 (D. C. Graham).

Bremus haemorrhoidalis (Smith).

1 queen; 1 queen, Malwa Tal, Kumaon, W. Himalayas, 3,600 ft., 7.V.1911 (S. Kemp); 4 queens, Dharampur, Simla Hills, c. 5,000 ft., 6-8.V.07 (N. Annandale); 1 queen Almora, Kumaon, 5,500 ft., 26-VI-11 (C. Paiva); 4 queens, Kasauli, Simla Hills, c. 6,300 ft., 16-V-08 (N. Annandale); 1 queen, Kangra Valley, 4,500 ft., May, 1899 (Dudgeon) 1 queen, Naini Tal, Kumaon, c. 6,000 ft., 10-VI-09 (Mus. Coll.); 1 queen, Kangra Valley 4,500 ft., May 1939 (Dudgeon); 1 queen, Simla, W. Himalayas, alt. 7,000 ft., 12-13.V.1913 (N. Annandale); 1 queen, Bhim Tal, Kumaon, W. Himalayas, 4,450 ft., 2-10.V.1911 (S. Kemp); 5 workers, Bhim Tal, Kumaon Hills, ca. 4,450 ft., cultivated fields, 18.V.30 (H. S. Pruthi); 1 worker, Shahpur, Punjab (small rocky stream close to Däk Bungalow), 2,469 ft., 24.V.26 (S. L. Hora); 1 worker, Sarol Garden, Chamba, Punjab, 20.V.27 (S. L. Hora); 4 workers, and 1 male, United Provinces, Mussoorie; 2 workers, Mussoorie, U. Provs. 2 workers, Monda, Nepal, 12-V-08 (R. H.); 3 workers, Dharampur, W. Himalayas, c. 5,000 ft., 14.V.1913 (Phaku Ram); 1 worker, Almora, Kumaon, 5,500 ft., 5-19-VIII-II (C. Paiva); 1 worker, Naini Tal, Kumaon, 6,400 ft. (N. Annandale); 1 worker, Mussoorie, U. Provs. alt. c. 7,000 ft. 12-VIII-5 (Brunetti); 1 worker, Kangra Valley, 4,500 ft., Aug. 1899 (Dudgeon); 1 worker, Mussoorie, U. Provs. alt. c. 7,000 ped, 20-24.VI-05 (Brunetti); 1 worker, Dhobie Khud, below Sunny View, ca. 3 miles from Mussoorie, Dehra Dun dist., U. Provs., 21-27.VI.30 (B. N. Chopra); 1 worker, Company Khud, below Landour Bazar, Mussoorie, Dehra Dun dist., U. Provs., 18.VI.30 (B. N. Chopra); 1 worker Round about Mussoorie, Dehra Dun dist., U. Provs., 15-16.VI-1-7.VII.30 (B. N. Chopra); 1 worker, Sioni, 10 miles n.w. of Ranikhet, sides of the stream below the Forest Rest House, 24.V.30 (H. S. Pruthi); 2 workers, Mossy

nullah, below Barlowganj, ca. 3 miles from Mussoorie, Dehra Dun dist., U. Provs.' Sta. 7, 30. VI-3. VII. 30 (B. N. Chopra); 1 worker, Naini Tal, Kumaon, c. 6,000 ft.' 7-VI-09 (Mus. Coll.); 1 male, Lobha, British Garhwal, W. Himalayas, 27-X-07 (Mus. Coll.); 1 male, Mussoorie, U. Provs.

***Bremus haemorrhoidalis* var. *albopleuralis* (Friese).**

1 worker, Bhim Tal, Kumaon Hills, ca. 4,450 ft., cultivated fields, 18.V.30 (H. S. Pruthi); 1 worker, Bhim Tal, Kumaon, 4,500 ft., 22-27-IX-06 (N. Annandale); 1 worker, Bhim Tal, Kumaon, W. Himalayas, 4,450 ft., 10-12.V.1911 (S. Kemp); 1 worker, Almora, Kumaon, 5,500 ft., 23-VI-11 (C. Paiva); 1 worker, Almora, Kumaon, 5,500 ft., 20-21-VI-11 (C. Paiva); 1 worker, Katmandu, Nepal. (R. Hodgart).

***Bremus metcalfi*, sp. nov.**

Queen.—Similar in morphological structures to the female of *Orientalibombus* as described and figured by Richards (1929). The pubescence is colored as follows: face, occipital orbits and occiput black; sides and dorsum of thorax a bright yellow, except for a few dark hairs near head and a narrow black band between wings; abdominal tergites one and two bright yellow, third black, fourth to apex bright ferruginous. Coxae, trochanters and bases of femora beneath with yellowish hairs; remainder of legs black; integument dark. Wings brown, without a distinct violaceous tinge.

Malar space long, about one and one-half times as long as width at articulation of mandibles, polished and practically impunctate. Clypeus with integument slightly reddish, somewhat convex, large punctures confined to outer apical angles and sides, disk polished and with very faint punctures. Tubercle-like areas on labrum well separated; labrum with shelf-like projection half as wide as width of labrum and its anterior edge nearly straight. Unpunctured area surrounding ocelli very extensive.

Antennae with third segment somewhat longer than the fourth and shorter than fourth and fifth together, fourth and fifth segments about of equal length. Mesobasitarsus without a pronounced spine-like projection.

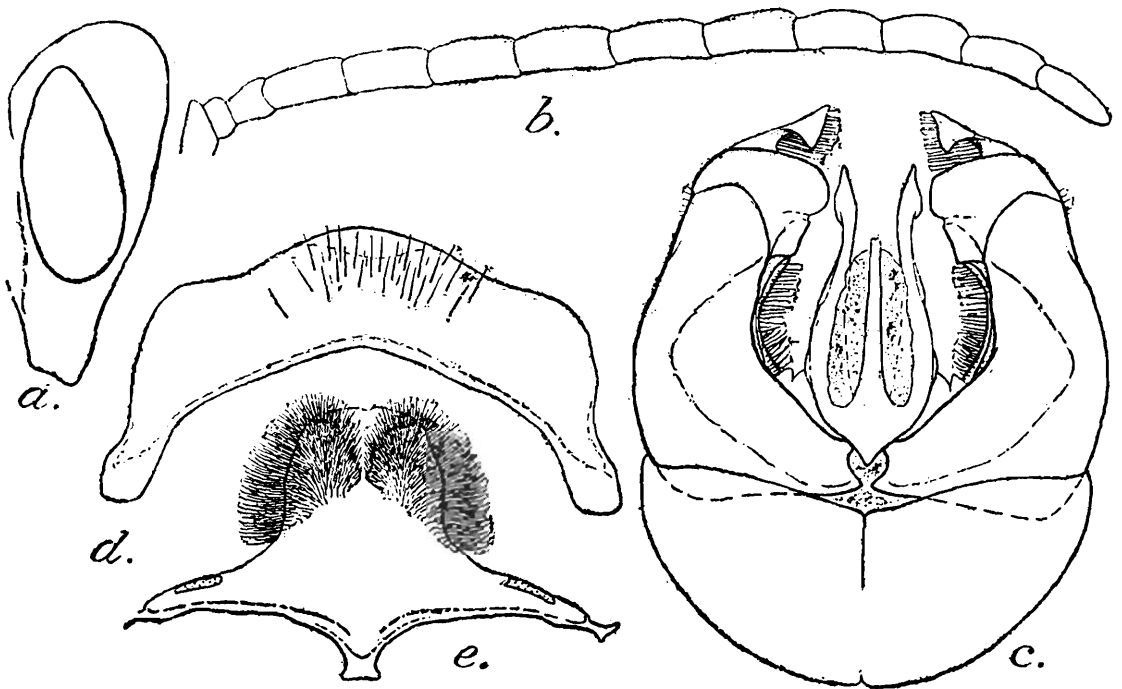
Length, 22 millimeters; spread of wings, 44 millimeters; width of abdomen at second segment, 9 millimeters.

Worker.—Very similar to queen in structure and in colors of pubescence. Differs in smaller size and in some specimens the black between the bases of the wings on the dorsum of the thorax is reduced to a small spot or even lacking.

Varying in size from 14 to 19 millimeters in length and other measurements in proportion.

Male.—Similar in most morphological structures to the male of *Orientalibombus* as described and figured by Richards (1929). The pubescence is colored as follows: face, occiput and occipital orbits with long dark hairs intermixed with shorter yellowish ones; sides and dorsum of thorax essentially bright yellow with some admixture of dark hairs particularly between the bases of the wings; abdominal tergites one and two bright yellow, third and most of fourth black, posterior margin of fourth and all remaining segments to apex are bright ferruginous. Coxae, trochanters and most of femora with long dense yellow

hairs, that on remaining segments mostly dark. Wings brownish, without a distinct violaceous tinge.



TEXT-FIG. 7.—*Bremus metcalfi*, sp. nov. *a.* head of male from a side view; *b.* antenna of male; *c.* dorsal view of genitalia of male; *d.* outer spatha of male; *e.* inner spatha of male.

Malar space (Fig. 7*a*) long, polished, impunctate, twice as long as width at articulation of mandibles. Mandibles two-toothed. Eyes normal. Unpunctured area around ocelli very extensive. Antennae (Fig. 7*b*) very elongate, segments arcuate, third segment very short and scarcely one-half as long as the fourth, fourth and fifth about equal in length.

Genitalia as in figure 7*c*. Inner and outer spathae as in figures 7*e* and 7*d*, respectively.

Length, 20 millimeters and other measurements in proportion.

Holotype.—Male, Suifu, Szechuen, China, XI-XII. 23. *Allotype*.—Queen, Suifu, Szechuen, China, alt. 1,000 ft., 11-1-22. *Morphotype*.—Worker, Mt. Omei, Szechuen, China, 25. VII. 1931 (Frison collection). *Paratypes*.—2 males, same data as holotype; 1 male and 3 workers, Suifu, Szechuen, China, Sept.-Nov. 28; 2 workers, Si Gi Pin, Mt. Omei, Szechuen, China, Aug. 5-17, 1925; 1 worker, Mt. Omei, China; 1 worker, same data as holotype; 1 worker, Suifu, Szechuen, China; 1 worker, Yachow, Szechuen, China, 2,000 ft., 1923; 4 workers, Szechuen, China, 1924; 1 worker, Shin Kai Si, Mt. Omei, Szechuen, China, 4,400 ft., Sept. 1-10, 1922 and 1 worker 8-1929; 1 worker, Suifu to Hongya, China, 1,000-1,400 ft. alt., June 15-21, 1919; 2 workers, Shin Kai Si, Mt. Omei, Szechuen, China, 4,400 ft., July-Aug., 1923; 2 workers, Kiating, China, 1,100 ft. alt., 6-29-24; 2 workers, Hua Sien Si, Mt. Omei, China, 7,000 ft. alt., 9-1-24; 1 worker, Tsae Keo, China, July, 1925; 1 worker, Suifu, Szechuen, China, 2,000 ft., 3-14-24; 3 workers, near Yachow, Szechuen, China, alt. 400-5,000 ft., July 2-8,

30 ; 1 worker, between Yachow and Kiating, Szechuen, China, 1,300-1,500 ft., July 2-4, 1930 ; 1 worker, Ningyuenfu, China, alt. 6,000-6,200 ft., Aug. 2-4, 1928 ; 2 workers, Mt. Omei, Szechuen, China, July 25, 1931 and July 29, 1929 (Frison collection). All collected by D. C. Graham except those indicated as in Frison collection.

Holotype, allotype and numerous paratypes deposited in the collection of the United States National Museum. Morphotype and several paratypes deposited in the collection of the author. Two paratypes deposited in the collection of the Indian Museum.

This striking and beautiful species can be readily distinguished in all castes from any other described species of the subgenus *Orientalibombus* on the basis of its color pattern. The male differs especially from all other known species of this subgenus in having the fourth and fifth antennal segments almost subequal in length. The color pattern of this new species resembles *trifasciatus* Smith, an *Agrobombus s. l.*, but may be readily separated from that species in the females by the lack of a prominent spine-like projection on the mesobasitarsus and in the males by marked differences in their genitalia.

I take pleasure in naming this new species for a former teacher, Professor C. L. Metcalf of the University of Illinois, because of his helpfulness and many kindnesses to the author.

***Bremus montivolans* (Richards).**

1 queen, Inailong, N. Shan States, Burma, I.I.27 (H. S. Rao); 2 workers, Lashio, N. Shan States, Burma, ca. 2,700 ft., 10-15.XI.26 (H. S. Rao); 1 male, Namkham, N. Shan States, Burma, ca. 2,500 ft., 27-29.XI.26 (H. S. Rao); 1 male, Take-pum Mtn., Chinese frontier, N. E. Burma, alt. 4,000-5,000 ft., XI.1910 (C. W. Beebe).

***Bremus orientalis* var. *buccinatoris* (Smith).**

2 queens and 1 worker, Kalimpong, Darjiling dist., E. Himalayas, 600-4,500 ft., 24. IV-10.V.15 (F. H. Gravely); 1 worker, Between Sukna and Siliguri, E. Himalayas, at light in carriage, VI.1930 (S. Ribeiro); 1 worker, Kurseong, E. Himalayas, alt. 4,500-5,000 ft., 22-VI-10 (N. Annandale); 1 worker, Sikkim, 3,800 ft., Sept. 1897 (Dudgeon Coll.); 1 worker, Sikkim (A. V. Knyvett); 6 workers, Tindharia, 2,822 ft.; 1 worker, Kurseong, E. Himalayas, 5,000 ft., 7-IX-09 (N. Annandale); 1 worker, Kurseong, E. Himalayas, 5,000 ft., 5-IX-09 (N. Annandale); 1 worker, Kurseong, E. Himalayas, 6,000 ft., 13-X-09 (D'Abreu); 1 worker, Kurseong, E. Himalayas, alt. 4,700-5,000 ft., 24-VI-10 (N. Annandale); 1 worker, Kurseong, E. Himalayas, 5,000 ft., 9-IX-09 (N. Annandale); 1 worker, Sikkim (Knyvett); 1 worker, Sikkim, 3,800 ft., Sept. 1897 (Dudgeon Coll.); 1 worker, Ghumti, Darjiling dist., E. Himalayas, c. 4,000 ft., VII.11 (F. H. Gravely); 1 worker, Sikkim (Dr. Stol); 1 queen and 1 worker, Darjiling dist., Singla, alt. 1,500 ft., April, 1913 (Lord Carmichael's Colln.); 2 workers, Darjiling, 6,000-7,000 ft., 3-VII-14 (Lord Carmichael's Colln.); 1 worker, Darjiling, 6,000-7,000 ft., 9-VII-14 (Lord Carmichael's Colln.).

***Bremus orientalis* var. *khasianus* (Richards).**

1 queen, Nepal Valley, E. Himalayas, alt. 4,500-6,500 ft. (Manners-Smith); 2 workers and 3 males, Nartiang, Khasi and Jaintia Hills district, Assam, 28-29.XI.30 (H. S. Rao); 3 workers, Soondrijal, Nepal; 3 workers, Katmandu, Nepal; 1 worker, Chitlong, Nepal; 1 male, Suparitar, 35 miles S. W. of Khatmandu at entrance to Hills, 2,000 ft., 1-XII-07 (I. H. Burkill); 1 male, Dikrang Valley.

Subgenus **PRATOBOMBUS** Vogt (1911).**Bremus atrocinctus** (Smith).

1 male, Sikkim, Tungloo, alt. c. 10,000 ft., July, 1912.

In addition to this record it seems opportune to include the following records of this species based upon specimens in the collection of the U. S. National Museum, Washington, D. C. and collected in China by D. C. Graham: 12 males, between Fu Yas Lin Pass and Da Shiang Lin Pass, Szechuen, China, 6,000-8,000 ft. alt., Aug., 1923; 19 males, Wen Chuan, Szechuen, China, Aug. 7-14, 1924; 13 males, near Mupin, Szechuen, China, July, 1929; 2 males, Gieh Yin Temple, Mt. Omei, China, Aug. 10, 1925; 2 males, Mt. Omei, Szechuen, China, 11,000 ft. alt., 1924; 1 male Shin Kaisi, Mt. Omei, Szechuen, China, 4,400 ft., Aug. 1922; 1 male, Yas-Gi, Szechuen, China, 4-8,000 ft., July 16, 1929; 6 males, near Tang-Gu, China-Tibet border, 15,600 ft. alt., Aug. 13-15, 1930; 3 males, Wa-Si-Geo, Szechuen, China, 5-6,000 ft., Aug. 18, 1930; 2 males, Suifu, Szechuen, China; 1 male, Da Shiang Lin Pass, China-Tibet border, 4,060 ft., Aug. 23, 1930; 1 male, Mi-Chi-in, Yu Long Si, Tibet, 13-15,000 ft., Aug. 8-12, 1930; 4 males, Yachow, Szechuen, China, 2,200-5,000 ft., Aug. 21-25, 1930.

Bremus atrocinctus var. **terminalis** (Smith).

1 queen, Sikkim, Tungloo, alt. 10,000 ft., July, 1912; 1 queen and 2 workers, Dal, above Dharmsala, Punjab, alt. 5,500 ft., 31-V-26 (S. L. Hora); 7 workers, Sikkim 4 workers, Onari, Garhwal, W. Himalayas, 11,000 ft., 27-VI-14 (Tytler); 1 worker, Kousanie, Kumaon, W. Himalayas, 6,075 ft., VII-14 (Tytler); 1 worker, Painsar, Garhwal, W. Himalayas, above Lobha 7,500 ft., 20-IV-14 (Tytler); 1 worker, Shahpur, Punjab, small rocky stream close to Dak Bungalow, 2,469 ft., 24-V-26 (S. L. Hora); 2 workers, Kumaon Hills, sides of the Deo-Gad stream and the Forests S. W. of Pinath, 7 miles from Kousanie (Almora dist.), 1-VI-30 (H. S. Pruthi); 1 worker. Kangra Valley, 4,500 ft., June 1899 (Dudgeon).

In addition to the above records based upon material in the Indian Museum, it seems opportune to record the following records based upon material in the U. S. National Museum, Washington, D. C., all collected by D. C. Graham: 36 workers, 3 queens, 2 males, Uen Chuan, Szechuen, China, Aug. 7-14, 1924; 3 workers, 1 queen, 2 males, between Fu Yao Lin Pass and Da Shiang Lin Pass, from 6,800 to 8,000 ft., Aug. 1923; 86 workers, 26 queens, 1 male, near Mupin, Szechuen, China, 2-8,000 ft., June 27-July 27, 1929; 8 workers, Szechuen, China, July 9, 1929; 3 workers, 2 queens, Shin Kaisi, Mt. Omei, Szechuen, China, 2-6,000 ft., Sept. 1-10, 1922; 4 workers, 2 queens, Mt. Omei, Szechuen, China, Si Gi Pm, Aug., 1925; 1 worker, 2 queens, between Uen Chuan and Mowchow, China, 45-5,500 ft.; Aug. 5, 1924 and Aug. 5, 1927, 1 worker, 1 queen between Yachow and Da Shiang Lin Pass, Szechuen, China, 6,000 ft., Aug. 1923; 1 queen, Wan Niens, China, alt. 6,000 ft.; 32 workers, 2 queens, Yachow to Mupin, Szechuen, China, 2-5,000 ft.; June 23-27, 1929, 1 worker, 1 queen, Suifu, Szechuen, China, Apr.-May, 1928; 8 workers, W. of Yachow, 2-7,500 ft., June 14-18, 1922, Szechuen, China; 1 worker, W. Kuanshien, Junnan, China; 1 worker, Mowchow, Szechuen, China, 14-4,500 ft. July 9, 1924; 2 workers, Washan, Szechuen, China, July 22-27, 1925, 55-11,000 ft.; 1 worker, near Washan, Szechuen, China, July 20, 1925; 1 worker, Uen Chuan, Szechuen, China, 2,200 ft. July 7, 1924; 2 workers, between Mt. Omei and Mt. Wa, Szechuen, China, 2-8,000 ft. between July 24-Aug. 4, 1922; 7 workers, 3 queens, between Li To and Lu Ding Chiao, 4-9,000 ft., July 11-14, 1930, Szechuen, China; 6 workers, 2 queens, 9 males, near Tang-Gu, China-Tibet Border, 14,000 ft., Aug. 3-6, 1930; 6 workers, 4 queens, Ningyuenfu, China, July 6-10, 800 ft. 24-26-Aug. 2-4, 1928; 9 workers, 1 queen, Suifu, Szechuen, China, June 1-21, 1928, 10-1,500 ft.; 1 queen, LuDing, Chiao, China-Tibet Border, 4-9,000 ft., July 12-14, 1930; 6 workers, 2 queens, 3 males, Yachow, Szechwan, China, May-June, 1928, and Aug. 21-25, 1930; 13 workers, 1 queen, DaShiang Lin Pass, China-Tibet Border, 4,960 ft., Aug. 23, 1930; 2 workers, 1 queen, Suifu, Szechuen, China; 41 workers, 1 queen, near Tang-Gu, Tibet, 14,000 ft., Aug. 3-6, 1930; 16 workers, 1 male, Yu-Long-Si, 15,600 ft., Tibet; July 31-Aug. 13, 1930, 2 workers, Kuanshien, 3,000 ft., Apr. 5-May 8, 1930, Szechuen, China; 7 workers, 4 males, Mi-Chi in Yu Long SiGge, 13-15,000 ft., Aug. 8-12, 1930, China-Tibet Border; 2 workers, Tatsienlu, China-Tibet border, 8-900 ft., 4 workers, 1 queen, 3 males, Yachow. Szechwan, China, May-June, 1928 and Aug. 21-25, 1930; 1 worker, Wa-Si-Geo, Szechwan, China, 5-6,000 ft., Aug. 18, 1930; 1 worker, Ningyuenfu, China, between Yachow 2,500-10,000 ft. July 14-28, 1929; 1 worker, China, From U. S. N. M. Collection; 1 male Ja-Ze Pass, China-Tibet Border, 16-17,150 ft., Aug. 13, 1930.

***Bremus flavescens* (Smith).**

4 males, nr. Mupin, Szechuen, China, 2-8,000 ft., 28. VI. 1929; 3 males, Suifu, Szechuen, China, May 15-June 8, 1929; 7 males, S. of Suifu, Szechuen, China, April-June, 1929; 2 males, Yachow to Mupin, Szechuen, China, alt. 2,000-5,000 ft., June, 23-27, 1929; 1 male, near Kinting, Szechuen, Shin Kai Si, Mt. Omei, China, 4,400 ft. 1921; 1 male, W. of Yachow, Szechuen, China, 2,000-7,500 ft., June 14-18, 1922; 2 males, Chin Chi Shien, W. of Yachow, Szechuen, China, 45-600 ft., 10-11, VII. 1930; 1 male, Suifu, Szechuen, China, V. 1924; all collected by D. C. Graham. 2 males, sides of the Deo-Gad stream and the Forests S. W. of Pinath, 7 miles from Kousanie (Almora dist.), I-VI.30 (H. S. Pruthi); 4 males, Naini Tal, May and June 1893 (Lucknow Mus.); 1 male, Naini Tal, 6-7,000 ft., Kumaon, 1908 (R. E. Lloyd); 1 male, Naini Tal, Kumaon, c. 6,000 ft., 10-VI-09 (Mus. Coll.).

The female has not as yet been reliably associated with the male.

***Bremus mearnsi* var. *bakeri* (Cockerell).**

1 worker, Sureil, Darjiling (Major Alcock); 1 worker and 2 males, Lebong, Darjiling dist., E. Himalayas, 6,000-6,600 ft., 13-VI-14 (F. H. Gravely).

***Bremus mearnsi* var. *dilutus* Frison.**

1 queen, Naini Tal, May and June 1893 (Lucknow Mus.); 1 worker, Bhowali, bed of a small hill stream near the Forest Rest House, 5,700 ft., 11.V.30 (H. S. Pruthi); 1 worker and 1 male, sides of the Geo-Gad stream and the Forests S. W. of Pinath, 7 miles from Kousanie (Almora dist.), Kumaon Hills, 1.VI.30 (H. S. Pruthi); 1 worker, Naini Tal, Kumaon, c. 6,000 ft., 10-VI-09 (Mus. Coll.); 1 male, Naini Tal, Kumaon, c. 6,000 ft., 7-VI-09 (Mus. Coll.).

***Bremus mearnsi* var. *geei* (Cockerell).**

1 queen, Naini Tal, May and June 1893 (Lucknow Mus.); 1 worker, Monda, Nepal, 12.V.08 (R. Hodgart).

***Bremus rotundiceps* (Friese).**

1 worker, Bhim Tal, Kumaon Hills, cultivated fields, ca. 4,450 ft., 18-V-30 (H. S. Pruthi).

***Bremus rotundiceps* var. *protensus*, nov.**

Worker.—Structurally similar in most respects to other members of the subgenus *Pratobombus*. Malar space medium, about as long as width at articulation with mandibles. Labrum with tubercle-areas not widely separated, shelf-like projection with anterior margin rounded. Clypeus with centre of disk practically without large punctures. Antenna with third segment slightly longer than fifth, fifth much longer than fourth. Area between lateral ocelli and margin of compound eyes polished and with but few punctures.

Tibia and tarsus with integument dark reddish-brown. Mesobasitarsus without a sharp spine-like projection. Wings dark, with a slight violaceous tinge.

Pubescence colored as follows: head, thorax and legs black; first, second and most of basal and middle area of third abdominal tergites yellow; remainder of third and following segments ferruginous.

Holotype.—Worker, Bhim Tal, Kumaon Hills, ca. 4,450 ft., cultivated fields, 18-V-30 (H. S. Pruthi). *Paratypes*.—1 worker, Shahpur, Punjab, small rocky stream close to Dak Bungalow, 2,469 ft. alt., 13-V-26 (S. L. Hora) and 1 worker, Dharampur, W. Himalayas,

5,000 ft., 15-V-1913 (Phaku Ram). Holotype and one paratype deposited in the collection of the Indian Museum and one paratype in the collection of the author.

This new variety differs from typical *rotundiceps* Friese, according to my concept, by having black pubescence on the sides and dorsum of the thorax.

***Bremus rotundiceps* var. *cruentatus*, nov.**

Worker.—Structurally the same as *rotundiceps* var. *protensus*. Differs in having black pubescence on sides of third and on most of fourth abdominal tergites.

Holotype.—Worker, Kalimpong, Darjiling dist., E. Himalayas, 19-24.V.30 (S. L. Hora). *Paratype*.—Worker, Sikkim (Bingham)—formerly determined by Friese as *channicus* var. *brevigenalis* and probably one of his typic specimens. Holotype in the collection of the Indian Museum and Paratype in the collection of the author.

This new variety differs from the true *rotundiceps* in having black pubescence on the sides and dorsum of the thorax and on some of the middle abdominal tergites. It differs from *rotundiceps* var. *protensus* in having black pubescence on most of the third and fourth abdominal tergites.

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