

*PAUL D. HURD, JR.*  
*and E. GORTON LINSLEY*

*Parasitic Bees  
of the Genus  
Holcopasites Ashmead  
(Hymenoptera: Apoidea)*

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## ABSTRACT

Hurd, Paul D., Jr., and E. Gorton Linsley. Parasitic Bees of the Genus *Holcopasites* Ashmead (Hymenoptera: Apoidea). *Smithsonian Contributions to Zoology*, number 114, 41 pages, 16 figures, 1 table. 1972.—Fifteen species of the formerly rare, parasitic Nearctic bee genus *Holcopasites* are recognized from North America. These bees, which are parasitic in the nests of other bees (Andrenidae) have been evaluated on morphological, distributional, and biological bases.

This study is a systematic revision of the species known to occur in the United States, Canada, and Mexico and contains keys, illustrations, and descriptions for the identification of the species. Complete distributional, biological, and synonymical data are provided together with discussions involving their taxonomy. Host-parasite relationships involving eight of the species are presented.

New taxa are *Holcopasites apacheorum*, *H. bigibbosus*, *H. bohartorum*, *H. cazieri*, *H. rozeni*, and *H. tegularis*. *Odontopasites* Linsley is declared a synonym of *Trichopasites* Linsley, and other new synonymy and changes in status include: *H. calliopsidis calliopsidis* (Linsley), new status (= *H. pseudocarinatus* Mitchell); *H. calliopsidis carinatus* (Linsley), new status; *H. eamia* Cockerell (= *H. acanthochilus* Crawford, = *H. texanus* Crawford); *H. heliopsis* (Robertson) (= *H. lutzii* Cockerell); *H. illinoiensis illinoiensis* (Robertson), new status; *H. illinoiensis minimus* (Linsley), new status; *H. pulchellus* (Cresson) (= *Neopasites robertsoni* Crawford, = *Neopasites robertsoni pubescens* Linsley); and *Holcopasites stevensi* Crawford (= *Neopasites elegans* Linsley = *N. knulli* Linsley).

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# Parasitic Bees of the Genus *Holcopasites* Ashmead (Hymenoptera: Apoidea)

## Introduction

This study is intended as a systematic revision of the bees belonging to the genus *Holcopasites*. These bees, which are parasites in the nests of certain pollen-collecting panurgine bees, occur in North America from southern Mexico to southern Canada and from extreme southeastern California to the Atlantic seaboard of the eastern United States. Most of the species have been found in the southwestern and midwestern United States, and twelve of the fifteen species are known only from or are also present in Arizona.

Several of the species of the genus are among some of the smallest bees known and this coupled with their localized occurrence and parasitic habit have perhaps been responsible for their infrequent capture and general scarcity in collections. At the turn of the century less than half a dozen specimens had been collected, and when Crawford (1915) reviewed the species he had only about eighteen specimens upon which to base his studies. At the time Linsley (1943) systematically analyzed the group, hardly more than fifty specimens had become available, including the type specimens of previously described species. During the past quarter of this century much new material has been collected by several investigators including

ourselves—mostly as the result of concentrated field studies of this and related genera of the parasitic nomadine bees. In spite of the fact, however, that 1,464 specimens are now preserved in collections and have formed the basis of this study, several species, including five of the new species described herein, are represented by less than a dozen specimens each. Nonetheless much has been learned from the vastly larger amount of material that is now available concerning the systematics of this formerly rarely collected genus of bees.

It is obvious from the foregoing discussion that a thoroughly detailed knowledge of the distribution and associated ecological data is vitally important. For this reason, in the species accounts, we have presented as completely as possible, within the limitations of space, a documentation of these data. Without this basis, future interpretative analyses, whether they be systematic or ecological in nature, would be severely hampered.

Although these bees have been most frequently discussed under the name of *Holcopasites*, in the recent past, they have especially been treated under the name of *Neopasites* (Linsley and Michener, 1939), Linsley (1943), and Michener (1944). Since the appearance of the "Synoptic Catalog, Hymenoptera of America North of Mexico" (Muesebeck et al., 1951), specialists have returned to using the name *Holcopasites*, which was the name most frequently applied to this group before 1939. The problem of the correct name for the genus was occasioned initially by Ashmead (1899) when he proposed *Holcopasites* as a new genus

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without including any nominal species. It was not until several years later that Crawford (1915) designated a type species, *Phileremus illinoiensis* Robertson (1891), and included several species, some of which had been assigned to *Neopasites* before the name *Holcopasites* was validated. Crawford's selection of the type species was guided by a comparison of the Robertson species with specimens (labeled *Holcopasites pratti* Ashm. ms.) used by Ashmead for the original proposal of *Holcopasites*. Crawford clearly demonstrated that *Holcopasites* is distinct from *Neopasites* Ashmead, whose type species was declared to be *Phileremus fulviventris* Cresson by Ashmead (1898: 284). It is clearly evident, however, that Ashmead based his description of *Neopasites* on misidentified material of *Phileremus fulviventris* Cresson, which in actuality is the same as *Holcopasites eamia* and which was originally assigned to the genus *Neopasites* by Cockerell (1909:29). Several years earlier Cockerell (1903:452) had examined the undescribed "*Holcopasites pratti* Ashmead" and concluded that he was ". . . rather disinclined to consider *Holcopasites* distinct from *Neopasites*." Cockerell was not aware, however, that Ashmead (ibid.) had misidentified the type species of *Neopasites*, and that the type specimen he had studied was indeed a species of *Holcopasites* (*H. illinoiensis*) and not the true *Phileremus fulviventris*, the misidentified type species of *Neopasites*. This is another instance of an erroneous identification of the type species of a genus, and ultimately the case should be submitted to the International Commission on Zoological Nomenclature. In the meantime we have elected to employ the names as they are currently being used. Additional discussions of this problem will be found in the works of Cockerell (1926:108), Linsley and Michener (1939:277-278), Linsley (1942:127), and Sandhouse (1943:558, 576).

### Biology

Some aspects of the biology of this genus are known. Most of this information, which is largely fragmentary and concerns host association, nesting habits, and activities of the adults and larvae, has been obtained by Rozen (1965, 1966, 1967) in connection with his biological investigations of the andrenid subfamily Panurginae. Other significant contributions to the biology of these bees include the studies of Ainslie (1937) and Shinn (1967:928-932). These references

should be consulted by anyone working on the biology of these bees.

In so far as known the species of *Holcopasites* are parasites in the nests of pollen-collecting bees belonging to the tribe Panurgini of the family Andrenidae. Although there are a number of unconfirmed host associations involving the genera *Calliopsis* and *Pseudopanurgus*, there are several records which establish a definite host association for some of the species of *Holcopasites* with the genera *Calliopsis*, *Hypomacrotera*, and *Pseudopanurgus* (Table 1). Thus far none of the other genera of the tribe Panurgini (*Nomadopsis*, *Panurginus*, *Perdita* and *Psaenythia*) which occur within the range of *Holcopasites* have been implicated as possible hosts.

The adults of *Holcopasites* are frequently encountered at flowers, usually in search of nectar, and there is some evidence to suggest that there is a predilection for the same flowers visited by their hosts. Not infrequently the adults are also encountered in low meandering flight about and over the nesting sites of their actual or presumed host species during the warmer part of the day. In these situations the females often alight and investigate small depressions, holes of various sorts, as well as active nesting burrows. A number of the unconfirmed host associations presented in Table 1 are based upon these kinds of observations. Established host-parasite relationships are ideally obtained by rearing the parasite from the cells of a reliably identified host species.

### Acknowledgments

Including the type specimens, we have had the privilege of examining nearly 1,500 specimens of this formerly rare genus of parasitic bees. Much of this material has been accumulated through the helpful collaboration of Drs. George E. Bohart, Mont A. Cazier, and Jerome G. Rozen, Jr., whose field efforts have provided us with a substantial collection of specimens and associated ecological information upon which to base our systematic investigations. We have also benefited from a study of specimens made available to us by colleagues individually acknowledged elsewhere in this article. During the course of their own investigations afield, they collected samples of these bees which, in the aggregate, have proved to be especially useful to us.

The illustrations were prepared by Celeste Green, Senior Scientific Illustrator, University of California, Berkeley.

We are particularly fortunate in having been able to examine the primary type specimens of all the nominal species except *Holcopasites haematurus* Cockerell and Hicks, which we have been unable to locate. To the curators of the collections in which the types are deposited we are grateful for the opportunity of studying these critical specimens. We would like to thank the following individuals who made these studies possible and who in addition placed at our disposal collections of these bees for examination: Drs. P. H. Arnaud, Jr., and E. S. Ross, California Academy of Sciences (CAS); G. E. Ball and B. Hocking, University of Alberta, Edmonton (UA); W. F. Barr, University of Idaho, Moscow (UI); G. E. Bohart, Wild Bee Pollination Investigations, Entomology Research Division, U.S. Department of Agriculture, Logan, Utah

(GEB); M. A. Cazier, Arizona State University, Tempe (ASU); California Insect Survey, University of California, Berkeley (CIS); G. C. Eickwort and L. L. Pechuman, Cornell University, Ithaca (CU); the late H. J. Grant, Jr., Academy of Natural Sciences, Philadelphia (ANSP); R. E. Hill, University of Nebraska, Lincoln (UN); J. N. Knull and C. A. Triplehorn, Ohio State University, Columbus (OSU); Karl V. Krombein, U.S. National Museum of Natural History, Washington, D.C. (USNM); W. E. LaBerge, Illinois Natural History Survey, Urbana (INHS); C. D. Michener, University of Kansas, Lawrence (KU); T. B. Mitchell, University of North Carolina, Raleigh (UNC); D. W. Ribble, Campbell, California (Ribble); H. G. Rodeck, University of Colorado Museum, Boulder (UCM); J. G. Rozen, Jr., American Museum of Natural History, New York (AMNH); R. O. Schuster and R. W. Thorp, University of California, Davis (UCD); A. F. Shinn, Oak Ridge, Ten-

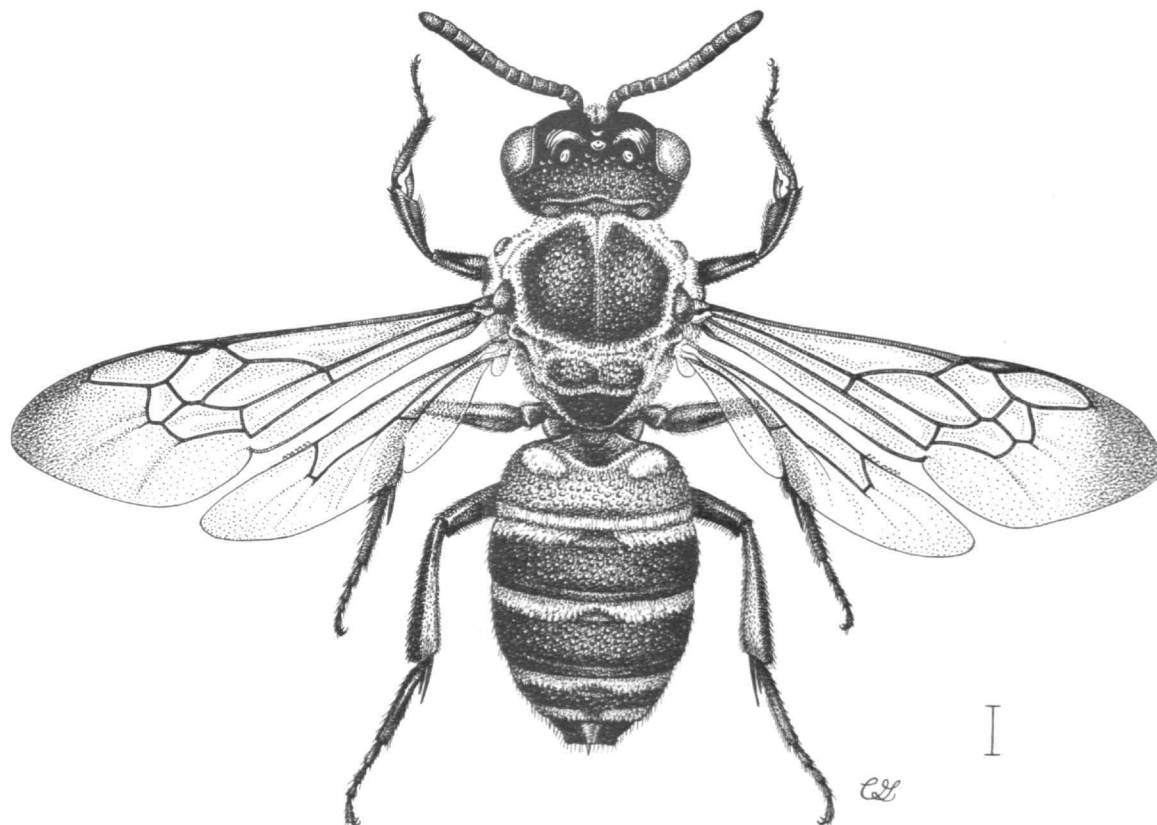
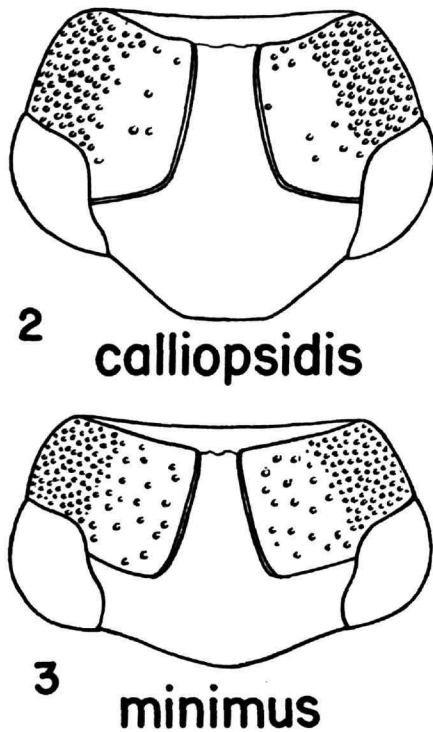


FIGURE 1.—*Holcopasites bigibbosus* Hurd and Linsley, female.

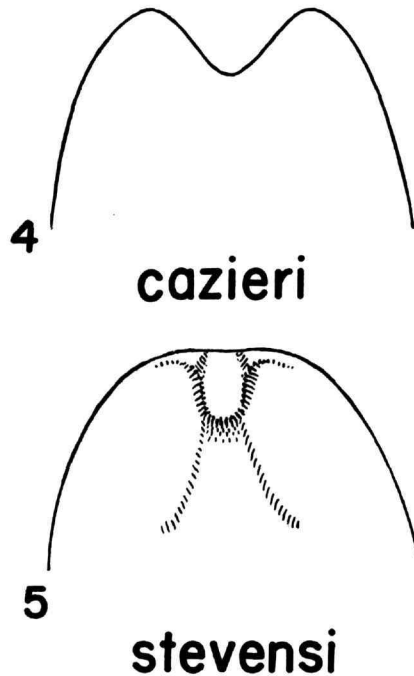


FIGURES 2, 3.—Diagrammatic representations of the ventral surface of head, males.

nessee (Shinn); G. I. Stage, University of Connecticut, Storrs (Stage); and P. H. Timberlake, University of California, Riverside (UCR).

#### Systematics

The species of the genus *Holcopasites* are readily distinguished from the other American nomadine bees of the family Anthophoridae by the elongate labrum, which is nearly twice as long as broad, and the very coarsely punctate body, which is conspicuously clothed with abundant patches of pale squamiform pubescence (Figure 1). The antennae of the males are 12-segmented and therefore are unlike all other North American bees except the genus *Neopasites*, which has the labrum broader than long and belongs to the tribe Biastini. Both sexes of *Holcopasites* possess a well-defined pygidial plate. Additional generic details are to be found in the works of Linsley and Michener (1939) and Michener (1944), wherein the genus



FIGURES 4, 5.—Diagrammatic representations of the fifth metasomal sternum, females.

*Holcopasites* is treated under the name *Neopasites*. The nearest structural relative of *Holcopasites* is the genus *Schmiedeknechtia* of the Palearctic region (Cockerell 1923; Grütte 1935; Popov 1933, 1951; Linsley and Michener 1939; and Mavromoustakis 1963), and these two genera have been placed in the tribe Holcopasitini (Linsley 1951:1207).

The species of *Holcopasites* are small bees with compact bodies and range from 2.5 mm to 8 mm in length. The integument is rather coarsely and generally closely punctate, that of the head and thorax is usually dark or black in coloration, while that of metasoma is most often red—though usually the metasomal terga, especially the apical ones, are darkened or clouded with black medially. Usually the clypeus, the antennae, the mandibles, the labrum, the tegulae, the dorsolateral angles of the propodeum and legs, especially basally, are extensively reddish brown, deep mahogany red, or rufotestaceous in coloration. The vestiture is usually white and expressed as closely appressed patches or spots on the head, thorax, and metasoma dorsally, but in some species the dorsal

surfaces of the head, thorax, and metasomal terga are clothed in addition with or supplanted by golden or reddish golden pubescence.

Although the body of most species is generally quite closely and coarsely punctate and sometimes rugosely so, in some species, like *Holcopsisites insoletus* (Linsley), the face above the antennae is largely impunctate. Similarly in other species the punctures on the mesoscutum and mesepisterna are not closely crowded and in these cases the interspaces are often polished and shining. In still other species, the ventral surface of the head is rather sparsely punctate adjacent to the hypostomal carinae (Figures 2 and 3). As will be noted in the accompanying species accounts, some structural features such as the pygidial plate, the comparative lengths of the antennal flagellar segments, and the position of the rear angle of the mandible in relation to the lower end of the eye are remarkably stable characteristics and are subject to very little variation. Some structures, like the apical configuration of the fifth metasomal sternum in the female, however, are quite variable. In the females of some species that structure is consistently and rather deeply emarginate apically (Figure 4), while in other species,

like *Holcopsisites stevensi* Crawford, the apical margin is sometimes entire or slightly incurved medially (Figure 5).

Largely on the basis of whether or not the eyes are densely clothed with short, erect pubescence, Linsley (1942, 1943) grouped the species of the genus into subgenera. The subgenera *Trichopsisites* and *Odontopsisites* were proposed by him for those species possessing very hairy eyes and were primarily distinguished from one another on whether the sides of the face at the anterior margin of the clypeus were toothed (*Odontopsisites*) or not (*Trichopsisites*). The remaining species, in which the eyes are bare (or essentially so), were assigned by Linsley to *Holcopsisites* proper, which at that time was called *Neopsisites*. Even though the present investigation has demonstrated that the species of the genus *Holcopsisites* can still be allocated to subgeneric groupings on the basis of bare or hirsute eyes, the discovery of several new species has demonstrated conclusively that the characters previously used to distinguish *Trichopsisites* and *Odontopsisites* are no longer tenable. Consequently we have adopted herein a classification that recognizes only two subgeneric units within the genus.

**Key to the Subgenera of the Genus *Holcopsisites***

- 1. Eyes densely clothed with short, erect pubescence ..... *Trichopsisites*
- Eyes bare or at most with a few, scattered, minute hairs ..... *Holcopsisites*

**Subgenus *Trichopsisites* Linsley**

FIGURES 7, 12

*Trichopsisites* Linsley, 1942:127; 1943:120.—Michener 1944:277.

*Odontopsisites* Linsley, 1942:128; 1943:120, 121.—Michener 1944:277. [New synonymy.]

TYPE-SPECIES.—*Neopsisites* (*Trichopsisites*) *insoletus* Linsley, monobasic and original designation.

This subgenus contains three species, all of which have the eyes densely clothed with short, erect pubescence. As mentioned elsewhere, the characters which previously were used to distinguish the subgenera

*Trichopsisites* and *Odontopsisites* are, with the discovery of several new species of the genus, no longer usable; therefore, *Odontopsisites* is placed as a synonym of *Trichopsisites*.

Although all three species of *Trichopsisites* have been collected together in Arizona, one of the species (*Holcopsisites arizonicus*) ranges northward into Idaho and southward as far as the state of Zacatecas in Mexico. The subgenus has not been found west of Arizona or east of Colorado and New Mexico.

The following key will serve to separate the species of this subgenus.

**Key to the Species of the Subgenus *Trichopsisites***

- 1. Face above antennae closely and coarsely punctate, without polished and shining areas; anterior and lateral ocelli separated by less than twice their diameters ..... 2

- Face above antennae polished, shining and often largely impunctate; anterior and lateral ocelli separated by at least three times their diameters ..... 1. *H. insoletus*
2. Metasomal tergum IV apically with only a short band or spot of white pubescence on each side; fifth metasomal sternum of female with apical margin scarcely incurved medially (as in Figure 5) ..... 2. *H. arizonicus*
- Metasomal tergum IV apically with a nearly complete band of white pubescence, only narrowly interrupted medially; fifth metasomal sternum of female with apical margin deeply emarginate (as in Figure 4) ..... 3. *H. rozeni*

### 1. *Holcopasites insoletus* (Linsley)

#### FIGURE 7

*Neopasites (Trichopasites) insoletus* Linsley, 1942:128, ♀ [Arizona: Tex Canyon, Chiricahua Mountains, 5,000-6,000 ft]; 1943: 120-121, ♀.

*Holcopasites (Trichopasites) insoletus*.—Linsley 1951:1208, ♀ [Arizona].—Rozen 1965:87, 88-91, ♀ [Arizona: Southwestern Research Station, near Portal, Cochise County]; 1966:30-33 [Arizona: Southwestern Research Station near Portal, Cochise County].

LOCATION OF TYPE.—California Academy of Sciences, San Francisco.

GEOGRAPHIC RANGE.—Southwestern United States (Arizona and New Mexico).

HOSTS (unconfirmed).—*Pseudopanurgus boylei* (Cockerell), *P. perlaevis* (Cockerell), *P. timberlakei* Cockerell, *Pseudopanurgus* species B, and *Pseudopanurgus* spp. (Table 1).

FEMALE.—Head and thorax black, metasoma red or chiefly so, sometimes terminal terga darkened or clouded medially; antennae, mandibles, tegulae, and legs reddish or dark mahogany brown; calcaria dark reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face adjacent to antennal insertions, head behind, mesonotal line, dorsolateral angles of pronotum, anterolateral margins and sides of mesoscutum, mesepisterna, scutellum at sides, medially and behind, metanotum and propodeum especially laterally, legs basally and on metasoma not conspicuously clothed with golden or reddish golden pubescence. Wings feebly violaceous, lightly tinged with brownish beyond closed cells. Length 4-8 mm. Eyes densely clothed with short, erect pubescence; face above antennae somewhat swollen, polished, shining, largely impunctate; antennae with first flagellar segment longer than combined length of succeeding two segments; anterior and lateral ocelli separated by at least three times their diameter; interocellar distance greater than ocellorbital distance; rear angle of mandible situated well

beyond middle of eye; labrum longitudinally carinate medially, without a thornlike tubercle near base, densely and closely punctate on basal half or more, without impunctate areas basally; ventral surface of head rather sparsely punctate especially adjacent to hypostomal carinae, interspaces polished and shining. Mesoscutum very coarsely and somewhat rugosopunctate throughout; scutellum entire or feebly indented medially on posterior dorsal surface, not prominently bilobed and strongly elevated posteriorly; metanotum produced posterolaterally into prominent posteriorly projected shelflike processes; mesepisternum rather coarsely and nearly rugosely punctate and with a large ringlike patch of white pubescence; wing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg about one-half as long as corresponding basitarsus. Metasomal terga II-III basally (usually also succeeding terga) with two discrete spots (sometimes evanescent) of white pubescence on either side of middle; apical margin of tergum IV with at most a spot or short band of white pubescence laterally; pygidial plate truncate or nearly so, rounded laterally; fifth metasomal sternum with apical margin incurved medially, not strongly emarginate.

MALE.—Similar to female in coloration of integument and vestiture. Length 3.5-8 mm. Eyes as densely hairy as in female; face as in female; antennae with first flagellar segment shorter than combined length of succeeding two segments; interocellar and ocellorbital distances about equal; rear angle of mandible situated as in female; labrum essentially as in female; ventral surface of head somewhat more densely and closely punctured than in female. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae sparsely punctate laterally, shining. Metasomal terga II-VI basally with two discrete spots (sometimes lacking or evanescent) of white pubescence on either side of middle; apical margin of

tergum IV with only a short band or spot of white pubescence laterally; apical margin of tergum V with at most only a spot of white pubescence laterally; basin of metasoma not sharply defined, punctured at least at sides; apical margin of sixth metasomal tergum feebly bisinuate in outline, with at most an obsolescent median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, nearly right angled on either side of pygidial plate; pygidial plate more than twice as long as maximum basal width, liguliform in outline.

**SPECIMENS EXAMINED.**—ARIZONA. COCHISE COUNTY: Benson, 7 mi W, ♂, IX-3-61, flowers *Heterotheca subaxillaris* (P.D. Hurd, Jr., CIS). Douglas, 2 ♀, VIII-22-68 (J.G. Rozen and M. Favreau, AMNH). Douglas, 1 mi E, ♀, VIII-14-62, flying over ground investigating holes between 11:00-11:20 A.M. (M.A. Cazier, CIS); 2 ♀, VIII-15-62, flying just above ground between 9:30-9:50 A.M. (M.A. Cazier, CIS); 3 ♂, 26 ♀, VIII-16-62, on flowers *Bahia absinthifolia* var. *dealbata* (E.G. Linsley, CIS); 2 ♀, same date (M. Statham, AMNH); 2 ♀, VIII-17-62 (M.A. Cazier, CIS); 3 ♀ same date (M. Statham, AMNH); 8 ♀, VIII-18-62 (M.A. Cazier, CIS); 2 ♀, VIII-21-62 (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); 2 ♀, VIII-24-70 (J.G. Rozen, AMNH). Douglas, 5 mi NE, 5 ♂, 2 ♀, VIII-23-64 (C.D. Michener, KU). Douglas, 16 mi NE, 2 ♂, VIII-23-62 (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); ♀, VIII-25-62 (J.G. Rozen, M. Statham, and S.J. Hessel, AMNH). Portal, 2 mi N, 4 ♀, IX-22-63, flying over nesting site of *Pseudopanurgus perlaevis* (J.G. Rozen, AMNH). Portal, 2 mi NE, ♀, IX-14-61 (J.G. Rozen and M. Statham, CIS); 2 ♂, 6 ♀, VIII-21-62 (J.G. Rozen, M. Statham and S.J. Hessel, AMNH). Portal, 5 mi W, 2 ♂, VIII-19-58, on flowers *Heterotheca subaxillaris* (E.G. Linsley, CIS). Southwestern Research Station, ♀, VIII-24-58 (P.D. Hurd, Jr., CIS); ♂, VIII-26-58, flowers *Heterotheca subaxillaris* (E.G. Linsley, CIS); ♂, IX-3-59, flowers *Heterotheca subaxillaris* (D.D. Linsdale, Stage); 2 ♀, VIII-28-62 (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); 7 ♀, VIII-28-62, site B (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); 2 ♀, VIII-29-62, site A (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); 6 ♀, VIII-29-62, site B (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); ♀, IX-1-62, site B (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); ♀, IX-2-62 (M. Statham, AMNH); 2 ♀, IX-16-62

(J.G. Rozen, AMNH); 2 ♀, IX-20-62 (J.G. Rozen, AMNH). Tex Canyon, Chiricahua Mountains, 5,000-6,000 ft, ♀, IX-16-27 (J.A. Kusche, CAS); ♀, VIII-23-62 (J.G. Rozen, M. Statham and S.J. Hessel, AMNH). GILA COUNTY: E. Verde River, 10 mi N Payson, ♀, IX-9-61 (GEB). MOHAVE COUNTY: Kingman, 10 mi unspecified direction, ♂, IX-2-62 (J.S. Buckett, UCD). PIMA COUNTY: Tucson, 9 mi, SE, ♀, IX-3-61, flowers *Bahia absinthifolia* (P.D. Hurd, CIS).

NEW MEXICO. HIDALGO COUNTY: Rodeo, ♂, VIII-22-58 (R.M. Bohart, UCD). Rodeo, 1 mi N, 2 ♀, VIII-2-64, at nesting site of *Pseudopanurgus* (J.G. and B.L. Rozen, AMNH). Rodeo, 4.5 mi. N, 4 ♀, VIII-21-62 (J.G. Rozen, M. Statham and S.J. Hessel, AMNH). Rodeo, 4.8 mi N, 2 ♂, 4 ♀, IX-4-61, flowers *Tidestromia lanuginosa* (P.D. Hurd, Jr., CIS); 3 ♀, IX-4-61, same data (P.H. Timberlake, UCR). Rodeo, 5 mi N, 2 ♀, VIII-19-66 (J.G. and B.L. Rozen, AMNH); ♀, VIII-20-66 (J.G. and B.L. Rozen, AMNH); ♀, VIII-24-66 (J.G. and B.L. Rozen, AMNH). Rodeo, 11 mi N, ♂, 8 ♀, VIII-18-68 (J.G. Rozen and M. Favreau, AMNH). SAN JUAN COUNTY: ♂, IX-6-63 (G.E. Bohart, GEB).

The chiefly reddish metasoma together with the large, swollen, impunctate areas of the face above the antennae are uniquely diagnostic for this species. Although there are only a relatively few flower records available, *Holcopasites insoletus* has been taken on several occasions at the flowers of *Bahia absinthifolia* and *Heterotheca subaxillaris* (Compositae), and both sexes in one instance were found visiting the flowers of *Tidestromia lanuginosa* (Amaranthaceae).

## 2. *Holcopasites arizonicus* (Linsley)

### FIGURE 12

*Neopasites (Odontopasites) arizonicus* Linsley, 1942:129, ♀ ♂ [Arizona: Hereford, Tucson, and Yuma; Baja California: San Pedro, 18 miles south of LaPaz]; 1943:122-123, fig. 1, ♀ ♂ [Arizona: Hereford, Tucson, and Yuma; Baja California: San Pedro, 18 miles south of LaPaz].

*Holcopasites (Odontopasites) arizonicus*.—Linsley 1951:1208, ♀ ♂ [Arizona and Baja California].—Rozen 1965:87, 88-89, ♀ [Arizona: Southwestern Research Station, near Portal, Cochise County]; 1966:30.

*Holcopasites arizonicus*.—Linsley, MacSwain, and Smith 1956:82 [Mexico: 9 miles southwest of Fresnillo, Zacatecas].—Shinn 1965:15, ♀ [Arizona: 2 miles northeast of Portal, Cochise County]; 1967:850, 929 ♀ [Arizona: 2 miles northeast of Portal, Cochise County].

LOCATION OF TYPE.—California Academy of Sciences, San Francisco.

GEOGRAPHIC RANGE.—Rocky Mountain region of the United States (Idaho, Utah, Colorado, Arizona, and New Mexico) southward into Mexico (Baja, California and Zacatecas).

HOSTS.—*Calliopsis coloradensis* Cresson (confirmed), ?*Pseudopanurgus timberlakei* Cockerell or *P. occidus* Timberlake (unconfirmed) and possibly *Calliopsis pectidis* Shinn and *Pseudopanurgus* sp. (Table 1).

FEMALE.—Head and thorax black, metasoma red or chiefly so, terga sometimes darkened medially; antennae, mandibles, tegulae, and legs usually reddish or dark mahogany brown; calcaria pale to reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, cheeks behind, mesonotal line, anterolateral margins of mesoscutum, mesepisterna, scutellum at sides and behind, metanotum and propodeum at sides, legs basally and on metasoma, especially on terga; dorsal surfaces of head, thorax, and metasoma not conspicuously clothed with golden or reddish golden pubescence. Wings faintly violaceous, lightly tinged with brownish beyond closed cells. Length 4-8 mm. Eyes densely clothed with short, erect pubescence; face above antennae closely and coarsely punctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment as long as or slightly longer than combined length of succeeding two segments; anterior and lateral ocelli separated by less than twice their diameters; interocellar distance shorter than ocellorbital distance; rear angle of mandible situated behind middle of eye; labrum longitudinally carinate medially, without a thornlike tubercle near base, rather closely punctate on basal half or more, and with restricted impunctate or sparsely shiny areas basally; ventral surface of head rather closely punctate especially adjacent to hypostomal carinae. Mesoscutum rather coarsely and nearly rugosopunctate throughout; scutellum entire or at most only weakly indented medially on posterior dorsal surface, not prominently bilobed and strongly elevated posteriorly; metanotum produced posterolaterally into prominent posteriorly projected shelflike processes; mesepisternum rather coarsely and nearly rugosely punctate dorsally and with a large ring-shaped patch of white pubescence; forewing with second submarginal cell not unusually small, more than one-half as long as

first submarginal cell when measured along posterior side; spur of middle leg nearly one-half as long as corresponding basitarsus. Metasomal terga II-IV basally with a transverse band of white pubescence on either side of middle; apical margin of tergum IV with a short band of white pubescence laterally; pygidial plate truncate apically or very nearly so; fifth metasomal sternum with apical margin entire or only slightly incurved medially.

MALE.—Similar to female in coloration of integument and vestiture. Length 4-8 mm. Eyes as densely hairy as in female; face as in female; antennae with first flagellar segment at least equaling combined length of succeeding two segments; ocelli and rear angle of mandible situated as in female; labrum essentially as in female; ventral surface of head rather closely and uniformly punctate, without large and impunctate shiny areas adjacent to hypostomal carinae. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae impunctate and shining laterally. Metasomal terga II-V basally with a transverse band of white pubescence on either side of middle; apical margin of tergum IV with only a short band or spot of white pubescence laterally; apical margin of tergum V usually with a nearly complete transverse band of white pubescence; basin of metasoma not sharply defined, punctured at least at sides; apical margin of sixth metasomal tergum feebly bisinuate in outline, without a median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, nearly right angled on either side of pygidial plate; pygidial plate more than twice as long as maximum basal width, nearly parallel sided, essentially liguliform in outline.

SPECIMENS EXAMINED.—ARIZONA. COCHISE COUNTY: Apache, 13 mi SW, ♂ VIII-14-69 (J.G. and K.C. Rozen, AMNH). Benson, 7 mi W, ♂, IX-3-61, flowers *Heterotheca subaxillaris* (P.H. Timberlake, UCR). Bisbee Mountains, ♂, VIII-26-59 (R.A. Flock, UCR). Douglas, ♂, 2 ♀, VIII-22-68 (J.G. Rozen and M. Favreau, AMNH); ♂, ♀, IX-1-68 (J.G. and M. Favreau, AMNH). Douglas, 1 mi E, ♀, VIII-14-62, flying over surface of ground investigating holes in ground from 11:00-11:20 A.M. (M.A. Cazier, CIS); 6 ♀, VIII-15-62, flying just above ground from 9:30-9:50 A.M. (M.A. Cazier, CIS); ♂, VIII-16-62 (M. Statham, AMNH); 2 ♂, ♀, VIII-17-62 (M. Statham, AMNH); 5 ♂, 4 ♀, VIII-18-62 (M.A. Cazier, CIS); ♂, VIII-19-62,

flowers *Bahia absinthifolia* var. *dealbata* (M.A. Cazier, CIS); 7 ♀, VIII-19-68 (J.G. Rozen, AMNH); 2 ♀, VIII-21-68 (J.G. Rozen and M. Favreau, AMNH). Douglas, 1 mi N, 11 ♂, 5 ♀, VIII-16-62, flowers *Bahia absinthifolia* var. *dealbata* (E.G. Linsley, CIS). Douglas, 5 mi NE, ♀, VIII-22-64, ♂, VIII-23-64 (C.D. Michener, KU). Douglas, 7 mi NE, ♂, ♀, VIII-14-69 (J.G. and K.C. Rozen, AMNH). Hereford, ♂, no data (W.M. Mann, ANSP, Linsley 1942:129). Pearce, 4 mi E (1 mi NW Jct. Hwys. 181 and 666), 3 ♀, IX-27-60 (M.A. Cazier, CIS). Portal, 2 mi NE, 2 ♀, IX-24-61, taken in association with *Calliopsis pectidis* (Shinn 1965:15; 1967:850, M.A. Cazier, CIS); ♀, IX-29-61 (M.A. Cazier, CIS); ♀, X-2-61 (M.A. Cazier, CIS); ♀, VIII-14-62 (H.A. Scullen, GEB); ♂, ♀, VIII-21-62 (J.G. Rozen, M. Statham and S. J. Hessel, AMNH). Portal, 5 mi NE, 10 ♀, IX-28-61 (M. Mortenson and M. Statham, CIS). Portal, 3 mi E, ♀, VIII-24-57 (W.F. Barr, UI). Skeleton Canyon, 6 mi SE, ♀, IX-4-58 (P.D. Hurd, CIS). Southwestern Research Station, 1 ♀, VIII-26-62, specimen labeled #2 in pencil script (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); 2 ♀, VIII-26-62 (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); ♀, same date (M. Statham, AMNH); 3 ♀, VII-28-62, site A (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); ♀, VIII-28-62, site B (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); 8 ♀, VIII-29-62, site A (1 ♀ labeled A-10) (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); 2 ♀, VIII-29-62, site B (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); 2 ♀, XI-3-62 (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); ♀, IX-13-62, flowers *Heterotheca subaxillaris* (J.G. Rozen, AMNH). Wilcox, ♀ VIII-14-58 (R.D. Cardiff, CIS). GILA COUNTY: Globe, 27 mi NE, 2 ♂, IX-1-58 (D.D. Linsdale, UCD). MARICOPA COUNTY: Aguila, ♀, IX-20-53, on flowers *Pectis papposa* (P.H. Timberlake, UCR). Aguila, 18.5 mi W, ♂, IX-5-58, flowers *Baileya pleniradiata* (P.H. Timberlake, UCR). Wickenburg, 5 mi N, ♀, IX-11-57 (T.R. Haig, UCD). MOHAVE COUNTY: Hualapai Mountain Park, ♂, IX-2-61 (J.S. Buckett, UCD). PIMA COUNTY: Tucson, ♂, ♀, VIII-2-09 (A.K. Fisher, Linsley 1942:129); ♂, VIII-14-50 (R.S. Beal, CIS). Tucson, 10 mi S, ♂, VIII-7-40, flowers *Verbesina* (E.S. Ross, CIS). SANTA CRUZ COUNTY: Pena Blanca, 2 mi W, ♀, IX-9-61 (C.W. O'Brien, Stage collection). YUMA COUNTY: Salome, ♀, IX-11-57, flowers *Pectis pap-*

*posa* (P.H. Timberlake, UCR). Yuma, ♂, 3 ♀, V-6-39 (R.M. Bohart, CAS, USNM, Linsley 1942:129). Wellton, ♂, ♀, V-5 to 6-18 (J.C. Bradley, CU).

COLORADO. FREMONT COUNTY: Coaldale, 3 ♂, VIII-11-68, flowers *Chrysopsis villosa* (C.D. Michener, KU). RIO BRANCO COUNTY: Meeker, 23 mi S, 1 ♂, VIII-20-62 (R.M. Bohart, GEB).

IDAHO. FRANKLIN COUNTY: Preston, ♀, VIII-1-66 (G.E. Bohart and Maeta, GEB).

NEW MEXICO. HIDALGO COUNTY: Granite Pass, 2 ♀, VIII-22-58 (P.D. Hurd, CIS); ♀, VIII-25-58 (P.D. Hurd, CIS). Lordsburg, 2 ♂, VIII-24-58 (R.M. Bohart, UCD). Rodeo, ♀, VIII-21-58 (R.M. Bohart, UCD); 2 ♂, 4 ♀, VIII-22-58 (R.M. Bohart, UCD); ♀, same data (C.G. Moore, CIS); ♂, ♀, VIII-26-58 (R.M. Bohart, UCD); ♀, VIII-22-62, flowers *Asclepias* (J.G. Rozen, M. Statham and S.J. Hessel, AMNH); ♂, ♀, VIII-22-64 (C.D. Michener, KU). Rodeo, 1 mi N, ♀, VIII-22-62, asleep on *Eriogonum* (M.A. Cazier and M. Mortenson, CIS); ♀, VIII-26-62 (M.A. Cazier and M. Mortenson, CIS); ♀, VIII-27-70, 10 ♀, VIII-28-70 (J.G. Rozen, AMNH). Rodeo, 2.5 mi N, ♂, IX-7-59, flowers *Baileya pleniradiata* (G.I. Stage). Rodeo, 4.8 mi N, 3 ♀, IX-4-61, flowers *Tidestromia lanuginosa* (P.D. Hurd, Jr. CIS). Rodeo, 11 mi N, VIII-18-68 (J.G. Rozen, AMNH). Rodeo, 18 mi N, ♀, VIII-25-58 (R.H. James, CIS). Rodeo, 7 mi, S, 2 ♂, VIII-21-58 (R.D. Cardiff, CIS).

UTAH. CACHE COUNTY: N. Logan, 5 ♀, VIII-1968, ex *Calliopsis coloradensis* (P. Torchio, GEB). MILLARD COUNTY: ♀, VIII-28-54 (G.F. Knowlton, OSU). SUMMIT COUNTY: Devils Slide, ♂, ♀, VIII-24-62 (G.F. Knowlton, KU). Flowell, ♀, VII-8-62 (G.E. Bohart, GEB). SANPETE COUNTY: Fairview, 4 mi NW, 1 ♀, VIII-18-57 (W.F. Barr, GEB).

MEXICO. BAJA, CALIFORNIA: San Pedro, 18 mi S La Paz, 3 ♂, X-7-41, sweeping flowers of yellow composite (E.S. Ross and G.E. Bohart, CAS, Linsley 1942:129). ZACATECAS: Fresnillo, 9 mi S, 5 ♀, VIII-7 to 14-54, collected at nest site of *Pseudopanurgus* sp. (E.G. Linsley, R.F. Smith, and J.W. MacSwain, CIS, Linsley, MacSwain, and Smith 1956:82, as 9 mi SW of Fresnillo); 6 ♀, VIII-20-56 (J.W. MacSwain, CIS). Tabasco, 5 mi N, 1 ♂, 1 ♀, IX-18-70 (G.E. and R.M. Bohart, GEB).

This species, which is widely distributed over the Rocky Mountain region of the western United States and has been found as far south as Zacatecas in Mexico, is readily recognized by the characteristics

presented in the key to species of the subgenus *Trichopasites*. In one specimen, a female collected at five miles north of Wickenburg, Arizona, the punctures on the face above the antennae are not as closely crowded as is usual for this species and the resulting interspaces are relatively large. In all other respects, however, the specimen is within the observed range of variation for species.

*Holcospites arizonicus* has been collected several times with *H. insoletus* and *H. stevensi* in Arizona, both about nesting sites of their presumed hosts and with one another at the same flowers.

### 3. *Holcospites rozeni* Hurd and Linsley, new species

**FEMALE.**—Head and thorax black, metasoma red, except apically where darkened to largely or entirely black on terminal two or three segments; antennae, mandibles, tegulae, and legs very dark mahogany brown; calcaria dark reddish brown. Vestiture of body chiefly white, not abundant, chiefly appressed and forming patches on face about antennal insertions, dorsolateral angles of pronotum, hind tibiae and metasoma; elsewhere pubescence sparse, chiefly dark and dorsal surfaces of head, thorax, and metasoma not clothed with golden or reddish golden pubescence. Wings feebly violaceous, fuscous beyond closed cells. Length 5-8 mm. Eyes densely clothed with short, erect pubescence; face above antennae closely and coarsely punctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment much shorter than combined length of succeeding two segments; anterior and lateral ocelli separated by nearly twice their diameters; interocellar distance greater than ocellorbital distance; rear angle of mandible situated well behind middle of eye; labrum longitudinally carinate medially, without a thornlike tubercle near base, very densely punctate on basal half, without impunctate or shiny areas basally; ventral surface of head rather closely punctate, without impunctate areas adjacent to hypostomal carinae. Mesoscutum distinctly punctured; scutellum weakly indented medially on posterior dorsal surface, not prominently bilobed, although posterior surface strongly elevated and truncated; metanotum produced posterolaterally into prominent posteriorly projected shelflike processes; mesepisternum distinctly punctured, interspaces shining, without a patch of white pubescence

dorsally; wing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg much shorter than one-half as long as corresponding basitarsus. Metasomal terga I-IV basally with a thin transverse band of white pubescence on either side of middle (virtually absent in the holotype); apical margin of tergum IV with a nearly complete band of white pubescence (feebly expressed in the holotype); pygidial plate evenly rounded apically; fifth metasomal sternum with apical margin deeply emarginate medially.

**MALE.**—Similar to female in coloration of integument and vestiture. Length 4 mm. Eyes as densely hairy as in female; face as in female; antennae with first flagellar segment nearly equaling combined length of succeeding two segments; ocelli and rear angle of mandible situated as in female; labrum as in female; ventral surface of head very densely and closely punctate throughout. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae very nearly punctate throughout. Metasomal tergum I basally with a small transverse band of pale pubescence on either side of middle, tergum II basally with a thin transverse band of white pubescence on either side of middle, and terga III-VI without basal bands of pale pubescence; apical margin of terga IV and V with complete bands of white pubescence; basin of metasoma sharply defined, impunctate; apical margin of sixth metasomal tergum feebly bisinuate in outline, without a median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, nearly right angled on either side of pygidial plate; pygidial plate about twice as long as maximum basal width, broadly liguliform in outline.

**GEOGRAPHIC RANGE.**—Southwestern United States (Arizona) and adjacent northwestern Mexico (Sinaloa and Sonora).

**HOST.**—Unknown.

Holotype female, 16 miles northeast of Douglas, Cochise County, Arizona, 25 August 1962, was collected by J. G. Rozen, M. Statham, and S. J. Hessel and is deposited in the collections of the American Museum of Natural History, New York. The allotype was collected at Magdalena, Sonora, Mexico, on 2 September 1970, by G. E. and R. M. Bohart and is deposited in the collection of Dr. G. E. Bohart. One female paratype was obtained by the Boharts at Culia-

can, Sinaloa, Mexico, on 10 September 1970, and will be deposited in the collection of Dr. G. E. Bohart.

This rather large and distinctive species, which appears to be most closely related structurally to *Holcospasites arizonicus*, is named in honor of Dr. Jerome G. Rozen, Jr., of the American Museum of Natural History in recognition of his untiring efforts to obtain and provide us with specimens and associated data for our investigation of the genus *Holcospasites*. Although the male of *H. rozeni* is somewhat smaller than are the known females, it is anticipated that additional material will substantiate our association of this single specimen with the female of this species. The female is unique among the species of the subgenus *Trichopasites* in having the apical margin of the fifth metasomal sternum deeply emarginate medially. The metasomal terga are provided with much less white pubescence than is evident in any of the other species of the genus.

**Subgenus *Holcospasites* Ashmead**

FIGURES 1, 2-6, 8-11, 13-16

*Holcospasites* Ashmead, 1899:82.—Linsley 1951:1207.  
*Neopasites* authors.—Linsley 1942:127-129; 1943:120-123.  
 —Michener 1944:277.

TYPE-SPECIES.—*Phileremus illinoiensis* Robertson by subsequent designation of Crawford (1915).

Included in this subgenus are the majority of the species of the genus and all have the eyes bare or essentially so. Most of the species are to be found in the southwestern United States, where eight of the twelve known species occur in Arizona. Several of the

species occur in the midwestern United States and two of the species (*Holcospasites calliopsidis* and *H. illinoiensis*) extend into the Atlantic seaboard states. Only one species (*H. bohartorum*) is definitely known to occur in California, though only a few miles from the Arizona border. Four species (*H. calliopsidis*, *H. heliopsis*, *H. pulchellus*, and *H. stevensi*) range into the north-central United States (Montana and/or North Dakota), and all except the first of these also occur in adjacent Canada (Alberta and/or Saskatchewan). Only three of the species (*H. calliopsidis*, *H. illinoiensis* and *H. pulchellus*) have been found in Mexico, and of these only the first and last mentioned have been found appreciably south of the border into central or southern Mexico (Zacatecas and Vera Cruz.) All three of these species are the most wide-ranging species in the genus.

There are two groups of species evident within the subgenus on the basis of the arrangement and extent of the pale pubescence on the metasomal terga. In one of the groups, this pubescence is arranged in the form of discrete spots basally on the metasomal terga (Figures 6-7, 9-11), which in one species (Figure 8) coalesce to form a pair of bilobed bands on each segment. This group may be vernacularly referred to as the Spotted Species Group. The other group of species, termed the Banded Species Group, has the pale pubescence arranged in the form of basal bands laterally on the metasomal terga (Figures 13-16), and in one species these bands coalesce medially to form a single transverse band on two or more terga (Figure 14).

The following key will serve to distinguish these groups of species.

**Key to the Species Groups of the Subgenus *Holcospasites***

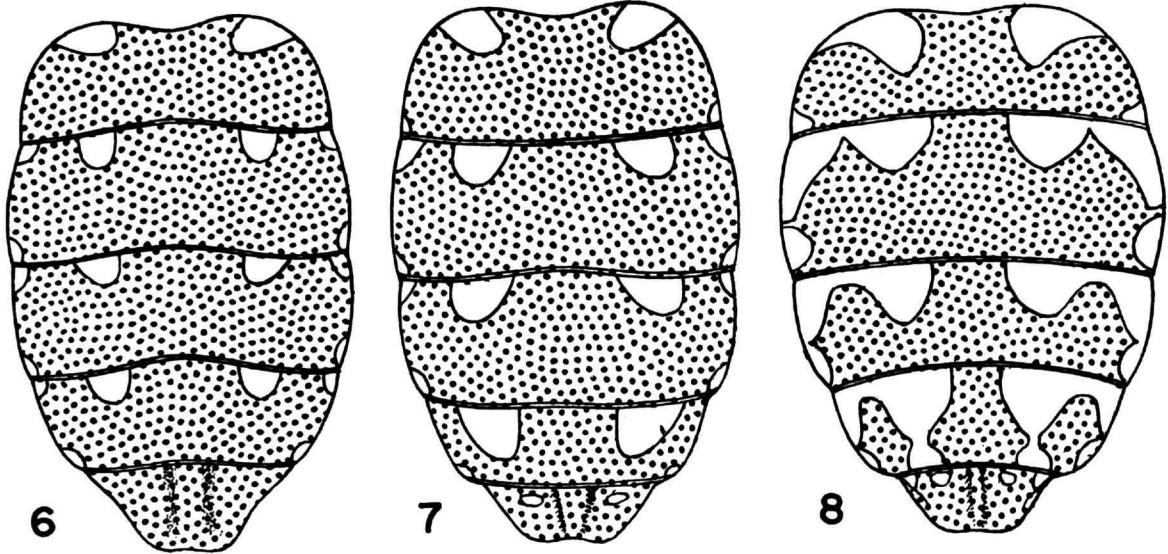
1. Metasomal terga II and III (usually also succeeding terga) basally with two discrete spots of white pubescence on either side of middle (as in Figures 6-7, 9-11) or with the spots narrowly coalesced on either side of middle to form a basal pair of bilobed bands (as in Figure 8) ..... Spotted Species Group
- Metasomal terga II and III (usually also succeeding terga) basally with a transverse band of white pubescence on either side of middle (as in Figures 13, 15-16), which sometimes coalesce medially to form a single transverse band on one or more terga (as in Figure 14) ..... Banded Species Group

**Spotted Species Group**

FIGURES 6, 8-11

The species of this group may be readily recognized by the spots of pale pubescence on the metasomal

terga. In four of the species these spots are discrete, but in *Holcospasites bohartorum* they are narrowly coalesced laterally to form a basal pair of bilobed bands (Figure 8). With the exception of *H. heliopsis*,



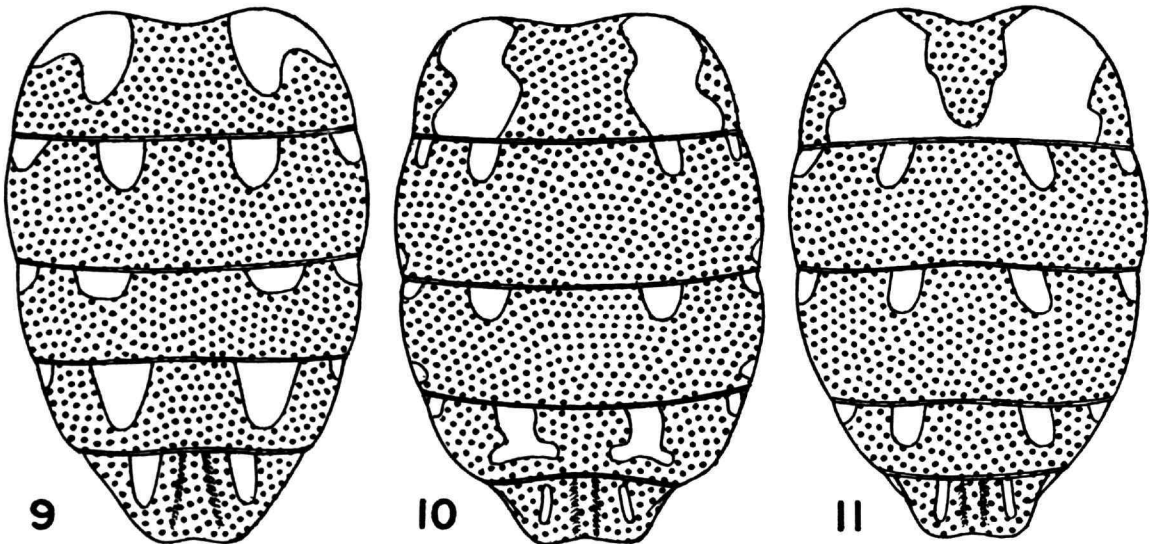
6

**calliopsis**

7

**insoletus**

8

**bohartorum**

9

**heliopsis**

10

**pulchellus**

11

**pulchellus**

FIGURES 6-11.—Diagrammatic representations of the metasoma in dorsal view, females. Pale pubescent areas indicated by unstippled areas.

all of these species are known to occur in Arizona and only two of these have been collected appreciably beyond its borders.

This group contains the smallest known species of the genus (*H. tegularis*) which is further unique among the species of the genus by having the second sub-

marginal cell of the forewing unusually small. This cell is much less than one-half as long as the first submarginal cell when measured along its posterior side.

The species of this group may be separated in the key which follows. The male of *H. apacheorum* is unknown.

### Key to the Species of the Spotted Species Group

- 1. Males<sup>1</sup> ..... 2
- Females ..... 6
- 2(1). Seventh metasomal tergum with lateral margins, as seen from above, nearly right angled on either side of pygidial plate; dorsal surfaces of head, thorax, and metasoma without golden pubescence; metasomal terga reddish or brownish black, sometimes reddened apically ..... 3
- Seventh metasomal tergum with lateral margins, as seen from above, evenly rounded, not angulately produced on either side of pygidial plate; dorsal surfaces of head, thorax, and metasoma usually with conspicuous, though closely appressed, golden pubescence; metasomal terga blackish brown or somewhat reddened apically ..... 4
- 3(2). Metasomal terga II and III (usually also succeeding terga) basally with two discrete spots of white or whitish pubescence on either side of middle (as in Figure 6); interocellar distance much shorter than ocellorbital distance; face below lateral ocelli distinctly punctate ..... 2. *H. calliopsidis*
- Metasomal terga II to IV basally with spots of white pubescence narrowly coalesced on either side of middle to form a basal pair of bilobed bands on each tergum (as in Figure 8); interocellar distance equaling ocellorbital distance; face below lateral ocelli rugose, without distinct punctures ..... 3. *H. bohartorum*
- 4(2). Tegulae impunctate and shining laterally; forewing with second submarginal cell not unusually small, more than one-half as wide as first submarginal cell when measured along posterior side ..... 5
- Tegulae reticulately punctate throughout; forewing with second submarginal cell very small, much narrower than one-half width of first submarginal cell when measured along posterior side ..... 6. *H. tegularis*
- 5(4). Mesepisternum with a large, conspicuous patch of white pubescence; antennae with first flagellar segment shorter than combined length of succeeding two segments ..... 5. *H. pulchellus*
- Mesepisternum without or at most with a small, evanescent, marginal patch of white pubescence; antennae with first flagellar segment at least equaling combined length of succeeding two segments ..... 4. *H. heliopsis*
- 6(1). Rear angle of mandible situated near middle of eye; metanotum produced posterolaterally into prominent, posteriorly projected shelflike processes ..... 7
- Rear angle of mandible situated well behind middle of eye; metanotum without prominent posterolateral processes ..... 8
- 7(6). Metasomal terga II and III (usually also succeeding terga) basally with two discrete spots of white or whitish pubescence on either side of middle (Figure 6); antennae with first flagellar segment equaling combined length of succeeding two flagellar segments ..... 2. *H. calliopsidis*
- Metasomal terga II to IV basally with spots of white pubescence narrowly coalesced on either side of middle to form a pair of bilobed bands (Figure 8); antennae with first flagellar segment much shorter than combined length of succeeding two segments ..... 3. *H. bohartorum*
- 8(6). Labrum closely punctate on basal half or more, without impunctate or sparsely punctate shiny areas basally; mesepisterna rugosopunctate, without clearly defined punctures and shining interspaces ..... 9

<sup>1</sup> The male of *H. apacheorum* is unknown.

- Labrum not closely punctate on basal half, with large impunctate or sparsely punctate areas basally; mesepisterna distinctly punctate, the punctures well separated, interspaces usually shining ..... 10
- 9(8). Scutellum deeply cleft medially to base, prominently bilobed and posteriorly elevated; forewing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side ..... 4. *H. heliopsis*
- Scutellum entire or at most only weakly indented medially on posterior dorsal surface, not prominently bilobed and elevated posteriorly; forewing with second submarginal cell unusually small, much shorter than one-half as long as first submarginal cell when measured along posterior side ..... 6. *H. tegularis*
- 10(8). Mesepisternum with a large, conspicuous patch of white pubescence; metasomal terga darkly colored, sometimes with apical margins of terga reddened; dorsal surfaces of head and thorax thickly clothed with golden or reddish-golden pubescence ..... 5. *H. pulchellus*
- Mesepisternum without a large and conspicuous patch of white pubescence, at most with only an irregularly evanescent outline of a patch; metasomal terga almost entirely red; dorsal surfaces of head and thorax predominantly clothed with white pubescence, sometimes with almost inconspicuous golden or reddish-golden pubescence intermixed ..... 1. *H. apacheorum*

**1. *Holcopsites apacheorum* Hurd and Linsley,  
new species**

*Neopasites (Neopasites) pulchellus*, in part (not Cresson 1878), Linsley 1943:133 [Cimmaron, New Mexico, record only].

**GEOGRAPHIC RANGE.**—Southwestern United States (Arizona and New Mexico).

**HOST.**—Unknown.

**FEMALE.**—Head and thorax black, metasoma red; antennae black; mandibles dark reddish brown, rufotestaceous medially; tegulae dark mahogany red, paler marginally; legs dark reddish brown, hind tibiae extensively rufotestaceous; calcaria pale rufotestaceous. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, hind margins of head, mesonotal line, dorsolateral angles of pronotum, mesoscutum circumferentially, mesepisterna, scutellum medially and circumferentially, metanotum and propodeum at sides, legs basally and on metasoma, especially on terga; dorsal surfaces of head and mesoscutum anteriorly with an admixture of some golden and reddish golden pubescence. Wings faintly violaceous, rather heavily infuscated with black apically. Length 7-8 mm. Eyes bare; face above antennae closely and coarsely punctate, neither gibbously swollen nor largely impunctate; antennae with first flagellar segment much shorter than combined length of succeeding two segments; anterior and lateral ocelli separated by much less than twice their diameters; interocellar and ocellorbital

distances about equal; rear angle of mandible situated well behind middle of eye; labrum longitudinally carinate medially, without a thornlike tubercle near base, rather sparsely and irregularly punctate on basal half, and with conspicuous impunctate areas basally; ventral surface of head moderately densely punctate adjacent to hypostomal carinae, without large impunctate areas. Mesoscutum rather coarsely and contiguously punctate throughout; scutellum nearly entire, only weakly indented medially along posterior surface, not prominently bilobed and scarcely elevated posteriorly; metanotum weakly produced posterolaterally into shelflike processes, mesepisterna coarsely and contiguously punctate on vertical surface and with an incompletely developed patch of white pubescence dorsally; wing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg about one-third as long as corresponding basitarsus. Metasomal terga II-IV basally with two spots of white pubescence on either side of middle; apical margin of tergum IV without white pubescence; pygidial plate truncate apically; fifth metasomal sternum angularly emarginate apically.

**MALE.**—Unknown.

Holotype female and two paratypes (females) were collected at Apache, Cochise County, Arizona, on 27 August 1968, by J. G. Rozen and M. Favreau. The holotype and one of the paratypes are in the collections of the American Museum of Natural History;

the other paratype is deposited in the collections of the National Museum of Natural History, Washington, D.C.

*Holcopsites apacheorum* is structurally related to *H. pulchellus*, but is abundantly distinct from that species most notably by the characters enumerated in the key to the Spotted Species Group of *Holcopsites* proper. We have been unable to recognize the male among material available to us and conclude that it has not been collected as yet.

## 2. *Holcopsites calliopsidis* (Linsley)

*Neopasites* (*Neopasites*) *calliopsidis* Linsley, 1943:124, 126, 137-138, ♀ ♂.

GEOGRAPHIC RANGE.—Northeastern, central, and southwestern United States and Mexico.

HOSTS.—*Calliopsis andreniformis* Smith (confirmed) and possibly *Psuedopanurgus* sp. (Table 1).

FEMALE.—Head and thorax black, clypeus apically rufotestaceous metasoma red, orange, yellow, or black, usually with at least some red, orange, or yellow laterally and apically, though sometimes extensively and nearly entirely black or brownish black; antennae, tegulae, and legs usually reddish brown or deep mahogany red; mandibles extensively rufotestaceous; calcaria pale reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, usually on hind margins of head, mesonotal line, dorsolateral surfaces of pronotum, mesoscutum circumferentially, mesepisterna, scutellum at sides and medioapically, metanotum, propodeum at sides, legs basally and on metasoma, especially on terga; dorsal surfaces of head, thorax, and metasoma without golden or reddish golden pubescence. Wings faintly violaceous, feebly infuscated apically. Length 4-6 mm. Eyes bare or at most with a few, scattered, minute hairs; face above antennae closely and rather coarsely punctate, neither bigibbose-swollen nor largely impunctate; antennae with first flagellar segment equaling combined length of succeeding two segments; anterior and lateral ocelli separated by much less than twice their diameters; interocellar distance slightly less than ocellorbital distance; rear angle of mandible situated near middle of eye; labrum at most obsolescently carinate longitudinally, without a thornlike tubercle basally, irregularly and variably punctate on basal half or more, usually impunctate

mediolongitudinally; ventral surface of head finely, though irregularly and sparsely, punctate adjacent to hypostomal carinae. Mesoscutum coarsely and closely punctate, very nearly rugosopunctate throughout; scutellum entire or at most only weakly indented medially on posterior dorsal surface, not prominently bilobed though moderately elevated posteriorly; metanotum produced posterolaterally into well-developed posteriorly projected shelflike processes; mesepisternum densely and nearly rugosely punctate dorsally and with an irregularly and variably developed ring-like patch of white pubescence; forewing with second submarginal cell not unusually small, one-half or more as long as first submarginal cell when measured along posterior side; spur of middle leg nearly one-half as long as corresponding basitarsus. Metasomal terga II-IV basally with two discrete spots of white pubescence on either side of middle, dorsal surface of first metasomal tergum usually with a large irregular patch of white pubescence on either side of middle; apical margin of tergum IV with four nearly equidistant small spots of white pubescence; pygidial plate apically rounded; fifth metasomal sternum entire or at most only weakly incurved medially.

MALE.—Similar to female in coloration of integument and vestiture. Length 3.5-6 mm. Eyes bare or at most with a few, scattered, minute hairs; face as in female; antennae with first flagellar segment longer than combined length of succeeding two segments; ocelli and rear angle of mandible situated as in female; labrum as in female; ventral surface of head somewhat more closely punctate than in female, but with large polished and shining interspaces. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae punctate throughout. Metasomal terga II-VI basally with two discrete spots of white pubescence on either side of middle, dorsal surface of first metasomal tergum with an irregular patch of white pubescence on either side of middle; apical margin of tergum IV with a short band of white pubescence laterally; apical margin of tergum V with four nearly equidistant short bands or spots of white pubescence; basin of metasoma not sharply defined, punctured at least laterally; apical margin of sixth metasomal tergum neither bisinuate in outline nor with a median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, nearly right angled on either side of pygidial plate; pygidial plate less than twice as long as maxi-

mum basal width, rather broadly liguliform in outline.

This species, which is one of the more easily distinguishable species of the subgenus *Holcopasites*, is the most wide-ranging species of the genus. There is

a good deal of variation in the coloration of the metasoma; however, on the basis of colorational features of the metasomal terga two geographically segregable subspecies are recognizable.

### Key to the Subspecies of *Holcopasites calliopsidis*

1. Metasomal terga extensively or entirely red or orange ..... *calliopsidis*  
 Metasomal terga extensively brownish black or dark in coloration, apically margined with yellowish or orange ..... *carinatus*

### *Holcopasites calliopsidis calliopsidis* (Linsley), new status

FIGURES 2, 6

*Neopasites illinoiensis*.—authors, not Robertson 1891, Crawford 1903:334 [Nebraska: Lincoln and West Point, 4-11 September, *Solidago rigida*, and *Grindelia squarrosa*].—Swenk 1907:297 [Nebraska: Lincoln, West Point, Cedar Bluffs, and Omaha at flowers of *Solidago rigida* and *Grindelia squarrosa* in fall and at flowers of *Ratibida columnaris*, *Symphoricarpos occidentalis*, and *Asclepias* in the summer. Note: Some of these records evidently also apply to *Holcopasites stevensi*, q.v.].

*Neopasites pulchellus*.—authors, not Cresson, 1878, Cockerell and Robbins 1910:190 [Colorado: Colorado Springs].

*Holcopasites pulchellus*.—authors, not Cresson 1878, Cockerell 1928:111; 1934:12 [Colorado: Denver].

*Holcopasites stevensi*.—authors, not Crawford 1903, Popov 1933:62-63, fig. 5b, fig. 7, ♂ ♀ [Iowa: Sioux City].—Ainslie 1937: 99-100 [Iowa: Sioux City].

*Holcopasites illinoiensis*.—not Robertson 1891, Ainslie 1937: 255.

*Neopasites (Neopasites) pulchellus*, in part, (not Cresson 1878), Linsley 1943:133 [Colorado records only; New Mexico records apply to *Holcopasites calliopsidis calliopsidis*, q.v.].

*Neopasites (Neopasites) calliopsidis* Linsley, 1943:124, 126, 137-138, ♀ ♂ [Iowa: Sioux City. Kansas: Manhattan. Montana: Forsyth]; 1944:280 [Colorado: Boulder on *Chrysopsis*; 2 miles north of Boulder on *Chrysopsis*; and Cuchara Camps, Spanish Peaks, elevation 8,000 ft., on *Aster*].

*Holcopasites (Holcopasites) calliopsidis*.—Linsley 1951: 1207, ♀ ♂ [Iowa, Kansas, Montana, and Colorado].—Linsley, MacSwain, and Smith 1956:82 [Mexico: nine miles southwest of Fresno in Zacatecas].—Mitchell 1962: 486-487, table 16, ♀ ♂ [Minnesota to Michigan, south to Tennessee].—Rozen 1966:33 [New Jersey: Watchung Reservation, Union County. Pennsylvania: Brookville, Jefferson County]; Krombein 1967:498.

*Holcopasites calliopsidis*.—Shinn 1967:928-929 ["... parasitizes *Calliopsis andreniformis* at Lawrence, Kansas; Nacogdoches, Texas; Knoxville, Tennessee; and apparently in Iowa and Illinois"].

*Holcopasites pseudocarinatus* Mitchell, 1962:486, 489-490, table 16, ♀ [Wisconsin: U. Hill Farm, Madison. New synonymy].

*Holcopasites (Holcopasites) pseudocarinatus*.—Krombein 1967:499.

LOCATION OF TYPES.—*H. calliopsidis*, Academy of Natural Sciences, Philadelphia; *H. pseudocarinatus*, North Carolina State University, Raleigh.

GEOGRAPHIC RANGE.—Northeastern, central, and southwestern United States (Arizona, Colorado, Illinois, Iowa, Kansas, Kentucky, Michigan, Missouri, Montana, Nebraska, New Jersey, New York, North Dakota, Tennessee, Texas, Utah, and Wisconsin) and southward into Mexico (Zacatecas).

HOSTS.—*Calliopsis andreniformis* Smith (confirmed) and possibly *Pseudopanurgus* sp. (Table 1).

SPECIMENS EXAMINED.—ARIZONA. COCONINO COUNTY: Flagstaff, 2 ♀, VIII-7 to 9-59 (K.V. Krombein, USNM).

COLORADO. "1604", ♂ (USNM). ARAPAHOE COUNTY: Littleton, ♂, VI-22-11 (AMNH). BOULDER COUNTY: ♂, VII-6-26 (C. H. Hicks, UCR). Boulder, ♂, ♀, VI-26-39, flowers *Chrysopsis* (P. H. Timberlake, UCR); ♀, VI-28-39, flowers *Chrysopsis* (P. H. Timberlake, UCR). Boulder, 2 mi N, ♀, VI-25-39, flowers *Chrysopsis* (P. H. Timberlake, UCR). Longmont, 2 ♀, VI-10 to 12-40 (L. Lanham, CIS). DENVER COUNTY: Denver, ♂, VI-18-18 (E. C. Jackson, CIS); ♂, VII-4-45 (R. W. L. Potts, CIS). HUERFANO COUNTY: Cuchara Camps, Spanish Peaks, 8,000 ft, 2 ♂, VII-4-39, flowers *Aster* (P. H. Timberlake, UCR).

ILLINOIS. CHAMPAIGN COUNTY: Urbana, ♀, VII-1-63 (E. R. JAYCOX, GEB); ♀, VI-25-64 (E. R. JAYCOX, GEB). JACKSON COUNTY: Carbondale, ♂, V-16-57 (D. Koehler, UCD); ♀, V-31-57 (J. C. Downey, UCD). MADISON COUNTY: Edwardsville, ♂, VI-4-41 (H. H. Ross and Mohr, INHS). UNION

COUNTY: Giant City State Park, ♀, VII-6-63 (R. M. Bohart, UCD). WABASH COUNTY: Mount Carmel, ♀, VI-6-41 (H. H. Ross and Mohr, INHS).

IOWA. COUNTY #28, ♂, VI-20-34 (H. C. Knutson, USNM). COUNTY #32, ♂, VII-7-34 (H. E. Jaques, USNM). BOONE COUNTY: Boone, 7 mi NE, 6♂, 4♀, VI-22-56 (W. E. LaBerge, UN). Boone, 13 mi NW, ♀, VIII-6-56 and ♀, VIII-14-56 (W. E. LaBerge). CARROLL COUNTY: Carroll, 9♂, 2♀, VI-8-63 (R. M. Bohart, UCD). JOHNSON COUNTY: Iowa City, ♂, VI-20-63 (R. M. Bohart, UCD). STORY COUNTY: Ames, ♂, VIII-8-58 (D. A. Haws, GEB). Ames, 2 mi N, 2♀, VII-6-56 (W. E. LaBerge, UN). WOODBURY COUNTY: Sioux City (all collected by C. N. Ainslie), 2♂, 12♀, no date (AMNH, CIS, KU, UCR); ♀, VII-8-21 (AMNH); ♀, VII-19-24 (AMNH); 4♀, VI-26-26 (AMNH); 2♂, 2♀, VII-3-26 (AMNH, CIS, KU, USNM); 2♀, VIII-5-27 (CIS, USNM); ♀, VIII-22-27 (KU); 3♀, VII-20-28 (CIS, USNM); 4♀, VII-13-29 (USNM); ♀, VI-4-30 (CIS); 2♂, ♀, VI-14-30 (USNM); ♂, 7♀, VII-3-30 (CAS, CIS, USNM); 25♀, VII-5-30 (CIS, USNM); ♂♀, VI-9-31 (ANSP, CAS, CIS, UCR); ♀, VI-13-31 (CIS); VII-2-35 (USNM); 28♂, 2♀, VI-19-36 (USNM); ♀, VI-2-37 (CAS); ♂, VI-21-37 (UCR); ♀, VI-16-38 (USNM); ♀, VI-13-40 (KU).

KANSAS. DOUGLAS COUNTY: ♂, ♀, VI-1-49, flowers *Melilotus officinalis* (R. H. Beamer, KU); ♂, ♀, VI-10-51, at nesting site of *Calliopsis andreniformis* (J. G. Rozen, AMNH); 2♀, VI-17-51 (J. G. Rozen, AMNH); ♂, V-24-62 (W. J. Hanson, KU). Lawrence, 2♀, VI-11-51, flowers *Melilotus* sp. (W. E. LaBerge, UN); ♀, VI-20-52 (C. D. Michener, KU); ♂, VI-28-57 (A. F. Shinn); ♂, VI-11-59 (E. Ordway, KU); 20♀, VI-13-63 (D. W. Ribble). Lawrence, 10 mi W ♀, VI-12-50 (J. R. White, KU). Potter Lake (southeast of), Lawrence, VI-12-57, sweeping flowers *Trifolium repens* (A. F. Shinn). Sunnyside, Lawrence, ♂, ♀, VI-12-57 and ♀, VI-18-57, sweeping flowers *Trifolium repens* (A. F. Shinn). RILEY COUNTY: Manhattan, ♀, VI-11-32 (C. W. Sabrosky, KU); ♂, VI-16-57 (E. F. Martinez, Shinn).

KENTUCKY. HARDIN COUNTY: Fort Knox, ♂, VII-8-63 (P. E. Adams, UCD).

MINNESOTA. GOODHUE COUNTY: Redwing, 11 mi S, VIII-21-60 (J. R. Powers, CIS).

MISSOURI. HENRY COUNTY: Clinton, 2♀, VII-9-63 (R. M. Bohart, UCD).

MONTANA. ROSEBUD COUNTY: Forsyth, ♀ (C. N. Ainslie, CIS).

NEBRASKA. CUMING COUNTY: Westpoint, ♂, VI-12-05 and 12♂, 11♂, VI-22-05 (H. S. Smith, UN); ♂, VI-20, flowers of daisy (UN); 20♂, VI-27, flowers *Ratibida* (UN, CIS); 2♂, VI-27, flowers *Symphoricarpos* (UN). DIXON COUNTY: Concord, ♂, 2♀, VII-14-15, flowers *Solidago* (E. G. Anderson, UN). DOUGLAS COUNTY: Omaha, 3♂, 4♀, VII-4-06 (F. H. Shoemaker, UN); ♀, VII-1-13 (L. T. Williams, UN); ♂, ♀, VI-23-14, flowers *Achillea millefolium* (L. T. Williams, UN). LANCASTER COUNTY: Lincoln, ♀, VI-28-10 (R. W. Dawson, UN); ♂, VI-30-10 (F. A. Burnham, UN); ♂, VIII-6-16, flowers *Solidago* (M. H. Swenk, UN). Malcom, 2♀, VI-18-59, flowers *Melilotus* (W. E. LaBerge, UN). Roca, ♂, VI-28-10, sucking nectar from *Anthemis cotula* (M. H. Swenk, UN). RICHARDSON COUNTY: Rulo, ♂, VII-1-15 (E. V. Partridge, UN). SAUNDERS COUNTY: Cedar Bluffs, 3♀, VII (H. S. Smith, UN).

NEW JERSEY. BERGEN COUNTY: Closter, ♀, VI-18-63, taken at *Calliopsis* nesting site (M. Statham, AMNH). MORRIS COUNTY: Farrington Lake, ♂, VI-24-62 (D. R. Whitehead, CIS). Morris Plains, ♀, VII-20-58 (D. R. Whitehead, CIS). UNION COUNTY: Watchung Reservation, ♂, VII-5-64 and 4♀, VIII-3-64, nest site 66 (A. R. Moldenke, AMNH).

NEW YORK. ALBANY COUNTY: Partridge Run St. Game Area, 4 miles north of Rensselaerville, 2♀, VII-20-70, "in nest area of *Calliopsis andreniformis*" (G. and K. Eickwort, CU). RENSSELAER COUNTY: Brainard, ♀, VII-11 to 22-66 (P. and B. Wygodzinsky, AMNH).

NORTH DAKOTA. CASS COUNTY: Fargo, ♀, IX-11-41, flowers *Cleome lutea* (O. A. Stevens, AMNH). MORTON COUNTY: Mandan Ullin, 10 mi W, 5♂, 2♀, VIII-7-62, associated with *Calliopsis* (J. G. and B. L. Rozen, AMNH). SLOPE COUNTY: Marmarth, 3♀, VII-4-49, flowers *Lactuca pulchella* (O. A. Steven, AMNH).

TENNESSEE. ANDERSON COUNTY: White Oak Lake, Atomic Energy Commission area, Oak Ridge, ♂, VII-15-57 (H. F. Howden, Shinn).

TEXAS. NACOGDOCHES COUNTY: Nacogdoches, 2♀, V-17-62 (A. F. Shinn).

UTAH. IRON COUNTY: Parowan Canyon, 5♂, 1♀, V-28-50 (G. E. Bohart, GEB). SAN JUAN COUNTY: La Sal Junction, 6 mi N, ♀, X-3-65 (R. W. Thorp, UCD).

WISCONSIN. DANE COUNTY: University Hill Farm, Madison, ♀, VIII-6-46, on flowers sweet clover (J. T. Medler, UNC).

MEXICO. ZACATECAS: Fresnillo, 9 mi SW, 7♀, VIII-7 to 14-56, associated with nests of *Pseudopanurgus* (E. G. Linsley, J. W. MacSwain, and R. F. Smith, CIS, Linsley, MacSwain and Smith, 1956:82); 11♀, VIII-20-56 (J. W. MacSwain, CIS).

*Holcopasites calliopsidis* proper is perhaps the most common member of the genus. It occurs over a large area of the United States and has been found as far south as Zacatecas in Mexico. It is geographically replaced in southern Texas and eastern Mexico by the generally more darkly colored *H. calliopsidis carinatus*. An examination of the holotype of *H. pseudocarinatus* Mitchell reveals that the specimen agrees in all essential characteristics with the holotype of *H. calliopsidis* and is accordingly placed in synonymy.

***Holcopasites calliopsidis carinatus* (Linsley),  
new status**

*Neopasites* (*Neopasites*) *carinatus* Linsley, 1943:124, 127-128, ♀ [Texas: Hidalgo County].

*Holcopasites* (*Holcopasites*) *carinatus*.—Linsley 1951:1207, ♀ [Texas].

LOCATION OF TYPE.—University of Kansas, Lawrence.

GEOGRAPHIC RANGE.—Southern Texas and eastern Mexico (Hidalgo, San Luis Potosi, and Vera Cruz).

HOST.—Unknown.

SPECIMENS EXAMINED.—UNITED STATES. TEXAS. BRAZORIA COUNTY: Sweeney, ♂, V-6-53, flowers *Teucrium* (R. H. Beamer, KU). CAMERON COUNTY: Brownsville, ♀, June (2382, KU). Southmost, ♂, IV-13-50 (R. H. Beamer, C. D. Michener, J. G. Rozen, and W. P. Stephen, KU); ♂, ♀, VI-13-53, flowers *Lippia* (University of Kansas Expedition, KU). HIDALGO COUNTY: ♀, VII-30-38 (R. H. Beamer, KU). Progresso, ♀, IV-12-50 (R. H. Beamer, C. D. Michener, J. G. Rozen, and W. P. Stephen, KU).

MEXICO. HIDALGO: Pachuca, 14 mi SW, 7,500 ft, ♂, 2♀, VII-9-61 (University of Kansas Mexican

Expedition, KU). Tezontepec, 21 mi SW of Actopan, 6,600 ft, ♂, VIII-27-62 (E. Ordway and N. Marston, KU). SAN LUIS POTOSI: Ciudad del Maiz, 5 mi E, 4,700 ft, ♂, VIII-22 to 23-54 (University of Kansas Mexican Expedition, KU). Ciudad del Maiz, 13 mi E, 3,700 ft, ♂, VII-23-62 (University of Kansas Mexican Expedition, KU). El Salto, 1,800 ft, ♂, VI-8-61, flowers *Kallstroemia hirsutissima* (University of Kansas Mexican Expedition, KU). VERACRUZ: Sayula, 3 mi N, ♂, IV-18-53 (R. C. Bechtel and E. I. Schlinger, CIS).

*Holcopasites calliopsidis carinatus*, which was previously known only from the holotype female, is now known to occur from southern Texas (the type locality) to southern Mexico (Vera Cruz). The male is very similar in appearance to the female in the dark coloration of the metasomal terga. Since we have been unable to find any structural differences between this and *H. calliopsidis*, and since these nominal forms occupy allopatric ranges, we consider them to be subspecies of the same species. *H. calliopsidis carinatus* has the metasoma chiefly brownish black or dark in coloration with apices of the terga margined with yellow or orange.

**3. *Holcopasites bohartorum* Hurd and Linsley,  
new species**

FIGURE 8

FEMALE.—Head and thorax black, metasoma red or chiefly so, terga sometimes clouded or darkened medially; antennae and legs dark reddish brown or black; mandibles, anterior margin of clypeus, and tegulae rufotestaceous in coloration; calcaria reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, head posteriorly, mesonotal line, dorsolateral surfaces of pronotum, mesoscutum circumferentially, mesepisterna, scutellum marginally and medioapically, metanotum laterally and medially, propodeum at sides, legs, especially coxae, femora, and tibiae, and on metasoma, particularly on terga; dorsal surfaces of head, thorax, and metasoma not conspicuously clothed with golden or reddish golden pubescence. Wings feebly violaceous, lightly infuscated apically. Length 6-7 mm. Eyes bare; face above antennae closely and coarsely punctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment shorter than combined

length of succeeding two segments; anterior and lateral ocelli separated by less than twice their diameters; interocellar distance about equal to ocellorbital distance; rear angle of mandible situated near middle of eye; labrum not longitudinally carinate medially, without a thornlike tubercle near base, not closely punctate on basal half, with large impunctate or sparsely punctate shiny areas basally; ventral surface of head sparingly punctate, largely impunctate areas adjacent to hypostomal carinae. Mesoscutum coarsely and rugosopunctate throughout; scutellum at most only weakly indented medially behind, not prominently bilobed and not strongly elevated posteriorly; metanotum produced posterolaterally into prominent posteriorly projected shelflike processes; mesepisternum coarsely and rather rugosely punctate dorsally with a large, irregularly ring-shaped patch of white pubescence above; wing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg nearly one-half as long as corresponding basitarsus. Metasomal terga II-IV basally with two spots of white pubescence (narrowly coalesced) on either side of middle to form a basal pair of bilobed bands, dorsal surface of first metasomal tergum similarly pubescent; apical margin of tergum IV with four nearly equidistant short bands or spots of white pubescence; pygidial plate obtusely rounded apically; fifth metasomal sternum nearly truncate apically, not emarginate medially.

**MALE.**—Similar to female in coloration of integument and vestiture. Length 6 mm. Eyes bare; face and antennae as in female; ocelli and rear angle of mandible situated as in female; labrum longitudinally carinate medially, somewhat more closely and densely punctate than in female; ventral surface of head rather closely and coarsely punctate adjacent to hypostomal carinae, interspaces polished and shining. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae very nearly punctate throughout. Metasomal terga II-VI basally with two discrete spots of white pubescence (narrowly coalesced) on either side of middle to form a basal pair of bilobed bands, dorsal surface of first metasomal tergum with a patch of white pubescence on either side of middle; apical margin of tergum IV with a short band of white pubescence laterally; apical margin of tergum V with four nearly equidistant short bands of white pubescence; basin of metasoma not

sharply defined, punctured at least at sides; apical margin of sixth metasomal tergum neither bisinuate in outline nor with a median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, strongly right angled on either side of pygidial plate; pygidial plate more than twice as long as maximum basal width parallel sided, narrowly liguliform in outline.

**GEOGRAPHIC RANGE.**—Southwestern United States (Arizona and adjacent southeastern California).

**HOST.**—Unknown.

Holotype male, Kingman, Mohave County, Arizona, 9 May (G. F. Knowlton), is deposited in the collections of the California Academy of Sciences, San Francisco. Allotype female, eighteen miles west of Blythe, Riverside County, California, was collected 3 April 1963, by R. M. Bohart where he had previously (9 April 1962) taken two females (paratypes). The allotype is in the collection of G. E. Bohart, and the paratypes are deposited in the insect collections of the University of California, Davis. An additional paratype female was collected at Granite Reef Dam, Maricopa County, Arizona, on 16 June 1964, by M. A. Cazier and M. Mortenson and is property of the California Insect Survey, University of California, Berkeley.

Although the patterning of the white pubescence on the metasomal terga of *Holcopsites bohartorum* (Figure 8) is unique among the Spotted Species Group of the subgenus *Holcopsites* (Figures 6-11) in that the spots on either side of the midline are narrowly coalesced to form somewhat bilobed basal bands, it is evident from the other characteristics of this species, presented in the description above, that this species is more closely related to this group of species than it is to those assigned to the Banded Species Group (see Figures 13-16 by way of comparison). *H. bohartorum*, which we dedicate to Drs. G. E. and R. M. Bohart, is one of the larger species of the subgenus and is structurally most closely related to *H. calliopsis*.

#### 4. *Holcopsites heliopsis* (Robertson)

FIGURE 9

*Ammobates heliopsis* Robertson, 1897:352-353, ♂ [Illinois: Carlinville].

*Neopasites heliopsis*.—Robertson 1900:55 [Illinois].—Crawford 1903:334 [Nebraska: West Point and Lincoln, on flowers *Aster*, *Grindelia squarrosa*, and *Solidago rigida*].—

Swenk 1907:298 [Nebraska: Lincoln, West Point, Springview, and Warbonnet Canyon, Sioux County on flowers *Aster*, *Grindelia squarrosa*, and *Aster* in the fall, and on *Senecio* in the summer].—Ducke 1908:45.—Linsley 1944:280 [Montana: Winnecook].—Stevens 1951:204, fig. 1 [North Dakota: Drake, Fargo, Hatton, Mandan, McKenzie, Tolley, Valley City, Wales, and Williston, mostly at gumweed, also golden aster (*Chrysopsis*), *Cleome lutea*, fleabane, and *Solidago canadensis*].

*Holcopasites heliopsis*.—Cockerell and Robbins 1910:190 [Colorado: Boulder at flowers *Grindelia*].—Crawford 1915:124, ♀ ♂; Cockerell 1928:111 [Colorado: Boulder].

*Neopasites (Neopasites) heliopsis*.—Linsley 1943:124, 125, 129–130, ♀ ♂ [Alberta: Lethbridge and Alberta. Arkansas: Ouachita Mountains, 2.5 miles north of Ft. Smith. Colorado: Boulder. Iowa: Sioux City. Montana: Winnecook. Nebraska: Lincoln and West Point. North Dakota: Fargo, Marmath, McKenzie, Minot, Mott, and Nicholson. Flower records: *Brauneria pallida*, *Grindelia squarrosa*, *Mentha canadensis*, and *Ratibida columnaris*].

*Holcopasites (Holcopasites) heliopsis*.—Linsley 1951:1207, ♂.—Mitchell 1962:486, 487–499, ♀ ♂ [Colorado to North Dakota and Illinois].—Krombein 1967:498.

*Holcopasites lutzi* Cockerell, 1934:12, ♂ [Colorado: Wray]. [New synonymy.]

*Neopasites (Neopasites) lutzi*.—Linsley 1943:125, 132, ♂.  
*Holcopasites (Holcopasites) lutzi*.—Linsley 1951:1208, ♂ [Colorado].

LOCATION OF TYPES.—*H. heliopsis*, Illinois Natural History Survey, Urbana; *H. lutzi*, American Museum of Natural History, New York.

GEOGRAPHIC RANGE.—Southern Canada (Alberta) and north-central United States (Arkansas, Colorado, Illinois, Iowa, Kansas, Montana, Nebraska, and North Dakota).

HOST.—*Calliopsis nebraskensis* Crawford (unconfirmed, see Table 1).

FEMALE.—Head and thorax black, metasoma dark reddish brown or deep mahogany red, apical margins of metasomal terga yellow, orange or pale reddish brown in coloration; antennae, clypeus apically, mandibles, pronotal tubercles, tegulae, and legs usually reddish brown; calcaria pale reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, hind margins of head, dorsolateral surfaces of pronotum, mesonotal line, mesoscutum anterolaterally, mesepisterna marginally, scutellum laterally and mediolongitudinally, metanotum and propodeum at sides, legs basally and on metasoma, especially on terga; dorsal surfaces of head, thorax, and metasoma usually with almost inconspicuous golden or reddish golden pubescence intermixed. Wings feebly vio-

laceous, rather distinctly brownish apically. Length 5–7 mm. Eyes bare or at most with a few, scattered, minute hairs; face above antennae coarsely rugosopunctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment shorter than combined length of succeeding two segments; anterior and lateral ocelli separated by much less than twice their diameters; interocellar distance shorter than ocellorbital distance; rear angle of mandible well behind middle of eye; labrum longitudinally carinate medially, without a thornlike tubercle near base, closely punctate on basal half or more, without impunctate or sparsely punctate shiny areas basally; ventral surface of head rather closely and coarsely punctate especially adjacent to hypostomal carinae. Mesoscutum coarsely and rugosopunctate throughout, scutellum deeply cleft mediolongitudinally to base, prominently bilobed and elevated posteriorly; metanotum without prominent posterolateral shelf-like processes; mesepisternum rugosopunctate, without clearly defined punctures and without shining interspaces, without or at most with a small, evanescent, marginal patch of white pubescence; forewing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg more than one-half as long as corresponding basitarsus. Metasomal terga II–IV (and sometimes V also) basally with two discrete spots of white or yellowish white pubescence on either side of middle, dorsal surface of first metasomal tergum with a quasicrescentic spot of white (or yellowish white) pubescence laterally; apical margin of tergum IV without or with evanescent spots of whitish (or yellowish) pubescence laterally; pygidial plate truncate apically, rounded laterally; fifth metasomal sternum angularly emarginate medially.

MALE.—Similar to female in coloration of integument and vestiture. Length 5–6 mm. Eyes and face as in female; antennae with first flagellar segment at least equaling combined length of succeeding two segments; ocelli and rear angle of mandible situated as in female; interocellar and ocellorbital distance about equal; labrum essentially as in female; ventral surface of head rather more closely and uniformly more punctate than in female, otherwise similar. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae impunctate and shining laterally. Metasomal terga II–V basally with two

discrete spots of white (or yellowish white) pubescence on either side of middle, dorsal surface of first metasomal tergum with similar quasicrescentic spots of white (or yellowish) pubescence evident in female; apical margins of terga IV and V without or with evanescent spots of whitish (or yellowish) pubescence laterally; basin of metasoma not sharply defined, punctured at least at sides; apical margin of sixth metasomal tergum not bisinuate in outline, without a well-defined triangular projection medially; seventh metasomal tergum with lateral margins, as seen from above, evenly rounded, not angulately produced on either side of pygidial plate; pygidial plate more than twice as long as maximum basal width, parallel sided, narrowly liguliform in outline.

SPECIMENS EXAMINED.—ARKANSAS. CRAWFORD COUNTY: Ouachita Mountains, 25 mi N Ft. Smith, 2 ♀, VIII-31-39 (E. C. Van Dyke, CAS, Linsley 1943:130).

COLORADO. BOULDER COUNTY: Boulder (C. H. Hicks, Linsley 1943:132). LARIMER COUNTY: Ft. Collins, ♀, VII-13-00 (M. C. Van Duzee, CAS). Glen Haven, ♂, VII-1946 (P. B. Lawson, KU). YUMA COUNTY: Wray, 3,700 ft, ♂, VIII-17 to 19-19 (F. 4412 C, AMNH).

ILLINOIS (Mitchell 1962: table 16). MACOUPIN COUNTY: Carlinville (Linsley 1943:130).

IOWA. WOODBURY COUNTY: Sioux City, ♀ (C. N. Ainslie, CIS, Linsley 1943:130).

KANSAS. CLARK COUNTY, 1,950 ft, 7 ♂, 2 ♀, VIII-24-11 (F. X. Williams, KU). NORTON COUNTY, 2,270 ft, 3 ♂, 2 ♀, VIII-24-12 (F. X. Williams, KU). SMITH COUNTY, 1,800 ft, ♂, 3 ♀, IX-4-12 (F. X. Williams, KU).

MONTANA. Winnecook, ♂, VII-19-39, flowers *Mentha canadensis* (S. S. Berry, UCR, Linsley 1943:130, 1944:280).

NEBRASKA. BROWN COUNTY: Springview Bridge, ♀, VI-21-02, flowers *Senecio* (J. C. Crawford, USNM). CUMING COUNTY: Westpoint, ♂, VIII-16-03, on flowers *Grindelia* (J. C. Crawford, USNM, Linsley, 1943:130); ♀, IX-11-06, flowers *Aster multifloris* (J. C. Crawford, AMNH). DAWES COUNTY: Ft. Robinson, ♀, VIII-12-71, flying over nesting site of *Calliopsis nebraskensis* Crawford (K. C. Rozen, AMNH). DOUGLAS COUNTY: Omaha, ♀, VIII-16-13, flowers *Helianthus* (L. T. Williams, UN). LANCASTER COUNTY: Lincoln, 4 ♀, September (UN, CIS); 4 ♀, IX-1-01, flowers

*Grindelia* (M. A. Carriker, Jr., UN); ♂, same date, flowers *Solidago* (M. Cary, USNM); ♀, IX-2-01 (J. C. Crawford, UCR); ♀, same date, on flowers *Grindelia* (J. C. Crawford, KU); 5 ♂, 4 ♀, VIII-27-02, flowers *Solidago* (M. H. Swenk, UN, USNM, CU); 3 ♀, IX-7-03 (W. D. Pierce, UCR, USNM); ♂, IX-17-17, flowers *Grindelia squarrosa* (L. Bruner, UN). SCOTTS BLUFF COUNTY: Mitchell, ♂, VI-25-13, flowers *Astragalus adsurgens* (L. M. Gates, UN). SIOUX COUNTY: Monroe Canyon, ♀, VIII-7-08, flowers *Solidago* (R. W. Dawson, UN). War Bonnet Canyon, 2 ♀, VII-23-01, flowers *Helianthus* (M. A. Carriker, Jr., UN).

NORTH DAKOTA. BARNES COUNTY: Valley City, ♂, VII-27-15, flowers *Chrysopsis* (O. A. Stevens, USNM); ♀, VIII-27-15, flowers *Ratibida columnaris* (O. A. Stevens, AMNH). BURLEIGH COUNTY: McKenzie, ♂, 3 ♀, VIII-5-13, on flowers *Grindelia squarrosa* (O. A. Stevens, AMNH, USNM). CASS COUNTY: Fargo, ♂, VIII-10-17, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH); ♂, ♀, VIII-11-17, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH); 2 ♀, VIII-12-17, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH); ♀, VIII-17-11, flowers *Grindelia squarrosa* (O. A. Stevens, CIS). HETTINGER COUNTY: Mott, 2 ♂, ♀, VII-7-18, flowers *Brauneria pallida* (O. A. Stevens, AMNH). SARGEANT COUNTY: Nicholson, ♂, VII-4-13, flowers *Ratibida columnaris* (O. A. Stevens, CIS). SLOPE COUNTY: Marmarth, 2 ♂, VII-4-18, flowers *Brauneria pallida* (O. A. Stevens, AMNH). WARD COUNTY: Minot, ♀, VII-25-15, flowers *Ratibida columnaris* (O. A. Stevens, AMNH).

CANADA. ALBERTA: Lethbridge and Medicine Hat (Sladen, Linsley 1943:130).

Among the species of the Spotted Species Group of the subgenus *Holcopasites*, *H. heliopsis* is easily recognized by the strongly elevated scutellum which is deeply cleft medially to the base and by the absence or nearly so of any white pubescence on the vertical face of the mesepisternum. In its dark coloration this species bears a striking resemblance to *H. pulchellus*, but it is usually larger and is provided with much less extensive patches of white (or yellowish white) pubescence especially on the dorsal surfaces of the head, thorax, and metasoma. It has most frequently been collected at the flowers of various Compositae and on a number of occasions has been found visiting the

same flowers in company with *H. stevensi* and *H. pulchellus*. Although nothing is known about its host relationships, recently a female of this species was collected by K. C. Rozen at a nesting site of *Calliopsis (Verbenaxis) nebraskensis* Crawford. Even though a number of *C. nebraskensis* were nesting in the area, only the single specimen of *Holcopsites* was observed at the nesting site. Excavation of the nests failed to demonstrate immatures of *Holcopsites*.

### 5. *Holcopsites pulchellus* (Cresson)

FIGURES 10, 11

*Phileremus? pulchellus* Cresson, 1878:84, ♀, ?♂ (Colorado); 1879:217.

*Ammobates pulchellus*.—Dalla Torre 1896:498, ♀♂ [Colorado].

*Phileremus pulchellus*.—Cockerell 1898:60 [New Mexico: Santa Fe].

*Neopasites pulchellus*.—Cockerell 1903:452.

*Holcopsites pulchellus*.—Crawford 1915:123.

*Neopasites (Neopasites) pulchellus*.—Linsley 1943:124, 125, 132-133, ♀♂ [Cimmaron, New Mexico, and Colorado Springs, Colorado, records apply to *Holocopsites apacheorum* and *H. calliopsidis calliopsidis*, respectively].

*Holcopsites (Holcopsites) pulchellus*.—Linsley 1951:1208 ♀♂ [Colorado and New Mexico].

*Neopasites robertsoni* Crawford, 1906:283-284, ♀♂ [Nebraska: Lincoln and West Point, at flowers of *Solidago*].—Svenk 1907:298 [Nebraska: Lincoln, at flowers of *Solidago rigida*].—Cockerell 1911:390 [North Dakota: Agricultural College, at flowers of *Grindelia squarrosa*].—Linsley 1944:280 [North Dakota: Hatton].—Stevens 1951:204 [North Dakota: Fargo, Valley City, McKenzie, Mandan, Hatton, Wales, Drake, Tolley, and Williston, 6 August to 11 September, mostly at gumweed, also golden aster (*Chrysopsis*), *Cleome lutea*, fleabane and goldenrod, *Solidago canadensis*. New synonymy].

*Holcopsites robertsoni*.—Crawford 1915:123, 124.—Cockerell 1928:111 [Colorado: Boulder].—Popov 1933:62, fig. 6, ♂♀ [North Dakota: Fargo and Williston].—Linsley, MacSwain, and Smith 1956:82 [Mexico: 9 miles southwest of Fresnillo, Zacatecas].

*Neopasites (Neopasites) robertsoni*.—Linsley 1943:124, 125, 130-131, ♀♂ [Alberta: Prince Albert. Colorado: Boulder. Nebraska: Lincoln and West Point. North Dakota: Bismarck, Drake, Fargo, McKenzie Mandan, Marmarth, Minot, Mott, Tollig, Valley City, and Wales. Flower records: *Brauneria pallida*, *Chrysopsis*, *Erigeron philadelphicus*, *Grindelia squarrosa*, and *Solidago canadensis*].

*Holcopsites (Holcopsites) robertsoni robertsoni*.—Linsley 1951:1208 ♀♂ [Alberta to North Dakota, Nebraska, and Colorado].

*Neopasites (Neopasites) robertsoni pubescens* Linsley, 1943:131-132, ♂ [New Mexico: Gallina Creek, Jemez Mountains, 8,500 ft. New synonymy].

*Holcopsites (Holcopsites) robertsoni pubescens*.—Linsley 1951:1208, ♂ [New Mexico].

LOCATIONS OF TYPES. *H. pubescens*, California Academy of Sciences, San Francisco; *H. pulchellus*, Academy of Natural Sciences, Philadelphia; *H. robertsoni*, U.S. National Museum of Natural History, Washington, D.C.

GEOGRAPHIC RANGE.—Southern Canada (Alberta and Saskatchewan), north-central (North Dakota and Nebraska) and southwestern United States (Arizona, Colorado, New Mexico, Texas, and Utah), and Mexico (Durango, Michoacan, and Zacatecas).

HOST (unconfirmed).—*Pseudopanurgus* sp. (Table 1).

FEMALE.—Head and thorax black or at least dark in coloration, often pruinose on ventrally exposed surfaces, metasoma dark reddish brown, deep mahogany red, occasionally nearly entirely black with reddened tergal apices or rarely extensively reddish, though darkened or clouded with black medially, especially on apical terga; antennae, clypeus often apically, mandibles, pronotal tubercles usually and tegulae frequently reddish brown or rufotestaceous in coloration; legs usually dark reddish brown, often extensively marked or clouded with black; calcaria usually pale reddish brown. Vestiture of body conspicuously white (though extensively and thickly intermixed or supplanted with golden or reddish golden pubescence on dorsally exposed body surfaces), mostly closely appressed and forming white patches on face about antennal insertions, hind margins of head, dorsal surface of pronotum, mesonotal line, mesoscutum anteriorly, laterally and posteriorly, mesepisterna, scutellum laterally, medially and posteriorly, and propodeum at sides; dorsal surfaces of vertex extending downward onto face, mesoscutum especially anteriorly and metasomal terga (adjacent to white pubescent patches) conspicuously and thickly clothed with golden or reddish golden pubescence. Wings feebly violaceous, somewhat darkened apically. Length 3.5-6 mm. Eyes bare or at most with a few, scattered, minute hairs; face above antennae rather closely and coarsely punctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment conspicuously shorter than combined length of succeeding two segments; anterior and lateral ocelli separated by less than twice their diameters; interocular distance shorter than ocellorbital distance; rear angle of mandible situated well behind middle of eye;

labrum longitudinally carinate medially, without a thornlike tubercle near base, not closely punctate on basal half, with large impunctate or sparsely punctate shiny areas basally; ventral surface of head often with pruinose reflections in bright light, finely and irregularly punctate adjacent to hypostomal carinae, interspaces variable in extent and shiny. Mesoscutum distinctly though closely and rather coarsely punctate throughout; scutellum usually deeply cleft medially to base, thus usually prominently bilobed, strongly elevated behind; metanotum not produced posterolaterally into prominent, posteriorly projected shelllike processes; mesepisternum distinctly punctate, the punctures well separated, interspaces usually shining, with a large, conspicuous patch of white pubescence on vertical face; forewing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg about one-half as long as corresponding basitarsus. Metasomal terga II-IV basally with two discrete spots of white pubescence on either side of middle, dorsal surface of first metasomal tergum with a variably sized and shaped patch or divided patch of white (or yellowish white) pubescence on either side of middle, sometimes covering much of dorsolateral surface and coalescing narrowly posteriorly, sometimes restricted in extent and nearly crescentic in shape, sometimes bipartite and sometimes expressed as a narrow longitudinal stripe; apical margin of tergum IV usually without white pubescence, if present then expressed as an evanescent patch of white pubescence laterally on each side; pygidial plate rather broadly, almost truncately rounded; fifth metasomal sternum angularly incurved medially.

MALE.—Similar to female in coloration of integument and vestiture. Length 4-5 mm. Eyes, face, antennae, ocelli, rear angle of mandibles, labrum, ventral surface of head essentially as in female. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae impunctate and shining laterally. Metasomal terga II-V (and usually VI) basally with two discrete spots of white (or yellowish) pubescence on either side of middle, dorsal surface of first metasomal tergum similarly variable and disposed as in female; apical margins of terga IV and V clothed or not as in female; basin of metasoma sharply defined, impunctate; apical margin of sixth metasomal tergum at most feebly bisinuate in outline, without a median

triangular projection; seventh metasomal tergum with lateral margins, as seen from above, evenly rounded, not angulately produced on either side of pygidial plate; pygidial plate more than twice as long as maximum basal width, nearly parallel sided, rather narrowly liguliform in outline.

SPECIMENS EXAMINED.—CANADA. ALBERTA: Bilby, ♂, VI-28-24 (O. Bryant, CAS). Tilley, ♀, VIII-25-40 (J. L. Carr, UA). SASKATCHEWAN: Prince Albert (Sladen, Linsley 1943:131).

UNITED STATES. ARIZONA. COCHISE COUNTY: Douglas, 1 mi N, ♀, VIII-16-62, flowers *Bahia absinthifolia* var. *dealbata* (E. G. Linsley, CIS). Portal, ♀, X-1-61 (M. A. Cazier, CIS). Portal, ♀, X-1-61 (M. A. Cazier, CIS). Portal, ♀, VIII-31-58 (P. D. Hurd, CIS). YAVAPAI COUNTY: Congress, 4 mi SW, ♀, IX-15-61, flowers *Hymenothrix wislizeni* (P. D. Hurd, CIS).

COLORADO. BOULDER COUNTY: Boulder, (C. H. Hicks, Linsley 1943:131). LARIMER COUNTY: Glacier Basin Campgrounds, Rocky Mountain National Park, ♀, VIII-29-62 (W. B. Kerfoot, KU). MONTEZUMA COUNTY: Mesa Verde National Park, 8,000 ft, ♀, VIII-8-57 (C. D. Michener, KU). RIO BLANCO COUNTY: Meeker, 23 mi S, 20 ♀, VIII-20-62 (R. M. Bohart, UCD, GEB, CIS).

NEBRASKA. CUMING COUNTY: West Point, ♂, VIII-30-03, flowers *Solidago* sp. (J. C. Crawford, USNM, Linsley 1943:131). LANCASTER COUNTY: Lincoln, ♀, VIII-27-02, flowers *Solidago* sp. (M. H. Swenk, USNM); ♀, September (CIS).

NEW MEXICO. EDDY COUNTY: Carlsbad, 5 mi N, ♂, IX-21-56 (J. W. MacSwain, CIS). LUNA COUNTY: Deming, 17 mi E, 3♂, 16♀, IX-17-66, flowers *Dyssodia coccinea* (P. Torchio, R. Rust, G. Wood, N. Yousef, GEB, CIS). RIO ARRIBA COUNTY: Gallina Creek, Jemez Mountains, 8,500 ft, ♂, VII-24-30 (J. C. Chamberlin, CAS).

NORTH DAKOTA. BARNES COUNTY: Valley City, ♂, VIII-13-22, flowers *Chrysopsis* sp. (O. A. Stevens, AMNH, Linsley 1943:131). BURLEIGH COUNTY: Bismarck (O. A. Stevens, Linsley 1943:131). McKenzie, 2♂, VIII-5-13, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH, USNM, Linsley 1943:131). CAVALIER COUNTY: Wales, ♀, VIII-8-13, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH, Linsley 1943:131). CASS COUNTY: Agricultural College, ♂, 2♀, no date, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH, USNM, CU).

Fargo, 2 ♀, VIII-17-11, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH, USNM); ♂, VIII-24-12, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH); ♀, VIII-22-15, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH); ♂, VIII-11-17, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH); ♀, VIII-12-17, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH); ♀, VIII-17-17 (P. W. Fattig, USNM); ♀, VIII-22-22, flowers *Solidago canadensis* (O. A. Stevens, AMNH). GOLDEN VALLEY COUNTY: Beach, ♀, VIII-25-23 (C. N. Ainslie, KU). GRAND FORKS COUNTY: Grand Forks, ♀, VIII-19-15 (P. W. Fattig, USNM). HETTINGER COUNTY: Mott (O. A. Stevens, Linsley 1943:131). MCHENRY COUNTY: Drake, ♀, VIII-24-15, flowers *Grindelia squarrosa* (O. A. Stevens, USNM, Linsley 1943:131). Granville, ♀, VIII-7-15, flowers *Grindelia squarrosa* (O. A. Stevens, CIS); ♀, VIII-17-15, flowers *Grindelia squarrosa* (O. A. Stevens, USNM). MORTON COUNTY: Mandan (O. A. Stevens, Linsley 1943:131). RAMSEY COUNTY: Devils Lake, ♀, VIII-20-13, flowers *Grindelia squarrosa* (O. A. Stevens, CIS). RENVILLE COUNTY: Tolley, ♀, VIII-6-15, flowers *Erigeron philadelphicus* (O. A. Stevens, AMNH, Linsley 1943:131). SLOPE COUNTY: Marmarth (O. A. Stevens, Linsley 1943:131). TRAILL COUNTY: Hatton, ♀, VIII-3-40, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH, Linsley 1943:131). WARD COUNTY: Minot (O. A. Stevens, Linsley 1943:131). WILLIAMS COUNTY: Williston, ♂, VIII-15-15, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH).

TEXAS. McLENNAN COUNTY: Waco, 2 ♀, X-12-06, flowers *Amphiachyrus dracunuloides* (F. C. Bishopp, USNM).

UTAH. UINTAH COUNTY: Vernal, 5 mi N, 2 ♂, 3 ♀, VI-24-30 (C. D. Michener, KU). WASATCH COUNTY: Heber, 2 ♀, VIII-11-62 (R. M. Bohart, CIS, UCD).

MEXICO. DURANGO: Bermejillo, ♀, XI-1-65 (G. E. and A. S. Bohart, GEB). Ceballos, 2 ♀, X-5-66 (G. E. and A. S. Bohart, GEB); ♂, ♀, IX-19-68 (G. E. Bohart, GEB). Ceballos, 10 mi S, 1 ♂, IX-20-70 (G. E. and R. M. Bohart, GEB). GUERRERO: Zihuatanejo, 3 ♂, XII-12-66 (G. E. Bohart, GEB). JALISCO: Guadalajara, 3 ♀, IX-16-70 (G. E. and R. M. Bohart, GEB).

MICHOACAN: Morelia, 10 mi N, 5, 900 ft, ♂, VII-28-62 (University of Kansas Mexican Expedition, KU). ZACATECAS: Fresnillo, 9 mi SE, 3 ♂, 8 ♀,

VIII-7 to 14-54, collected at nesting site of *Pseudopanurgus* sp. (E. G. Linsley, J. W. MacSwain, and R. F. Smith, CIS, Linsley 1956:82, as 9 mi SW of Fresnillo). Fresnillo, 9 mi S, 4 ♀, VIII-20-54 (E. G. Linsley, J. W. MacSwain, and R. F. Smith, CIS). Tabasco, 5 mi N, ♂, 6 ♀, IX-18-70 (G. E. and R. M. Bohart, GEB).

*Holcopasites pulchellus* is a widely ranging species in North America, having been found principally in the Rocky Mountain region and well south into Mexico (Guerrero and Michoacan). It is quite variable in coloration of the integument and pubescence. The patches of pale pubescence, especially those on the metasomal terga, tend to become increasingly more extensive in the more arid and southern parts of its range. In the northern or elevationally higher localities of its range, this pubescence tends to be restricted in the form of small patches which are not infrequently yellowish white in coloration. At lower elevations and especially in more arid areas to the south, as in Arizona and in Zacatecas, Mexico, the patches are larger and predominantly white in coloration (Figures 10, 11). Similarly the integument of the metasoma tends to be darker at higher and less arid areas, but becomes rather extensively paler in coloration at lower and more arid localities.

*H. pulchellus* was originally described from Colorado by Cresson (1878:84) and subsequently two of its more obviously differing color variants have been characterized as new species. These include *H. robertsoni* (Crawford 1906) from Nebraska, and *H. robertsoni pubescens* Linsley (1943) from New Mexico. As a consequence of our investigations of the variation discussed above, both of these forms are now relegated to synonymy. Although there appears to be a tendency toward geographical segregation in the colorational features of the integument and pubescence, it appears that the observed variation is fundamentally of a clinal nature. *H. pulchellus* is, on the evidence of structural features, most closely related to *H. heliopsis*.

#### 6. *Holcopasites tegularis* Hurd and Linsley, new species

FEMALE.—Head black, mesoscutum of thorax largely black, otherwise thorax chiefly or entirely reddish brown; metasoma chiefly or least extensively reddish brown, usually with terga clouded or darkened with black medially; antennae, clypeus, mandibles,

tegulae, and legs usually reddened, sometimes nearly dark mahogany red; calcaria pale reddish brown. Vestiture of body chiefly white (extensively intermixed or supplanted with golden or reddish golden pubescence on dorsally exposed body surfaces), mostly closely appressed and forming patches on face, about antennal insertions and above, vertex, hind margins of head, mesonotal line, dorsal surfaces of pronotum, mesoscutum especially anteriorly, mesepisterna, scutellum laterally and medially and propodeum at sides; dorsal surfaces of head, thorax, and metasoma conspicuously clothed with golden or reddish golden pubescence. Wings almost imperceptibly violaceous, scarcely darkened apically. Length 2.5-4 mm. Eyes bare; face above antennae closely and coarsely punctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment much shorter than combined length of succeeding two segments; anterior and lateral ocelli separated by less than twice their diameters; interocellar distance shorter than ocellorbital distance; rear angle of mandible situated well behind middle of eye; labrum not longitudinally carinate medially, without a thornlike tubercle near base, closely punctate on basal half or more, without impunctate or sparsely punctate shiny areas basally; ventral surface of head rather closely and finely punctate adjacent to hypostomal carinae, interspaces dull and tessellate. Mesoscutum closely and finely punctured throughout; scutellum entire or at most only weakly indented medially on posterior dorsal surface, not prominently bilobed and not conspicuously elevated posteriorly; metanotum not produced posterolaterally into prominent, posteriorly projected shelflike processes; mesepisternum rather coarsely and nearly rugosely punctate dorsally and with an evanescent and largely incomplete patch of white pubescence; forewing with second submarginal cell unusually small, much shorter than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg more than one-half as long as corresponding basitarsus. Metasomal terga II-IV basally with two discrete spots of white pubescence on either side of middle, dorsal surface of first metasomal tergum with an irregular patch of white pubescence laterally; apical margin of tergum IV usually with a small patch of white pubescence laterally on each side; pygidial plate truncate apically, rounded laterally; fifth metasomal sternum angularly emarginate medially.

**MALE.**—Similar to female in coloration of integument and vestiture. Length 2.5-3.5 mm. Eyes, face, antennae, ocelli, rear angles of mandibles, labrum, ventral surface of head essentially as in female. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae reticulately punctate throughout. Metasomal terga II-V basally with two discrete spots of white pubescence on either side of middle, dorsal surface of first metasomal tergum with a somewhat triangular spot on each side; apical margins of terga IV and V with a small band or spot of white pubescence laterally; basin of metasoma not sharply defined, punctate throughout; apical margin of sixth metasomal tergum not bisinuate in outline, without a median triangular projection; seventh metasomal tergum with lateral margins as seen from above, evenly rounded, not angulately produced on either side of pygidial plate; pygidial plate short, not twice as long as maximum basal width, parallel sided, narrowly liguliform in outline.

**GEOGRAPHIC RANGE.**—Southwestern United States (Arizona).

**HOST.**—*Pseudopanurgus nanulus* Timberlake (confirmed, see Table 1).

Holotype male, allotype, and 13 paratypes (3♂, 10♀) were collected at 13 miles southwest of Apache, Cochise County, Arizona, by J. G. and B. L. Rozen from 19 to 26 August 1964. Additional paratypes (3♂, 10♀) were subsequently collected at the type locality as follows: 2♀, 21 August 1966, ♀ 22 August 1966 and ♀, VIII-29-66 (J. G. and B. L. Rozen); 2♂, VIII-14-69 (J. G. and K. C. Rozen); ♀, VIII-27-69 (J. G. and B. L. Rozen); ♂, 2♀, VIII-22-70 (J. G. Rozen); and 3♀, VIII-18-71, emerging from burrows of *Pseudopanurgus nanulus* Timberlake (J. G. Rozen and M. Favreau, AMNH). Other specimens examined (paratypes) were taken at 14 miles southwest of Apache, Cochise County, Arizona (♀, VIII-4-61, J. G. Rozen) and 15 miles southwest of Apache, Cochise County, Arizona (♂, 3♀, VIII-13-70, J. G. and K. C. Rozen). The primary types and most of the paratypes are deposited in the collections of the American Museum of Natural History, New York. Paratypes have also been deposited in the collections of the California Insect Survey, University of California, Berkeley, and the National Museum of Natural History, Washington, D.C.

*Holcoposites tegularis*, which is on the average the smallest species of the genus, is very reminiscent of *H.*

*pulchellus* in its generally dark body coloration and patterning of the pale pubescence, especially that on the metasomal terga. Structurally, it appears that *H. pulchellus* is its nearest relative although it is very distinct from that species. The unique and rather exceedingly small second submarginal cell of the forewing immediately distinguishes this species from the other species of the genus.

Two first instar larvae of this species were found in separate cells of a nest of *Pseudopanurgus nanulus* Timberlake by J. G. Rozen and M. Favreau at 13 miles southwest of Apache, Cochise County, Arizona, on August 18, 1971. These investigators also found eggs of this species inserted in the cell wall of the host in the same fashion previously described by Rozen (1965) for other species of *Holcopasites* studied by him and his colleagues at the Southwestern Research Station near Portal, Arizona.

### Banded Species Group

FIGURES 13-16

Included in this group are those species with bare eyes in which the pale pubescence of the metasomal

terga is expressed basally on either side of the midline as a transverse band (Figures 13-16). In some species, however, these bands sometimes coalesce medially to form a single transverse band on one or more of the terga (Figure 14). The patterning of the pale pubescence is very much like that of the subgenus *Trichopasites* (Figure 12), whose species have the eyes densely hirsute.

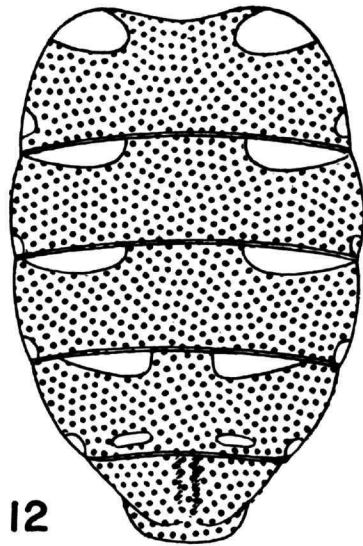
This group contains six species which chiefly occur in the southwestern and central United States, although one species (*H. stevensi*) is known to range northward into southern Canada (Alberta). Another species (*H. illinoensis*) ranges across much of the United States into the eastern seaboard states and southward marginally into Mexico (Sonora). One specimen of *H. stevensi* is labeled from "Cala" and the species may, as this label seems to suggest, be present in California.

One of the species (*H. bigibbosus*) is the most darkly colored species of the genus and superficially resembles certain species of the megachilid genus *Dioxys* found in the Palaearctic region.

The species of this group may be identified by means of the following key.

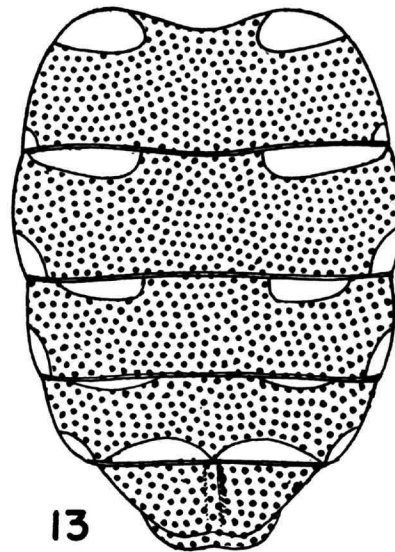
### Key to the Species of the Banded Species Group

1. Males ..... 2
- Females ..... 7
- 2(1). Face above antennae closely and coarsely punctate, neither bigibbosely swollen nor largely impunctate; metasoma chiefly or entirely reddish in coloration ..... 3
- Face above antennae bigibbosely swollen, shining and largely impunctate (Figure 1); metasoma chiefly black or brownish black ..... 1. *H. bigibbosus*
- 3(2). Pygidial plate parallel sided or more or less liguliform; apical margin of sixth metasomal tergum without a well-defined, median triangular projection; labrum without a median tubercle near base ..... 4
- Pygidial plate subtriangular; apical margin of sixth metasomal tergum with a median triangular projection; labrum with a small median tubercle near base ..... 4. *H. eamiae*
- 4(3). Fifth metasomal tergum with a basal and an apical transverse band (sometimes incomplete medially) of white pubescence (Figures 13, 15) ..... 5
- Fifth metasomal tergum with a subtriangular patch of white pubescence on each side of middle, apical margin rarely white pubescent (Figure 16) ..... 6
- 5(4). Small species, 3 to 5 mm; metasomal terga extensively clouded medially with blackish or with apical terga chiefly or entirely blackish; mesoscutal punctures distinct and separated by shining interspaces ..... 5. *H. illinoensis*
- Larger species, usually 5.5 to 7 mm, rarely smaller; metasomal terga almost entirely reddish, at most only vaguely clouded with blackish; mesoscutum densely rugosopunctate without shining interspaces ..... 6. *H. stevensi*
- 6(4). Small species, 3 to 5 mm; interocellar distance greater than ocellorbital distance (12:10); pygidial plate nearly twice as long as maximum width ..... 2. *H. cazieri*
- Larger species, 6 to 8 mm; interocellar distance less than ocellorbital distance (14:18); pygidial plate scarcely longer than maximum basal width ..... 3. *H. haematurus*



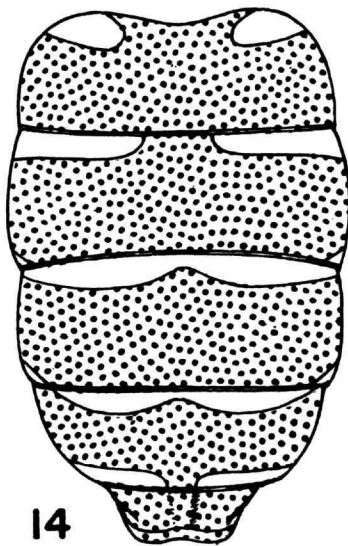
12

**arizonicus**



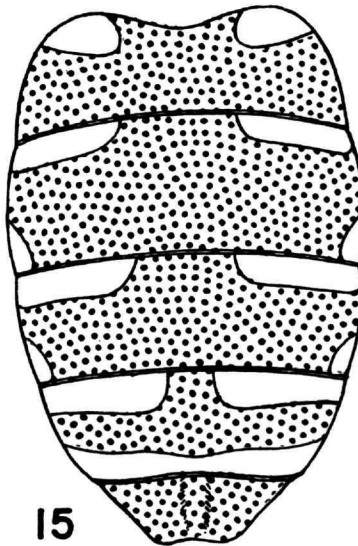
13

**stevensi**



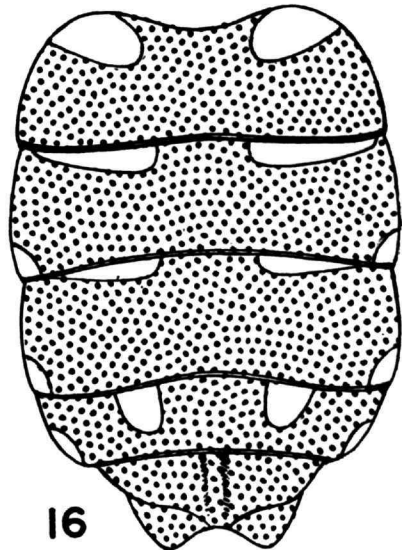
14

**bigibbosus**



15

**minimus**



16

**cazieri**

FIGURES 12-16.—Diagrammatic representations of the metasoma in dorsal view, females. Pale pubescent areas indicated by unshaded areas.

- 7(1). Face above antennae closely and coarsely punctate, neither bigibbosely swollen nor largely impunctate; metasoma chiefly or entirely reddish in coloration..... 8  
 Face above antennae bigibbosely swollen, shining and largely impunctate (Figure 1); metasoma chiefly black or brownish black..... 1. *H. bigibbosus*
- 8(7). Fifth metasomal sternum broadly and deeply emarginate apically (Figure 4)..... 9  
 Fifth metasomal sternum entire or at most only weakly incurved apically (Figure 5)..... 10
- 9(8). Small species, 3 to 5 mm; interocellar distance equal to ocellorbital distance (8:8); spur of middle tibia short, about one-third as long as corresponding basitarsus..... 2. *H. cazieri*  
 Larger species, 6 to 8 mm; interocellar distance conspicuously shorter than ocellorbital distance (10:13); spur of middle tibia long, nearly one-half as long as corresponding basitarsus..... 3. *H. haematurus*
- 10(8). Antennae with first flagellar segment shorter than combined length of succeeding two segments; ventral surface of head rather closely punctate, especially adjacent to hypostomal carinae..... 11  
 Antennae with first flagellar segment as long as, or slightly longer than, combined length succeeding two segments; ventral surface of head sparingly punctate (Figure 3), largely impunctate adjacent to hypostomal carinae..... 5. *H. illinoensis*
- 11(10). Labrum with a small median thornlike tubercle near base; pygidial plate evenly rounded apically; fourth metasomal tergum with a subtriangular patch of white pubescence on either side of middle, apical margin without white pubescence..... 4. *H. eamia*  
 Labrum longitudinally carinate medially, without a thornlike tubercle near base; pygidial plate truncate apically; fourth metasomal tergum with a basal and an apical band of white pubescence on either side of middle (Figure 3)..... 6. *H. stevensi*

**1. *Holcoposites bigibbosus* Hurd and Linsley,  
 new species**

FIGURES 1, 14

**FEMALE.**—Head and thorax black; metasoma, except reddish basal segment and reddened sterna, black; antennae, mandibles, tegulae, and legs dark mahogany red; calcaria dark reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, hind margin of head, mesonotal line, anterolateral margins of pronotum, mesoscutum and scutellum circumferentially, mesepisterna, metanotum, and propodeum at sides, legs basally and on metasoma, especially terga; dorsal surfaces of head, thorax, and metasoma not conspicuously clothed with golden or reddish golden pubescence. Wings feebly violaceous, infuscated apically. Length 7 mm. Eyes essentially bare, at most with a few, scattered short hairs; face above antennae bigibbosely swollen, shining and largely impunctate; antennae with first flagellar segment shorter than combined length of succeeding two segments; anterior and lateral ocelli separated by much less than twice their diameter; interocellar distance greater than ocellorbital distance; rear angle of mandible situated very near posterior margin of eye; labrum not longitudinally carinate medially,

without a thornlike tubercle basally, densely and closely punctate on basal half; ventral surface of head rather closely punctate, especially adjacent to hypostomal carinae, interspaces polished and shining. Mesoscutum rather coarsely and nearly contiguously punctate, interspaces shining; scutellum nearly entire, feebly indented on posterior dorsal surface, not prominently bilobed and strongly elevated posteriorly; metanotum produced posterolaterally into prominent posteriorly projecting shelflike processes; mesepisternum coarsely though distinctly punctured dorsally and with anterior, dorsal, and posterior margins fringed with thin, white pubescence; wing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg less than one-half as long as corresponding basitarsus. Metasomal terga II-IV basally with a transverse band of white pubescence on either side of middle, those on terga III and IV coalescing medially; apical margin of tergum IV banded with white pubescence except medially; pygidial plate not visible; fifth metasomal sternum with apical margin broadly though shallowly incurved.

**MALE.**—Similar to female in coloration of integument and vestiture. Length 8 mm. Eyes bare; face as in female; antennae with first flagellar segment much

shorter than combined length of succeeding two segments; ocelli similarly disposed as in female, but interocellar distance is less than ocellorbital distance; rear angle of mandible well behind middle of eye; labrum essentially as in female; ventral surface of head rather closely and uniformly punctate, interspaces shorter and less shiny than in female. Mesoscutum, scutellum, metanotum, mesepisternum, and wings essentially as in female; tegulae impunctate and shining laterally. Metasomal terga II-VI basally with a transverse band of white pubescence, that on tergum II nearly interrupted medially; apical margins of terga II-V banded with white pubescence; however, weakly expressed medially; basin of metasoma rather sharply defined and largely impunctate; apical margin of sixth metasomal tergum essentially entire, without a median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, nearly right angled on either side of pygidial plate; pygidial plate short, much less than twice as long as maximum basal width, broadly liguliform in outline.

**GEOGRAPHIC RANGE.**—Southwestern United States. (Arizona).

**HOST.**—Unknown.

Holotype female, Willcox, Cochise County, Arizona, 18 August 1958, on flowers of *Asclepias subverticillata* (P. D. Hurd, Jr.) is deposited in the collections of the California Academy of Sciences, San Francisco. Allotype male, Rodeo, Hidalgo County, New Mexico, collected 26 August 1958 by D. D. Linsdale, is in the collections of the California Insect Survey, University of California, Berkeley.

In its almost entirely black coloration of the head, thorax, and metasoma, *Holcopasites bigibbosus* is the darkest species of the genus. It is most readily recognized by having the face above the antennae bigibbosely swollen and largely impunctate and shining (Figure 1). Although the face of *H. insoletus* is somewhat similarly modified, but not so strongly swollen, that species being a member of the subgenus *Trichopasites* has the eyes densely hirsute and is therefore easily separated from *H. bigibbosus*, in which the eyes are bare. The basal bands of white pubescence on metasomal terga III and IV of the female are not interrupted medially (Figure 14). In the male these bands, although interrupted medially on tergum II, are complete on terga III-VI. In both sexes the first metasomal tergum is brightly red and consequently contrasts sharply with the succeeding black terga. This

is a very distinctive species and perhaps its nearest relative is *H. stevensi*, even though this relationship is evidently a remote one.

## 2. *Holcopasites cazieri* Hurd and Linsley, new species

FIGURES 4, 16

**FEMALE.**—Head and thorax black, metasoma orange or chiefly so, though sometimes apical terga stained or clouded medially with brownish; antennae, mandibles, tegulae, and legs dark reddish brown; calcaria pale reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, hind margins of head, mesonotal line, anterolateral angles of pronotum, mesoscutum circumferentially, mesepisterna, scutellum, metanotum, propodeum at sides, legs basally and metasoma especially on terga; dorsal surfaces of head, thorax, and metasoma not conspicuously clothed with golden or reddish golden pubescence. Wings feebly violaceous, lightly tinged with brownish beyond closed cells. Length 3.0–5 mm. Eyes bare; face above antennae rather closely and coarsely punctate, interspaces shining, neither bigibbosely swollen nor largely impunctate; antennae with first flagellar segment much shorter than combined length of succeeding two segments; anterior and lateral ocelli separated by less than twice their diameter; interocellar distance about equaling ocellorbital distance; rear angle of mandible well behind middle of eye; labrum with a feeble longitudinal carina medially, without a thornlike tubercle near base, rather closely punctate on basal half or more and without impunctate shiny areas basally; ventral surface of head rather sparsely punctate adjacent to hypostomal carinae and with interspaces polished and shining. Mesoscutum closely but distinctly punctured; scutellum weakly cleft medially nearly to base, somewhat bilobed in appearance, posterior margin not strongly elevated; metanotum produced posterolaterally into poorly developed posteriorly projected shelflike processes; mesepisternum coarsely and nearly rugosely punctate dorsally and with a large patch of white pubescence; wing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg much shorter than one-half as long as corresponding basitarsus. Metasomal terga II and III basally with a

transverse band of white pubescence on either side of middle; fourth metasomal tergum with a triangular patch of white pubescence on either side of middle; apical margin of tergum IV with a small patch or band of white pubescence laterally; pygidial plate evenly rounded apically; fifth metasomal sternum with apical margin deeply emarginate medially.

**MALE.**—Similar to female in coloration of integument and vestiture. Length 3–5 mm. Eyes bare; face as in female; antennae with first flagellar segment much shorter than combined length of succeeding two flagellar segments; ocelli and rear angles of mandibles disposed as in female; interocellar distance greater than ocellorbital distance; labrum essentially as in female; ventral surface of head more finely and less densely punctate than in female, shiny areas adjacent to hypostomal carinae more extensive. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae very nearly punctate throughout. Metasomal terga II and III basally with a transverse band of white pubescence on either side of middle; metasomal terga IV and V with an elongate, quasitriangular patch of white pubescence on either side of middle; apical margin of tergum IV with only a short band or spot of white pubescence laterally; apical margin of tergum V usually with a nearly complete transverse band of white pubescence, sometimes interrupted medially; basin of metasoma not sharply defined, well punctured throughout; apical margin of sixth metasomal tergum rather conspicuously bisinuate in outline, with a weak median quasitriangular projection; seventh metasomal tergum with lateral margins, as seen from above, very nearly right angled on either side of pygidial plate; pygidial plate more than twice as long as maximum basal width, broadly liguliform in outline.

**GEOGRAPHIC RANGE.**—Southwestern United States (Arizona and New Mexico).

**HOST.**—Unknown.

Holotype male and a paratype male were taken two miles northeast of Portal, Cochise County, Arizona, 29 September 1961 (M. A. Cazier), and the holotype is in the collections of the California Academy of Sciences, San Francisco. Allotype female was collected at the same locality on 26 September 1961 by M. Statham and is the property of the American Museum of Natural History, New York. Additional specimens examined (paratypes) are as follows: ♀, 16 miles northeast of Douglas, Cochise County, Ari-

zona, 23 August 1962 (J. G. Rozen, M. Statham, and S. J. Hessel, AMNH); and ♂, 3 ♀, 4.8 miles north of Rodeo, Hidalgo County, New Mexico, 4 September 1961, flying over ground (♀, P. H. Timberlake, UCR), on flowers of *Pectis papposa* (♀, P. D. Hurd, CIS), and on flowers of *Tidestromia languinosa* (♂, ♀, P. D. Hurd, CIS).

*Holcopasites cazieri*, named in honor of Dr. Mont A. Cazier in recognition for the arduous field effort he made on our behalf, is readily distinguished from the other species of the Banded Species Group of *Holcopasites* proper by its small size, coupled with the very deeply emarginate fifth metasomal sternum in the female (Figures 4, 16). The male may be separated by the characters presented in the accompanying key. *H. haematurus* is its nearest relative.

### 3. *Holcopasites haematurus* Cockerell and Hicks

*Holcopasites haematurus* Cockerell and Hicks, 1926:107–108, ♂ [Colorado: Boulder at White Rocks on flowers of a boraginaceous plant].—Cockerell 1928:111; 1938:230 [Nebraska: Harrison].

*Neopasites (Neopasites) haematurus*.—Linsley 1943:124, 125, 128, ♀, ♂ [Colorado: Boulder. Iowa: Sioux City and Sergeant Bluff. Kansas: Atchison County].

*Holcopasites (Holcopasites) haematurus*.—Linsley 1951:1207, ♂ [Iowa, Kansas and Colorado].

**LOCATION OF TYPE.**—Unknown.

**GEOGRAPHIC RANGE.**—Central United States (Colorado, Kansas, Nebraska, and Iowa).

**HOST.**—Unknown.

**FEMALE.**—Head and thorax black, metasoma red, rarely with terga stained or darkened medially; antennae, mandibles, tegulae, and legs dark mahogany red; calcaria pale yellowish red. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, mesonotal line, dorsolateral angles of pronotum, mesoscutum circumferentially, mesepisterna, scutellum, metanotum and propodeum at sides, legs basally and on metasoma, legs basally and on metasoma, especially on terga; dorsal surfaces of head, thorax, and metasoma without golden or reddish golden pubescence intermixed. Wings feebly violaceous, lightly brownish apically. Length 6–8 mm. Eyes bare or with a few, well-scattered short hairs; face above antennae closely and coarsely punctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment much shorter than combined length of succeed-

ing two segments; anterior and lateral ocelli separated by less than twice their diameters; interocellar distance shorter than ocellorbital distance; rear angle of mandible situated well behind middle of eye; labrum longitudinally carinate medially, without a thornlike tubercle near base, very densely punctate on basal half or more and without impunctate shining areas basally; ventral surface of head moderately closely and coarsely punctate adjacent to hypostomal carinae, interspaces polished and shining. Mesoscutum rather coarsely and nearly rugosopunctate throughout; scutellum longitudinally cleft medially nearly to base, rather prominently bilobed and moderately elevated posteriorly; metanotum produced posteriorly into prominent posteriorly projected shelflike processes; mesepisternum rather coarsely and nearly rugosely punctate throughout and with an evanescent patch of white pubescence best expressed along anterior face of mesepisternum; wing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg fully one-half as long as corresponding basitarsus. Metasomal terga II and III basally with a transverse band of white pubescence (sometimes quasitriangularly lengthened medially) on either side of middle; fourth metasomal tergum basally with a quasitriangular patch of white pubescence on either side of middle; apical margin of tergum IV with a short band or spot of white pubescence laterally; pygidial plate obtusely rounded apically; fifth metasomal sternum with apical margin broadly and angularly emarginate.

**MALE.**—Similar to female in coloration of integument and vestiture. Length 6–8 mm. Eyes essentially bare; face as in female; antennae with first flagellar segment appreciably shorter than combined length of succeeding two segments; ocelli and rear angle of mandible situated as in female; labrum essentially as in female; ventral surface of head somewhat less densely punctate than female, interspaces greater in extent adjacent to hypostomal carinae. Mesoscutum, scutellum, metanotum, mesepisternum, and wings as in female; tegulae impunctate and shining laterally. Metasomal terga II–IV basally with a transverse band of white pubescence (usually quasitriangularly lengthened medially) on either side of middle; metasomal terga V and VI with a somewhat triangular spot of white pubescence on either side of middle; apical margin of terga IV and V with only a short band or spot

of white pubescence laterally; basin of metasoma not sharply defined, punctured at least at sides; apical margin of sixth metasomal tergum irregularly and feebly bisinuate in outline, without a median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, evenly rounded on either side of pygidial plate; pygidial plate scarcely longer than maximum basal width, nearly parallel sided, essentially liguliform in outline.

**SPECIMENS EXAMINED.**—**COLORADO.** BOULDER COUNTY: Boulder, 2 ♀, VIII–14–26, “flying along ground where many nests at Owens Lake” (C. H. Hicks, USNM, Linsley 1943:128).

**IOWA.** COUNTY #43: ♀, VI–30–32 (Russell, USNM). WOODBURY COUNTY: Sergeant Bluff, ♀, VII–26–28 (G. O. Hendrickson, CIS, Linsley 1943:128). Sioux City, ♂, VII–26–24 and ♀, VII–13–27 (C. N. Ainslie, CIS, Linsley 1943:128).

**KANSAS.** ATCHISON COUNTY: ♀, VII–11–24 (E. P. Breakey, KU, Linsley 1943:128). DOUGLAS COUNTY: Lawrence, ♂, VI–14–60, on *Rhus glabra* (KU). LEAVENWORTH COUNTY: ♀, VI–21–32 (L. S. Henderson, KU).

**NEBRASKA.** DUNDY COUNTY: Haigler, ♂, VII–8–11 (J. T. Zimmer, UN). SIOUX COUNTY: Harrison, 7 mi N, ♀, VIII–13–62 (J. G. and B. L. Rozen, AMNH).

This is a comparatively large species which has been infrequently collected in the central United States. It is structurally most similar to *Holcopasites cazieri*, which so far is known from only a few specimens taken in Arizona and New Mexico. Hosts of neither species have been established, although Charles Hicks has labeled two female specimens of *H. haematurus* as flying along the ground near Boulder, Colorado, where there were many nests (unspecified) at Owens Lake. Similarly P. H. Timberlake obtained one male and three females of *H. cazieri* “flying over ground” near Rodeo, New Mexico. *H. haematurus* is easily separated from the other species of the Banded Species Group by means of the accompanying key to that group.

#### 4. *Holcopasites eamia* (Cockerell)

*Neopasites fulviventris*.—authors, not Cresson 1873, Ashmead 1898:284; 1899:81.

*Neopasites eamia* Cockerell, 1909:29, ♂ [Texas: Lee County].—Crawford 1915:124.—Linsley and Michener 1939:277–278.

*Holcopasites eamia*.—Cockerell 1926:108.

*Neopasites (Neopasites) eamia*.—Linsley 1943:125, 138-139, ♂ [Texas].

*Holcopasites (Holcopasites) eamia*.—Linsley 1951:1207, ♂ [Texas].

*Holcopasites acanthochilus* Crawford, 1915:124, 125, ♀ [Texas: Clarendon at flowers of *Monarda citriodora* (the type) and Cypress Mills. New synonymy].

*Neopasites (Neopasites) acanthochilus*.—Linsley 1943:124, 139, ♀ [Texas: Cypress Mills, Clarendon, and Fedor].

*Holcopasites (Holcopasites) acanthochilus*.—Linsley 1951:1207, ♂ [Texas].

*Holcopasites texanus* Crawford, 1915:124, 126, ♂ [Texas: Cotulla at flowers of *Verbesina encelioides* (the type) and *Monarda punctata*. New synonymy].

*Neopasites (Neopasites) texanus*.—Linsley 1943:125, 140, ♂. *Holcopasites (Holcopasites) texanus*.—Linsley 1951:1208, ♂ [Texas].

LOCATION OF TYPES.—*H. acanthochilus* and *H. texanus*, National Museum of Natural History, Washington, D.C.; *H. eamia*, Citrus Experiment Station, University of California, Riverside, California.

GEOGRAPHIC RANGE.—South-central United States (Oklahoma and Texas).

HOST.—Unknown.

FEMALE.—Head and thorax black, metasoma red or chiefly so, terga often stained or clouded with black medially; antennae, mandibles, tegulae, and legs extensively pale reddish or ferruginous in coloration; calcaria pale reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about and above antennal insertions, hind margins of head, mesonotal line, dorsolateral angles of pronotum, mesoscutum circumferentially, mesepisterna, scutellum at sides and behind, metanotum and propodeum at sides, legs basally and metasoma, especially on terga; dorsal surfaces of head, thorax, and metasoma sometimes with some intermixed golden or reddish golden pubescence. Wings perceptibly violaceous, faintly tinged with brownish apically. Length 5–8 mm. Eyes bare; face above antennae closely and coarsely punctate, neither bigibbosely swollen nor largely impunctate; antennae with first flagellar segment shorter than combined length of succeeding two segments; anterior and lateral ocelli separated by less than twice their diameters; interocellar distance slightly less than ocellorbital distance; rear angle of mandible situated well behind middle of eye; labrum with a median thornlike process near base, basal half or more densely and closely punctate and without impunctate and shiny areas; ventral surface of head moderately punctate adjacent to hypostomal carinae,

interspaces shining. Mesoscutum rather coarsely and nearly rugosopunctate throughout; scutellum weakly cleft medially along longitudinal axis, feebly bilobed in outline, not strongly elevated posteriorly; metanotum produced posterolaterally into weakly developed, posteriorly projected shelflike processes; mesepisternum rugosopunctate throughout and with an evanescent and largely incomplete patch of white pubescence dorsally; wing with second submarginal cell not unusually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg much shorter than one-half as long as corresponding basitarsus. Metasomal tergum II basally with a transverse band of white pubescence (sometimes triangularly produced posteriorly) on either side of middle; metasomal terga III and IV basally with a quasitriangular patch of white pubescence on either side of middle; apical margin of tergum IV with only a short band or spot of white pubescence laterally; pygidial plate broadly and evenly rounded apically; fifth metasomal sternum with apical margin entire or only feebly incurved medially.

MALE.—Similar to female in coloration of integument and vestiture. Length 4–8 mm. Eyes bare or at most with a few, scattered, short hairs; face as in female; antennae with first flagellar segment much shorter than combined length of succeeding two segments; ocelli and rear angle of mandible situated as in female; interocellar distance much shorter than ocellorbital distance; labrum essentially as in female; ventral surface of head more closely and coarsely punctate than in female, interspaces shorter and less conspicuously shining. Mesoscutum, scutellum, metanotum, mesepisternum and wings as in female; tegulae impunctate and shining laterally. Metasomal terga II–V basally with a transverse band (usually somewhat triangularly lengthened medially) of white pubescence on either side of middle; apical margin of tergum IV with only a short band or spot of white pubescence laterally; apical margin of tergum V with a complete, though narrow, band of white pubescence; basin of metasoma not sharply defined, coarsely punctured throughout; apical margin of sixth deeply bisinuate in outline, with a prominent, median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, rather sharply right angled on either side of pygidial plate; pygidial plate much less than twice as long as maximum basal width, triangular in outline.

**SPECIMENS EXAMINED.**—OKLAHOMA. MARSHALL COUNTY: Lake Texoma, 2 mi E. Willis, 3♂, VII-1965 (R. M. Bohart, UCD, CIS).

TEXAS. ♂, VI-1879 (Schwarz, USNM). DONLEY COUNTY: Clarendon, ♀, VI-11-10, flowers *Monarda citriodora* (F. C. Bishopp, USNM). LEE COUNTY: 3♀, V-1908 (INHS); ♀, May (INHS); ♀, V-17 (INHS); ♀, V-19 (INHS). Cypress Mills, ♀ (USNM). Fedor, ♂, 2♀, (Birkmann, ANSP, CIS, CU). Giddings, ♀, V-12-53, flowers *Dalea aurea* (R. H. Beamer, KU); ♂, ♀, V-9-54 (L. D. Beamer, KU). LASALLE COUNTY: Cotulla, ♂, V-9-06, flowers *Monarda punctata* (F. C. Pratt, USNM); ♂, V-10-06, flowers *Verbesina encelioides* (F. C. Pratt, USNM).

*Holcopasites eamia* is unique among the genus by having a small, thornlike tubercle situated basally on the labrum. The pygidial plate of the male is subtriangular in outline and the preceding tergum (VI) has a median triangular projection. These are very distinctive features which are not shared with any other species of the genus, and it is therefore difficult to determine its relationships within the genus. It seems possible, however, that *H. haematurus* may conceivably be the nearest relative which still exists in the fauna. An examination of the type specimens of *H. acanthochilus* (a female) and *H. texanus* (a male) reveals that both are synonyms of the earlier described *H. eamia*. With exception of one collection made in Oklahoma, all of the specimens of this species have been taken in Texas.

##### 5. *Holcopasites illinoiensis* (Robertson)

*Phileremus illinoiensis* Robertson, 1891:64, ♀ ♂.

**GEOGRAPHIC RANGE.**—Eastern, central, and southwestern United States.

**HOSTS.**—*Calliopsis andreniformis* Smith and *Hypomacrotera callops callops* Cockerell and Porter (unconfirmed) and *H. c. persimilis* Cockerell (confirmed), see Table 1.

**FEMALE.**—Head and thorax black, clypeus apically rufotestaceous, metasoma red, though usually terga variably stained or darkened with black laterally and medially; antennae, tegulae, and legs usually dark reddish brown or deep mahogany red, mandibles rufotestaceous; calcaria reddish brown. Vestiture of

body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, usually on hind margins of head, mesonotal line, dorsolateral angles of pronotum, mesoscutum circumferentially, mesepisterna, scutellum, metanotum, propodeum at sides, legs basally and on metasoma, especially on terga; dorsal surface of head, thorax, and metasoma sometimes with an intermixture of golden or reddish golden pubescence. Wings faintly violaceous, faintly brownish apically. Length 3.5-5 mm. Eyes bare or essentially so; face above antennae closely and rather finely punctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment as long as or slightly longer than combined length of succeeding two segments; anterior and lateral ocelli separated by much less than twice their diameters; interocellar distance nearly equaling ocellorbital distance; rear angle of mandible situated much behind middle of eye; labrum feebly carinate longitudinally near base, without a thornlike tubercle basally, irregularly and variably punctate on basal half or more, usually with impunctate area mediobasally; ventral surface of head finely, though irregularly and sparsely, punctate adjacent to hypostomal carinae. Mesoscutum distinctly punctured, interspaces short and shining; scutellum entire or at most only weakly indented medially on posterior dorsal surface, not prominently bilobed, though moderately elevated posteriorly; metanotum produced posterolaterally into weakly developed posteriorly projected shelflike processes; mesepisternum densely and nearly rugosely punctate dorsally and with a variably developed patch or fringe of white pubescence; forewing with second submarginal cell not unusually small, one-half or more as long as first submarginal cell when measured along posterior side; spur of middle leg less than one-half as long as corresponding basitarsus. Metasomal terga II-III basally with a transverse band of white pubescence on either side of middle; apical margin of tergum IV usually with a complete or nearly complete band of white pubescence; pygidial plate truncate apically; fifth metasomal sternum with apical margin weakly incurved apically.

**MALE.**—Similar to female in coloration of integument and vestiture. Length 3.0-5.0 mm. Eyes bare; face as in female; antennae with first flagellar seg-

ment longer than combined length of succeeding two segments; ocelli and rear angle of mandible situated as in female; labrum essentially as in female, perhaps less densely punctate basally; ventral surface of head, although generally rather irregularly punctate, more densely punctate than in female, interspaces polished and shining. Mesoscutum, scutellum, metanotum, mesepisternum and wings essentially as in female; tegulae impunctate and shining laterally. Metasomal terga II-VI basally with a transverse band of white pubescence on either side of middle; apical margins of terga IV and V usually with a complete transverse band of white pubescence; basin of metasoma rather sharply defined almost

impunctate; apical margin of sixth metasomal tergum truncate, without a median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, right angled on either side of pygidial plate; pygidial plate more than twice as long as maximum basal width, nearly parallel sided, narrowly liguliform in outline.

*Holcopasites illinoiensis*, although having some variation in the color of the metasoma and also in the amount of white pubescence on the body, is a rather distinctive small species of the Banded Species Group.

Two geographically segregable subspecies are recognized on the basis of differences resident in the vestiture and coloration of the metasoma.

#### Key to the Subspecies of *Holcopasites illinoiensis*

1. Metasomal terga reddish laterally; stained or clouded medially with blackish; vertical face of mesepisternum margined with white pubescence or with an incomplete patch of white pubescence. . . . . *illinoiensis*
- Metasoma with basal two or three terga clear reddish and with apical terga almost entirely black; vertical face of mesepisternum nearly entirely white pubescent. . . . . *minimus*

#### *Holcopasites illinoiensis illinoiensis* (Robertson), new status

- Phileremus illinoiensis* Robertson, 1891:64, ♀ ♂ [Illinois: Carlenville, at flowers of *Lespedeza procumbens*].
- Ammobates illinoiensis*.—Dalla Torre 1896:498.
- Ammobates illinoiensis* [sic].—Robertson 1898:230 [Illinois: Macoupin County, at flowers of *Lespedeza procumbens*].
- Neopasites illinoiensis* [sic].—Robertson 1900:54 [Illinois].
- Holcopasites pratti* (Ashmead ms.) Crawford, 1915:124-125, *nomen nudum, teste* Cockerell, 1903:452, ♀ [Washington, D.C.].
- Neopasites illinoiensis*.—Vioreck 1916:730 [Connecticut: New Haven].—Bequaert 1923:171, ♀ [New York: White Plains].—Linsley and Michener 1939: pls. XV-XVIII.—Michener 1944:200.
- Holcopasites illinoiensis*.—Crawford 1915:124-125, ♀ ♂ [Louisiana. Mississippi: Agricultural College, on flowers *Erigeron annuus*. Washington, D.C., vicinity].—Shinn 1967:929 [Texas: Nacogdoches].
- Holcopasites illinoiensis* [sic].—Robertson 1926:118 [Illinois: Carlenville].
- Neopasites (Neopasites) illinoiensis*.—Linsley 1943:124, 126, 133-134, ♀ ♂ [Connecticut: New Haven. District of Columbia: Washington. Illinois: Carlenville and Dubois. Massachusetts: Dover. Mississippi: Agricultural College. New York: White Plains and Huntington, Long Island. North Carolina: Bryson City. Virginia: Barcroft. Flower records: *Lespedeza procumbens*, *L. repens*, *Ceanothus americanus*, *Coreopsis verticillata*, and *Chrysopsis mariana*].

*Neopasites (Neopasites) punctulatus* Linsley, 1943:125, 135, ♂ [District of Columbia: Chevy Chase, at flowers of *Erigeron ramosus*].

*Holcopasites (Holcopasites) punctulatus*.—Linsley, 1951:1208 ♂ [D.C.].—Krombein 1967:499.

*Holcopasites (Holcopasites) illinoiensis*.—Linsley 1951:1207.—Mitchell 1962:486, 488-489, ♀ ♂ [Illinois to Massachusetts, south to Georgia. Flower records: *Ceanothus*, *Chrysanthemum*, *Erigeron*, and *Oenothera*].—Krombein 1967:498.

LOCATION OF TYPES.—*H. illinoiensis*, Illinois Natural History Survey, Urbana; *H. punctulatus*, Academy of Natural Sciences, Philadelphia.

GEOGRAPHIC RANGE.—Eastern to Southwestern States (Connecticut, District of Columbia, Georgia, Illinois, Kansas, Louisiana, Maine, Maryland, Massachusetts, Mississippi, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, and Virginia).

HOST.—*Calliopsis andreniformis* Smith (Table 1).

SPECIMENS EXAMINED.—CONNECTICUT. NEW HAVEN COUNTY: New Haven, VI-30-05 (B. H. Walden, Vioreck 1916: 730; Linsley 1943: 134).

DISTRICT OF COLUMBIA: Washington, ♂, VI-1878 (ANSP); ♀, (F. C. Pratt, USNM); ♀, V-24-04 (W. D. Pierce, USNM); ♀, IX-9-16, flowers

*Chrysopsis mariana* (W. McAtee, CIS); ♂, 2 ♀, VI-14-16, flowers *Chrysanthemum leucanthemum* (W. D. Pierce, USNM); ♂, VI-14-16, flowers *Erigeron ramosus* (W. D. Pierce, ANSP).

GEORGIA. RICHMOND COUNTY: 2 ♀, V-3-59 (Stage).

ILLINOIS. MACOUPIN COUNTY: Carlinville (all collected by C. H. Robertson), ♀, VII-20-92; ♀, VII-2-94; ♂, V-6-02; 4 ♀, VI-9-02; ♀, VI-10-02; 6 ♂, 2 ♀, VI-14-02 (INHS). WASHINGTON COUNTY: Dubois, ♂, VIII-9-17 (CIS).

KANSAS. DOUGLAS COUNTY: Baldwin, ♂, ♀, VI-5-06 (J. C. Bridwell, USNM).

LOUISIANA. "Loui. 2547", ♀ (F. C. Pratt, USNM). ST. LANDRY PARISH: Opelousas, ♀ (Pilate collection, USNM).

MAINE. PENOBSCOT COUNTY: Orono, ♀, VI-4-39, flowers of daisy (USNM); 2 ♀, VI-9-39 (USNM).

MARYLAND. PRINCE GEORGES COUNTY: Beltsville, ♀, VII-1-17 (W. L. McAtee, USNM).

MASSACHUSETTS. Tremont, 1 ♀, VII-30-09 (W. L. McAtee, USNM). NORFOLK COUNTY: Dover, ♀, VII-4-25, flowers *Chrysanthemum parthenium* (J. C. Bequaert, CIS).

MISSISSIPPI. OKTIBBEHA COUNTY: Agricultural College, ♀, V-24-04, flowers *Erigeron annuus* (W. D. Pierce, USNM).

NEW JERSEY. BERGEN COUNTY: Demarest, ♀, VII-1937 (J. C. Crawford, AMNH). Ramsey, ♂, ♀, VI-15-18 (F. E. Lutz, AMNH). MORRIS COUNTY: Long Valley, ♀, VII-10-55 (G. R. Ferguson, GEB). Morris Plains, ♂, VI-18-59 (D. R. Whitehead, CIS). 4 ♀, VII-10-61 (M. Mazurkiewicz and D. R. Whitehead, CIS). UNION COUNTY: Lincoln Park, ♂, VI-15-37 (M. A. Cazier, AMNH). Watchung Reservoir, ♂, VII-22-55 (G. R. Ferguson, GEB); ♀, VI-30-56 (G. R. Ferguson, GEB); ♀, VII-25-64, nest site #66 (A. R. Moldenke, AMNH); 2 ♂, ♀, VII-3-64, nest site #66 (A. R. Moldenke, AMNH). Westfield, ♀, VII-1-56 (G. R. Ferguson, GEB).

NEW YORK. ORANGE COUNTY: Tuxedo Park, 5 mi NW, ♀, VII-3-62 (J. G. Rozen, M. Statham, J. A. Woods, and S. J. Hessel, AMNH). SUFFOLK COUNTY: Babylon, 2 ♂, VI-11-36 (Blanton and Borders, GEB). East Williston, ♀, VI-30-51 (J. G. Rozen, AMNH). Huntington, 15 ♂, 3 ♀, VI-1932 (J. C. Bridwell, USNM, CIS). TOMPKINS COUNTY: Cornell University Campus, Kite Hill, ♀, VII-2-35,

♀, VII-1-36, and ♀, VII-5-37 (P. P. Baiby, CU). WESTCHESTER COUNTY: White Plains (J. R. de la Torre Bueno, Linsley 1943: 134).

NORTH CAROLINA. SWAIN COUNTY: Black Mountains, ♂, ♀, June (CIS); ♂, "1911 Exped." Accession 33827 (AMNH); ♀, VI-10 to 13-12 (Beutenmuller, CU). Bryson City, 3 ♂, 3 ♀, VI-30-23, flowers *Ceanothus americanus* (J. C. Crawford, nos. 6115-16, 6118, 6122-23, 6126-27, AMNH, CIS, UCR); ♂, VI-30-23 (J. C. Crawford, no. 6116, UN); ♀, VII-4-23, flowers *Erigeron ramosus* (J. C. Crawford, no. 6232, AMNH); ♂, IX-4-23, flowers *Lespedeza repens* (J. C. Crawford, no. 6770, AMNH). WAKE COUNTY: Raleigh, ♂, VI-25-33, flowers *Oenothera* (T. B. Mitchell, UN); ♀, V-30-41 (T. B. Mitchell, Stage); ♂, V-16-48 (T. B. Mitchell, Stage).

OHIO. GUERNSEY COUNTY: Old Washington, 4 mi W, ♂, VI-24-51 (J. G. Rozen, AMNH).

OKLAHOMA. MARSHALL COUNTY: Lake Texoma, 2 mi E Willis, ♂, VI-1965 (R. M. Bohart, UCD); 2 ♀, VII-1965 (R. M. Bohart, UCD).

PENNSYLVANIA. BUCKS COUNTY: Newtown, ♂, VI-28-36 (L. J. Stannard, INHS).

SOUTH CAROLINA (Mitchell 1962:499, table 16).

TENNESSEE (Mitchell 1962:499, table 16).

TEXAS. NACOGDOCHES COUNTY: Nacogdoches, ♂, 8 ♀, V-8-62, ♂, 7 ♀, V-15-62, 2 ♂, 8 ♀, V-17-62, at nesting sites of *Calliopsis andreniformis* (A. F. Shinn, Shinn and CIS).

VIRGINIA. ♀, VI-5 (T. Pergrande, USNM). FAIRFAX COUNTY: Alexandria, ♂, 2 ♀, VI-21-31, flowers *Coreopsis verticillata* (P. H. Timberlake, UCR). Barcroft, 2 ♂, VI-24-17, flowers *Ceanothus americanus* (W. L. McAtee, CIS); ♀, VI-17-29 (J. C. Bridwell, USNM); ♂, VI-13-31 (J. C. Bridwell, UCR); 2 ♀, VI-21-31, flowers *Coreopsis verticillata* (P. H. Timberlake, UCR). Clifton, ♂, 5 ♀, VI-20-31 (J. C. Bridwell, USNM); ♂, VI-11-33 (J. C. Bridwell, USNM); 5 ♂, ♀, VI-30-35 (K. V. Krombein, USNM, CU). Falls Church, 2 ♂, 3 ♀, July 2-7 (AMNH, UN, USNM); ♂, ♀, VII-4-07 (N. Banks, AMNH, USNM); ♀, VI-16-18 (E. A. Chapin, USNM); ♂, 2 ♀, VII-4 (N. Banks, CU).

*Holcopasites illinoiensis* proper is widely distributed over the south-central and eastern United States, extending from Texas and Kansas eastward to Atlan-

tic seaboard states from Georgia north into Maine. We have reexamined the holotype of *H. punctulatus* Linsley and concur with Mitchell (1962:488) that it is a synonym of *H. illinoiensis* proper.

This subspecies has the metasoma less brightly red than *H. illinoiensis minimus* and in general is more somberly colored than that subspecies.

***Holcopasites illinoiensis minimus* (Linsley),  
new status**

FIGURES 3, 15

*Neopasites* (*Neopasites*) *minimus* Linsley, 1943:123, 126–127, ♀ [Arizona: sixteen miles south of Tucson].

*Holcopasites* (*Holcopasites*) *minimus*.—Linsley 1951:1208, ♀ [Arizona].

LOCATION OF TYPE.—California Academy of Sciences, San Francisco.

GEOGRAPHIC RANGE.—Southwestern United States (Arizona and New Mexico) and adjacent Mexico (Sonora).

HOST.—*Hypomacrotera callops callops* Cockerell and Porter (unconfirmed) and *H. c. persimilis* Cockerell (confirmed). Table 1.

SPECIMENS EXAMINED.—ARIZONA. COCHISE COUNTY: Apache, 13 mi SW, 8 ♀, VIII–19 to 26–64 (J. G. and B. L. Rozen, AMNH); ♂, VIII–21–66, 2 ♂, VIII–22–66, and ♀, VIII–29–66 (J. G. and B. L. Rozen, AMNH); 2 ♂, ♀, IX–1–71, flying over nesting area of *Calliopsis* spp. (J. G. Rozen and M. Favreau, AMNH). Apache, 15 mi SW, ♀, VIII–22–70 (J. G. Rozen, AMNH). Apache, 17.5 mi SW, 2 ♀, VIII–14–69 (J. G. and K. C. Rozen, AMNH); 5 ♀, VIII–16–69 (J. G. Rozen, AMNH). Douglas, ♀, VIII–22–68 (J. G. Rozen and M. Favreau, AMNH); ♀, VIII–24–69 (J. G. and K. C. Rozen, AMNH). Douglas, 1 mi, E, 3 ♀, VIII–13–62, flying just above ground (M. A. Cazier, CIS); ♀, VIII–14–62, flying over surface of ground investigating holes, 11:00–11:20 A.M. (M. A. Cazier, CIS); 5 ♀, VIII–15–62, flying just above ground, 9:00–9:50 A.M. (M. A. Cazier, CIS); 3 ♀, VIII–16–62 (M. Statham, AMNH); 2 ♀, VIII–17–62 (M. A. Cazier, CIS); ♀, same date (M. Statham, AMNH); ♀, VIII–14–69 (J. G. and K. C. Rozen, AMNH); ♀, VIII–21–69 (J. G. Rozen and M. Favreau, AMNH); ♂, 5 ♀, VIII–24–70 (J. G. Rozen, AMNH). Portal, 2 mi, NE, ♀, IX–14–61 (J. G. Rozen and M. Statham, CIS); ♀, VIII–30–71, examining burrow entrances

of *Hypomacrotera callops callops* Cockerell and Porter (J. G. Rozen and M. Favreau, AMNH); ♀, same data, except VIII–31–71 (J. G. Rozen and M. Favreau, AMNH). PIMA COUNTY: Sabino Canyon, Santa Catalina Mountains, ♂, VII–7–50, flowers *Euphorbia capitellata* (R. H. Beamer, KU). Tucson, 16 mi S, ♀, VIII–11–24 (E. P. Van Duzee, CAS, Linsley 1943:127).

NEW MEXICO. HIDALGO COUNTY: Rodeo, 1 mi N, ♀, VIII–29–63, asleep on *Eriogonum* (M. A. Cazier and M. Mortenson, CIS); ♂, IX–4–63 (M. A. Cazier and M. Mortenson, CIS).

MEXICO. SONORA: Belen, 5 ♂, 38 ♀, IX–28–66, from nesting site of *Hypomacrotera callops* (G. E. and A. S. Bohart, GEB).

Although *Holcopasites illinoiensis minimus* was originally accorded the rank of species, the male has subsequently been discovered and with the acquisition of much new material, we have been unable to find any structural features to distinguish it from *H. illinoiensis*. On the basis of geographically segregable colorational features and differences in the expression of white pubescence, we conclude that they are subspecifically distinct. It is interesting that *H. illinoiensis minimus* has been associated with a host bee that is different from those thus far associated with the nominate subspecies (Table 1).

In late August of 1971, J. G. Rozen and M. Favreau found adults of this subspecies examining burrow entrances of *Hypomacrotera callops callops* Cockerell and Porter at one mile west of Douglas, Cochise County, Arizona. In their excavation of the nests a feeding larva and several postdefecating larvae of presumably this subspecies were recovered. Of further interest these observers noted nests of *Calliopsis gilva* in the same area which were not visited or examined by the adults of this parasite. Upon excavation of the nests no *Holcopasites* larvae were recovered. However, at 13 miles southwest of Apache, Cochise County, Arizona, adults of this bee were seen flying over a nesting area occupied by several species of the genus *Calliopsis*.

**6. *Holcopasites stevensi* (Crawford)**

FIGURES 5, 13

*Neopasites illinoiensis*.—authors, not Robertson 1891, Crawford 1903:334 [Nebraska: Lincoln and West Point at flowers of *Solidago rigida* and *Grindelia squarrosa*].—

Swenk 1907:297 [Nebraska: Lincoln, West Point, Cedar Bluffs, and Omaha at flowers of *Solidago rigida* and *Grindelia squarrosa* in the fall and at flowers of *Ratibida columnaris*, *Symphoricarpos occidentalis* and *Asclepias* sp. in the summer].—Crawford 1912:359, ♀ [Alberta: Medicine Hat. Note: Some of these records evidently also apply to *Holcopsites calliopsidis*].

*Holcopsites stevensi* Crawford, 1915:123, 124, 125–126, ♀, ♂ [North Dakota (all at flowers of *Grindelia squarrosa*): Bismarck (the type), Drake, McKenzie, Minot, and Williston. Nebraska: Lincoln at flowers of *G. squarrosa* and West Point at flowers of *Solidago rigida*. Alberta: Medicine Hat].—Mavromoustakis 1963:754, ♀ [Iowa].

*Neopasites (Neopasites) stevensi*.—Linsley 1943:124, 126, 135–136, ♀, ♂ [Alberta, Nebraska, and North Dakota. Flower records: *Grindelia squarrosa* and *Solidago rigida*].

*Holcopsites (Holcopsites) stevensi*.—Linsley 1951:1208, ♀, ♂ [Alberta to North Dakota and Nebraska].

*Neopasites stevensi*.—Stevens, 1951:204 [North Dakota (mostly at flowers of *Grindelia squarrosa*, one specimen at flowers of *Melilotus alba*): Bismarck, Drake, Hatton, McKenzie, Minot and Washburn].—Linsley 1944:280 [North Dakota: Hatton, visiting flowers of *Grindelia squarrosa*].

*Neopasites elegans* Linsley, 1944:277–278, ♀ [Texas: Culberson and El Paso Counties. New synonymy].

*Holcopsites (Holcopsites) elegans*.—Linsley 1951:1207, ♀, [Texas].

*Neopasites knulli* Linsley, 1944:278–279, ♂ [Texas: Culberson and El Paso Counties. New synonymy].

*Holcopsites (Holcopsites) knulli*, Linsley, 1951:1208, ♀ [Texas].—Rozen 1965:87, 88–91, figs. 1–2, [Arizona: Southwestern Research Station near Portal, Cochise County].—Rozen 1966:30 [Arizona: Southwestern Research Station near Portal].

LOCATION OF TYPES.—*H. elegans* and *H. knulli*, Ohio State University, Columbus; *H. stevensi*, National Museum of Natural History, Washington, D.C.

GEOGRAPHIC RANGE.—Southern Canada (Alberta), north-central (North Dakota and Nebraska) and southwestern United States (Arizona, New Mexico, and Texas).

HOSTS.—*Calliopsis crypta* Shinn (confirmed) and possibly *C. rozeni* Shinn (Table 1).

FEMALE.—Head and thorax black, metasoma red or chiefly so, sometimes terga darkened medially; antennae, tegulae, and legs usually dark reddish or deep mahogany brown, mandibles and anterior margin of clypeus bright rufotestaceous; calcaria reddish brown. Vestiture of body chiefly white, mostly closely appressed and forming patches on face about antennal insertions, hind margins of head usually, mesonotal line, dorsolateral angles of pronotum, anterolateral angles of mesoscutum, mesepisternum, scutellum in

whole or in part, metanotum and propodeum normally at sides, legs basally and on metasoma, especially on terga; dorsal surfaces of head, thorax and metasoma without or at most only very inconspicuously clothed with a few intermixed golden or reddish golden hairs. Wings feebly violaceous, faintly tinged with brownish apically. Length 4–7.5 mm. Eyes bare or at most with a few, scattered, short hairs; face above antennae closely and coarsely punctate, neither bigibbously swollen nor largely impunctate; antennae with first flagellar segment shorter than succeeding two segments; anterior and lateral ocelli separated by much less than twice their diameters; intercellular and ocellorbital distances about equal; rear angle of mandible well behind middle of eye; labrum longitudinally carinate medially, without a thornlike tubercle near base, rather closely punctate on basal half or more except impunctate mediolongitudinally; ventral surface of head rather closely and coarsely punctate adjacent to hypostomal carinae, interspaces less than puncture width across. Mesoscutum rather coarsely and nearly rugosopunctate throughout; scutellum entire or at most only weakly indented medially on posterior dorsal surface, not prominently bilobed and not strongly elevated posteriorly; metanotum produced posterolaterally into prominent posteriorly projected shelflike processes; mesepisternum rather coarsely and nearly rugosely punctate dorsally and with a large ringlike patch of white pubescence; wing with second submarginal cell not usually small, more than one-half as long as first submarginal cell when measured along posterior side; spur of middle leg less than one-half as long as corresponding basitarsus. Metasomal terga II–IV basally with a transverse band of white pubescence on either side of middle, rarely bands greatly reduced to form a spot (as in *elegans* type of variation); apical margin of tergum IV usually with a quadripartite band of white pubescence, shortest band segments situated laterally, widest band segments situated immediately on either side of middle (occasionally absent in some specimens); pygidial plate truncate apically, rounded laterally; fifth metasomal sternum with apical margin entire or only slightly incurved medially.

MALE.—Similar to female in coloration of integument and vestiture. Length 4–7 mm. Eyes bare or at most with a few scattered hairs, not densely hirsute; face as in female; antennae with first flagellar segment much less than combined length of succeeding two

segments; ocelli and rear angle of mandible as in female; labrum essentially as in female; ventral surface of head punctate about as in female. Mesoscutum, scutellum, metanotum, mesepisterna, and wings as in females; tegulae very nearly punctate throughout. Metasomal terga II-V basally with a transverse band of white pubescence on either side of middle (rarely bands reduced to form a spot); apical margin of tergum IV with only a short band or spot of white pubescence laterally; apical margin of tergum V (and sometimes VI also) with a complete (rarely interrupted medially) transverse band of white pubescence; basin of metasoma not sharply defined, punctured at least at sides; apical margin of sixth metasomal tergum feebly bisinuate in outline, without a median triangular projection; seventh metasomal tergum with lateral margins, as seen from above, nearly right angled on either side of pygidial plate; pygidial plate more than twice as long as maximum basal width, nearly parallel sided essentially liguliform in outline.

**SPECIMENS EXAMINED.**—ARIZONA. COCHISE COUNTY: Douglas, 1 mi N, 2♂, 10♀, VIII-16-62, flowers *Bahia absinthifolia* var. *dealbata* (E. G. Linsley, CIS). Douglas, 1 mi E, 2♀, VIII-12-62, flying just above ground at 5:30 P.M. (M. A. Cazier, CIS); 4♀, VIII-13-62, searching next to ground from 10:00-11:00 A.M. (M. A. Cazier, CIS); 2♀, VIII-14-62, flying above ground among *Hoffmanseggia* plants from 10:15 to 10:30 A.M. (M. A. Cazier, CIS); 10♀, VIII-14-62, flying over surface of ground investigating holes from 11:00 to 11:20 A.M. (M. A. Cazier, CIS); 21♀, VIII-15-62, flying just above ground between 9:30 and 9:50 A.M. (M. A. Cazier, CIS); 7♀, VIII-17-62 (M. A. Cazier, CIS); ♂, 3♀, same date (M. Statham, AMNH); 5♀ VIII-12-62 (M. A. Cazier, CIS); ♂, VIII-19-62, flowers *Lepidium thurberi* (M. Statham, AMNH); 2♀, VIII-19-68 (J. G. Rozen, AMNH); 3♀ VIII-20-68 (J. G. Rozen and M. Favreau, AMNH); 3♀, VIII-21-68 (J. G. Rozen and M. Favreau, AMNH). Portal, ♂, VIII-15-58 (P. D. Hurd, CIS); ♀, VIII-16-58 (C. G. Moore, CIS). Portal, 2 mi E, ♀, VIII-26-57 (W. F. Barr, UI). Portal, 2 mi N.E., ♀, IX-23-61 (M. A. Cazier, CIS); ♀, VIII-14-62 (H. A. Scullen, GEB); ♀, VIII-17-62 (H. A. Scullen, GEB). Portal, 2.5 mi NE, ♀, VIII-16-59 (M. Statham, AMNH); ♀, VIII-24-59 (M. Statham, AMNH). Portal, 5 mi N, 3♀, IX-28-61 (M. Mortenson and M.

Statham, CIS). Southwestern Research Station, ♀, VIII-25-62, site A (J. G. Rozen, M. Statham, S. J. Hessel, AMNH); 2♀, VIII-26-62 (J. G. Rozen, M. Statham, S. J. Hessel, AMNH); ♀, same date, sleeping on stem near burrow #6 (J. G. Rozen, M. Statham and S. J. Hessel, AMNH); 2♀, VIII-29-62 (J. G. Rozen, M. Statham and S. J. Hessel, AMNH); ♀, VIII-20-62. Site C, Burrow #1 (J. G. Rozen, M. Statham and S. J. Hessel, AMNH); ♀, IX-16-62 (J. G. Rozen, AMNH); ♀, IX-17-62, flowers *Heterotheca subaxillaris* (J. G. Rozen, AMNH). Willcox, ♂, VIII-20-58, flowers *Baileya pleniradiata* (E. G. Linsley, CIS).

NEBRASKA. CUMING COUNTY: Westpoint, ♀, IX-6-00, flowers *Grindelia squarrosa* (J. C. Crawford, USNM). KNOX COUNTY: Crofton, 7 mi NW, ♂, VIII-31-60, flowers *Grindelia squarrosa* (W. E. LaBerge and C. McCoy, UN). LANCASTER COUNTY: Lincoln, ♀, September (UN); ♂, IX-2-01, flowers *Grindelia squarrosa* (J. C. Crawford, USNM).

NEW MEXICO. EDDY COUNTY: Carlsbad, 5 mi N, 3♂, 39♀, IX-21-56 (J. W. MacSwain, CIS). HIDALGO COUNTY: Rodeo, ♀, VII-21-58 (R. M. Bohart, UCD). Rodeo, 2.5 mi N, ♂, IX-4-59, flowers *Heterotheca subaxillaris* (J. R. Powers, Stage). Rodeo, #18 mi N, ♀, VIII-25-58 (J. Hamai, CIS). Rodeo, 7 mi SE, ♀, VIII-21-58 (J. M. Marston, CIS).

NORTH DAKOTA. BURLEIGH COUNTY: Bismarck, 2♂, ♀, VIII-6-13, flowers *Grindelia squarrosa* (O. A. Stevens, USNM). McKenzie, ♀, VIII-5-13, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH). CASS COUNTY: Fargo, ♂, VIII-12-10, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH); ♀, VIII-10-17, flowers *Grindelia squarrosa* (O. A. Stevens, UN); ♂, ♀, VIII-12-17, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH and UN). LA MOURE COUNTY: Edgeley, ♀, VIII-27-21, on flowers *Grindelia squarrosa* (O. A. Stevens, AMNH). McCLEAN COUNTY: Washburn, ♂, VII-23-26, flowers *Melilotus alba* (O. A. Stevens, AMNH). McHENRY COUNTY: Drake, ♂, ♀, VIII-24-15, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH, USNM). MORTON COUNTY: Mandan Ullin, 10 mi W, ♀, VIII-7-62 (J. G. and B. L. Rozen, AMNH). STUTSMAN COUNTY: Jamestown, ♂, VIII-7-62 (J. G. and B. L. Rozen, AMNH). TRAILL COUNTY: Hatton, 5♂, 9♀, VIII-3-40, flowers *Grindelia squarrosa* (O. A. Stevens, AMNH).

WARD COUNTY: Minot, 2 ♀, VIII-22-15, on flowers *Grindelia squarrosa* (O. A. Stevens, AMNH, USNM). WILLIAMS COUNTY: Williston, ♂, ♀, VIII-9-15, flowers *Grindelia squarrosa* (O. A. Stevens, CIS).

TEXAS. CULBERSON COUNTY: ♂, 3 ♀, VIII-30-40 (D. J. and J. N. Knull, OSU, CIS, UCR). EL PASO COUNTY: 2 ♀, VIII-30-40 (D. J. and J. N. Knull, OSU).

CANADA. ALBERTA: Medicine Hat, ♂, 2 ♀ (J. R. Malloch, ANSP, USNM); 2♂, VIII-17-28, ♂, VIII-21-28, ♀, VIII-26-28 (F. S. Carr, CAS). Tilley, ♀, VIII-18-40 (J. L. Carr, UA).

The eyes of *Holcopasites stevensi*, although normally bare, are sometimes provided with minute scattered

hairs, especially in the males. This would seem to suggest a possible link with the species of the subgenus *Trichopasites* whose eyes are densely clothed with short, erect pubescence. There is also some variation in the expression of the basal bands of white pubescence on the metasomal terga. Most frequently these bands are as indicated in Figure 13; however, in some specimens they are abbreviated transversely and appear almost spotlike in outline. As a consequence in these instances reliance must be placed on other characteristics to establish the correct identification of the species. One such extreme (*H. elegans*) which previously had been characterized as a new species is now placed as a synonym of this species as is also *H.*

TABLE 1.—Established and presumed host relationships of the genus *Holcopasites*<sup>1</sup>

Species of <i>Holcopasites</i>	Host	Authority
<i>arizonicus</i> .....	<i>Calliopsis coloradensis</i> *	New record
	<i>Calliopsis pectidis</i>	Shinn (1965:15; 1967: 850, 920)
	<i>Pseudopanurgus occidus</i> ?	Rozen (1965:88, as unknown <i>Pseudopanurgus</i> )
	<i>Pseudopanurgus timberlakei</i> ?	Rozen (1965:88)
	<i>Pseudopanurgus</i> sp.	Linsley et al. (1956:82)
" <i>arizonicus</i> ?" .....	<i>Pseudopanurgus timberlakei</i> ? or <i>P. occidus</i> *	Rozen (1966:32, as <i>Pseudopanurgus</i> sp.)
<i>calliopsidis</i> proper .....	<i>Calliopsis andreniformis</i>	Swenk (1907:297)
	<i>Calliopsis andreniformis</i> *	Ainslie (1937:99-100)
	<i>Calliopsis andreniformis</i> *	Rozen (1966:33)
	<i>Calliopsis andreniformis</i> *	Shinn (1967:928)
	<i>Calliopsis andreniformis</i>	Rozen (1967:33)
	<i>Pseudopanurgus</i> sp.	Linsley et al. (1956:82)
<i>heliopsis</i> .....	<i>Calliopsis nebraskensis</i>	New record
	<i>Calliopsis andreniformis</i>	Robertson (1926:118)
<i>illinoiensis</i> proper .....	<i>Calliopsis andreniformis</i> *	Shinn (1967:929)
	<i>Calliopsis andreniformis</i>	New record
	<i>Hypomacrotera callops persimilis</i> *	New record
<i>illinoiensis minimus</i> .....	<i>Hypomacrotera callops callops</i>	New record
	<i>Pseudopanurgus boylei</i>	Rozen (1967:26)
<i>insoletus</i> .....	<i>Pseudopanurgus perlaevis</i>	New record
	<i>Pseudopanurgus timberlakei</i> ?	Rozen (1965:88)
	<i>Pseudopanurgus</i> species B	Rozen (1967:27)
	<i>Pseudopanurgus</i> sp.	Linsley et al., (1956:82)
	<i>Pseudopanurgus</i> spp.	Rozen (1965:88)
	<i>Pseudopanurgus</i> sp.	Linsley et al. (1956:82)
<i>pulchellus</i> .....	<i>Calliopsis crypta</i> *	Rozen (1965:88)
<i>stevensi</i> .....	<i>Calliopsis rozeni</i> ?	Rozen (1965:88)
	<i>Pseudopanurgus nanulus</i> *	New record
<i>tegularis</i> .....	<i>Calliopsis</i> *	Stephen et al. (1969:125)
	<i>Hypomacrotera</i> *	Stephen et al. (1969:125)
	<i>Pseudopanurgus aethiops</i> *	Rozen (1965:90)
	<i>Pseudopanurgus perlaevis</i> *	Rozen (1965:90, fig. 4)
	<i>Pseudopanurgus</i> *	Rozen (1965:90); Stephen et al. (1969:125)

<sup>1</sup> Established relationships are indicated by an asterisk (\*); all others are presumed host relationships, see text for details. Those specific names followed by a question mark indicate that the identification is in question.

*knulli*, which is indistinguishable from *H. stevensi*. Prior to the description of *H. stevensi*, it was confused with the earlier described *H. illinoiensis* by Crawford (1903:334) and Swenk (1907: 297).

*H. stevensi* is distributed over much of the Rocky Mountain region of North America from Canada well into the southwestern United States, but has not yet been found in Mexico, although almost surely it occurs there. One specimen, a female in the collection of the Museum of Comparative Zoology, Harvard University, is simply labeled "Cala," suggesting perhaps that it was collected in California.

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