A REVISION OF THE GENUS COLLETES IN AMERICA NORTH OF MEXICO (HYMENOPTERA, COLLETIDAE)

by

William P. Stephen
B.S.A., University of Manitoba, 1948

Vol. I

Submitted to the Department of Entomology and the Faculty of the Graduate School of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

May, 1952

TABLE OF CONTENTS

INTRODUCTION 1

MORPHOLOGY OF THE MALE GENITALIA 6

BIONOMICS 12

DISTRIBUTION AND PHYLOGENY 25

GEOGRAPHICAL VARIATION 35

METHODS AND MEASUREMENTS 36

DESCRIPTION OF THE GENUS 37

KEY TO THE MALES 39

KEY TO THE FEMALES 75

DESCRIPTION OF THE SPECIES 108

ADDENDA 666

ACKNOWLEDGEMENTS 676

REFERENCES CITED 677

FIGURES 682

MAPS 695

INTRODUCTION

The bee genus Colletes abounds in America north of the tropic of Cancer and is widely distributed throughout the world, with the exception of Australia. This study is limited to those species occurring in America north of Mexico, for material from the Central American countries is meagre and areas of collection disjunct.

The work is primarily of a systematic nature and contributes little to an evolutionary or phylogenetic study of the genus. However, in conjunction with Noskiewicz's (1936) treatise on the Palearctic members of the genus plus a critical treatment of the Central American fauna, it should form a suitable basis for the inauguration of such a project.

Shortly after the turn of the twentieth century, Swenk (1908) published the first extensive systematic paper on the American species of the genus. His work considered twenty-six species possessing some black thoracic pile in either or both sexes. He experienced a great deal of difficulty in obtaining accurately determined material, and recent inquiry indicates that he had opportunity to examine but a few of the types. Despite his effort to avoid the use of chromatic characters for species differentiation, he occasionally submitted to their utilization; where these lapses occurred the species picture is obscure. In spite of these shortcomings the Swenk work was laudable and unique until the Timberlake papers on Colorado (1943) and California (1951) Colletes

appeared. In addition to the aforementioned treatises, several species lists and incomplete keys have been compiled, usually accompanied by new species descriptions from which accurate recognition is difficult or impossible. All, except the Swenk work, are regional in scope and are unsatisfactory to workers outside of the zones covered. The original descriptions are, for the most part, unsatisfactory, frequently referring solely to the color of the body pile, and to other characteristics since proven to be of infra-specific nature.

This condition led to a redescription of all species with the exception of a few known only from single females listed in the addenda with their original descriptions. Most, if not all, of the monotypes may eventually prove to be synonyms of better known species, but further investigation is necessary on this group. An attempt was made to standardize descriptive techniques: holotypes, paratypes or topotypes, in descending order of availability, were selected for the basic description with variability over the species range recorded in a preamble or postscript to each description; the first paragraph of the description deals with the distribution, density and color of the pile of the body, beginning at the clypeus and extending progressively caudad, terminating with an account of the pubescence on the metasomal sterna; the second paragraph includes a discussion of the tegumental morphology of the insect in the same sequence as

listed under the pile characteristics. In most cases a brief summary of the characters of the seventh ventral plates and capsule of the male is given, while in all, there is reference to illustrations at the end of the work.

The conventional synonymy precedes the descriptive portion of each species. Included are some records, obviously erroneous, which are well out of the known range of distribution for the species. In some instances there has been opportunity to examine original material (of Swenk, Graenicher, Criddle, etc.) upon which publication was based; many have proven to be incorrectly determined. Thus of the numerous references accumulated, many are faulty or questionable, and the task of verification of all records is no longer possible. Nevertheless in an effort to make the work as comprehensive as possible the reference lists have been included in their entirety. Where any question exists in the mind of the author on the validity of a specific record, a clarifying note, in parentheses, follows that item. The records contained in the Cresson, Dalla Torre and Michener (in Muesebeck et al.) catalogues have not been included for it is felt that their inclusion would entail unnecessary repetition.

The greatest difficulty in the descriptive phase of this work was experienced with the color of the body pile. This problem lies not only in the fact, as Swenk suggests, that "the original color undergoes a rapid fading, so that a specimen in which the hair of the thorax and face was of

a bright yellowish color when fresh will, in a short while, fade to pale grey without a tinge of yellow . . " but also to an equal or greater extent on the inherent polychromatic nature of the pile. In a number of species there is so much color variation that accurate description would necessitate the consideration and subsequent treatment of at least twenty-five per cent of the individuals. C. thoracicus is the prime example of this variability. Typically this species has the pile of the body, particularly of the head and the thorax, uniformly ochreus to ferrugineous, but in many specimens the pile is tawny or dusky grey much as in the closely related inaequalis Say. Other members of this species have a few hairs of the mesoscutum and scutellum so deeply ferrugineous that they may be confused with black. I suspect that some of this variation can be attributed to fading but not, as Swenk suggests, exclusively to this cause. Throughout the genus repeated examples appear in which black pile is present in reduced quantity on the scutellum or vertex or both of a large percentage of the population but absent in a number of others. Similarly variation in the intensity of yellow pigmentation of the pile often occurs on specimens taken in a single area during a single flight season.

There is little doubt that the presence of black hairs, whether on the face, vertex, or thoracic dorsum, serves as a suitable character of constant value. However, I doubt whether it is of much phyletic significance. The presence

of black pile in a restricted number of species in many diverse groups merely indicates that the character has arisen independently and repeatedly during the evolutionary history of the genus.

Hazardous, as a specific character, is the use of slight differences in the density of body pubescence. With age many, if not all, species lose pile, probably due to simple abrasion during the construction of their nests. The thoracic and metasomal terga are most susceptible to repeated contact and, consequently, the metasomal fasciae are often reduced or absent, depending on the age and sex of the specimen. Despite its limitations, I do not advocate that consideration of the body pile be eliminated in species determination, but caution its usage and when possible would restrict it to the secondary role of characteristics to be employed principally in substantiation of conclusions based on other morphological characters.

A number of characteristics, previously regularly used in species recognition, have also proven unreliable when generally applied. Those dealing with the intensity of color of some morphological structure are of little value, except when applied to species of a restricted range. Variation in the degree of melanistic deposition is found in the general body color of the insect; in the coloration of the underside of the flagellum; in the extent of red and black on the apices of the mandibles; in the color of the nervures of the wing and in the shade of the tarsi and

tegulae. These have all proven equally unsatisfactory when applied to the more widely distributed species, and reference to such characters has been kept to a minimum.

Difficulty in species recognition is by no means restricted to chromatic variability. In the widely distributed species minor inconsistencies are found in the puncturation of the clypeus and vertex, the sculpturation of the basal area and posterior face of the propodeum, the patterning and pitting of the metanotum and the pectination of the spurs of the hind tibiae to the extent of negating or impairing the structures' use as characteristics of value. Again, it must be emphasized that the above characters become increasingly useful in species of restricted distribution.

MORPHOLOGY OF THE MALE GENITALIA

The variation in terminology of the various structures of the primary copulatory organs of the male is disturbing; the list of terms is resplendent with synonyms and appears to be growing with each of the more recent papers. Crosskey (1951) has done little to clarify the situation with his introductory statement, "It has been conclusively shown that the male genitalia of Hymenoptera are entirely phallic in origin." Perhaps no other morphological problem in entomology remains so unsettled. His failure to consider the basic contributions by Crampton (1919, 1920, 1938), Singh-Pruthi (1925, 1929), and Michener (1944) leads one to con-

sider the statement no more than a personal expression of satisfaction with the conclusions of Snodgrass (1941). Despite the uncertainty which enshrouds the homologies of the primary copulatory organs I find the work of Michener and Crampton much more plausible than claims for exclusive phallic origin of the capsular structures. Pertaining to the matter I quote from Michener (1944): " . . . it seems necessary first to establish with certainty the segment with which the primary copulatory structures are associated. Apparently the most important evidence is the fact that, as already stated, in the adults they are always articulated on the ninth abdominal segment or lie immediately behind that segment. Since the embryonic appendages of the tenth abdominal segment are retained as larval 'legs' or postpedes in many holometabolous insects (Johannsen and Butt, 1941), and since the rudiments of the copulatory structures arise in the larvae while these legs are still present, we may be quite certain, as pointed out by Snodgrass (1941) that tenth segment appendages do not enter into the formation of the genitalia in these forms, although as shown by Else (1934) and Quadri (1940) they appear to do so in Orthoptera. Holometabolous insect larvae, however, do not have 'legs' on the ninth abdominal segment, which is the segment upon which the claspers are situated, or if appendages are present as in the larvae of Trichoptera, they give rise to claspers (Crampton 1920, 1920(a)). It seems certain then, at least

the outer claspers, and the inner ones as well except possibly in Orthoptera, are, like the gonopore, associated with the ninth abdominal segment. . . . That the copulatory organs are new structures (probably of phallic origin) seems far less probable than they are derived from pre-existing structures."

The terminology used in this paper to describe the primary copulatory organs (capsule) is that of Michener with slight modification. Frequent reference is made to the membranous expansions or wings of the penis valves which offer excellent specific and group characters. The ventral wing is broad and readily distinguishable in all species except C. speciosus Robertson where it is reduced to a semi-lunar preapical expansion. A number of species, particularly those of the consors group, also have the dorsal margin of the penis valves broadly convoluted and extended laterally in a plane parallel to the ventral wings. These two expansions I have termed the dorsal and ventral wings of the penis valves. This is done despite Timberlake's previous use of the term "lateral wing" for the ventral lamination. As both wings are liable to occur as lateral projections I feel that the retention of the term "lateral wing" would eventually add to the confusion. I have followed Snodgrass' terminology for the apical portions of the volsellae, i.e., lateral process = cuspis, median process = digitus (see fig.87).

Noskiewicz (1936) based his capsular nomenclature on the work of Strohl (1908) and frequently referred to appendicular terms as employed by Schmiedeknecht (1882-1884). An attempt to synonymize the various names used by the principal workers in dealing with the copulatory structures of Hymenoptera is shown in Table I.

The seventh metasomal sternum has been treated as being composed of two separate plates attached to a narrow transverse basal apodeme. Throughout the genus the two plates are united at their medio-basal margins. The seventh ventral plates, despite their simplicity, are undoubtedly the most useful single morphological structures for species differentiation. I have arbitrarily applied names to portions of the plates for ease in elucidation during verbal description. The rounded basal points of attachment I have termed the "basal articulatory condyles" because of their condylar structure and their function in serving as the processes which articulate the plates with the body. The apical portions of the plates are broadened appreciably, possessing a dorsal pubescent covering of variable density and distribution. The length, density, and distribution of these hair patterns offer excellent differentiating characteristics and are essential to the separation of a number of sibling species. Attempts have been made to illustrate the plates with extreme accuracy and in a few species the hair patterns may be slightly over-emphasized to aid in

Table I

Michener (modified)	Snodgrass	Schmiedeknecht	Strohl	Timberlake
gonobase	basal ring	cardo	cardo	
gonocoxite	parameral plate	stipes	) valvae	stipes
gonostylus	parameres	lacinia	) external	apical segments of stipes
penis valves	sagittae	sagittae	sagittae	sagittal rods
-dorsal wing			) lamellae	-dorsal wing
-ventral wing			)	-lateral wing
volsellae	volsellae		valvae internal	volsellae
-cuspis	-cuspis			
-digitus	-digitus			

their detection. These broadened apical portions of the plates are referred to as "discs". Occasionally reference is made to a narrow petiolate sector between the disc and condyle, termed the "neck" (see fig.86).

Noteworthy is the unique nature of the seventh ventral plates of C. thoracicus Smith, a sibling species of inaequalis which is found along the eastern and southern seaboard of the United States. There are a few minor external features by which these species can be separated, but occasionally genitalic examination is necessary. The most interesting feature of thoracicus is the fact that it shows striking variation in the form of the seventh ventral plates. The plates may be weakly trilobate with the lateral lobes free along the median margins, partially fused to the median lobes or united completely to form a bilobate apex. This is the only species in which inconsistency in these characters has been observed within populations, although subspecific differences occur rather frequently. From the material examined it is evident that the variability is dispersed at random throughout the range, to such an extent that it is impossible to tell which of the three forms predominates.

BIONOMICS

The species of Colletes are solitary, tending to be semi-gregarious in selection of their nesting sites, exhibiting, as far as is known, species preference for certain soil types and textures. Biologies of too few species have been well studied to form conclusive generalizations, but on the basis of our present knowledge the above would seem to be the case.

The conditions believed most primitive are a composite of the biological phenomena exhibited by the various groups of species known in America today. The gregarious tendency, the simple straight nesting tube probably not extending more than a foot below ground level, having 3 or 4 cells in a row, the well-mixed pollen and nectar supplies in each cell, and the complete lining of the nest tunnel with salivary excretions appear to constitute the more basic ancestral characteristics. Unfortunately biological data are so sketchy that one must be overly-imaginative to attempt even so much as group phylogeny with the material at hand.

C. inaequalis Say is the only American colletid on which a creditable amount of information has been accumulated, and from these data we can assume the species to have undergone considerable evolution from its progenitors.

Several contributions have been made to the biological knowledge of this Colletes, of which the most outstanding is the work by Dr. J.B. Smith (1900, 1901). (The original

determination of the species as C. compacta by W.J. Fox was in error as was substantiated by Swenk's re-examination of the Smith material.) Interesting but incomplete information on C. compactus Cresson by Phil and Nellie Rau (1916), and on C. rufithorax (= thoracicus Smith) by Parker and Boving (1924), has shed some light on the biology of these two species but much more observation is necessary before either can be considered to be complete.

Two papers by Friese (1912, 1922) contain summaries of part of the biological knowledge of the Palearctic Colletes fauna. Both works deal with Colletes daviesanus Smith, a widespread species of northern and north central Europe and Asia. Malyshev (1923, 1927) and Müller (in Noskiewicz, 1936) contributed abundantly to the life history of C. cuniculariius, a very close relative of the Nearctic C. inaequalis. It is not at all surprising to find the biologies of these two species almost identical.

Some additional data on C. inaequalis were obtained by the author during the spring of 1951 in Douglas County, Kansas, which supplement the Smith paper on the life history of this species. I remain indebted to Smith for a great deal of that which follows and have omitted the quotation marks where his information was used in hope of increasing the coherency of the discourse.

The species was first noted in abundance on the 20th

of April in Kansas, a full month later than those observed by Smith. Groups of 15 to 30 mounds of sand and silt were found by chance along the margin of a wheat field in the lowlands along the Kaw River. From the color of the exposed sand and a knowledge of the soil strata, it was calculated some burrows were at least 18 inches deep while others were just in the process of excavation. During the two weeks following the first observation, little mounds appeared in abundance all along the sheltered margin of the field, with few extending into the open adjacent wheat field. Males were noted in great numbers at the time of the first visit to the location, keeping a constant vigil over and about the excavations, but for some obscure reason they would become less and less obvious towards noon. Very few males were noted in the afternoon of the day but the next morning they reappeared in droves and repeated the violent buzzing about the nests. The earlier the hour, the closer they flew to the ground, becoming progressively higher from ground level as the day wore on. It was assumed, with no verification, that the males were awaiting the nuptial flight of the emerging females, but during the days which followed no actual coition was observed. During these first few days the females did not attempt to leave the nest but would frequently come to the opening and bask in the sun. Occasionally the female would descend and in a few minutes the abdomen would become visible while the hind and middle pairs of legs would violently fling the sand from the

entrance. The reaction of the occupants was noted on several occasions where the mouth of the nest had been damaged, and in each instance after the tunnel had been cleared the bee would be observed to move up and down with its mouthparts and fore legs working vigorously close to the tunnel wall as if it were in the process of applying a very thin adhesive. The species is known not to line the tunnel but it may secrete a very fine film to strengthen the walls leading to the capsular cell. Partial verification was obtained on the excavation of a number of nests in which the sandy-silt tunnel walls adhered more closely than the surrounding medium; often pieces of the tunnel could be removed in place.

On the second day of observation the females began gathering pollen and presumably nectar, with each trip falling into a similar pattern. The female would project the head and then the thorax cautiously, as if in fear of a foe. If a shadow fell across the mouth of the tunnel or the observer moved, the bee hurriedly clambered down the hole with the head acting as a plug. Finally, when left undisturbed the bee would emerge, circle the entrance once or twice, and leave for the food source. The return to the nest was usually direct, but on a number of occasions the female would become lost, in which case it would circle the area, often settling and walking over the soil to enter first one, then another burrow. This process was repeated, at times requiring up to 20 minutes, before it successfully found its own nest. An attempt was made to determine the time required

for a female to secure a load, and as expected there was considerable variation, depending upon supply of pollen and nectar as well as the distance to the source. One female required 13 minutes to return laden while another took 47, with the mean time per trip approximating half an hour. The deposition of the collected food required much less time, some emerging 4 minutes after entering the tube. Again, however, there were great differences in the time required to emerge. One bee remained in the burrow for 1 hour 5 minutes before reappearing; it was assumed that the female was in the process of sealing a cell and preparing another.

By the 3rd of May many of the burrows were filled in and the flight activity of both sexes had become reduced. Contrary to Smith's observations there was no preponderance of males following the cessation of female activity.

Later, attempts were made to follow active burrows to their source, each of which resulted in meagre finds. The first and second tunnels ended barely 12 inches below the surface in partially completed cells and despite continued digging yielded nothing. A third excavation was made on filled-in observation burrows, known to contain good supplies of pollen. The first 22 inches of the tunnel were followed without too much difficulty until the first (actually the last formed) cell was reached. The female had apparently filled the tunnel with light colored sand surrounding the burrow entrance and the solidly-packed yellow sand stood out well in the darker sandy-silt. There is

evidently no common form to the burrow, for the first 12 inches curved weakly from a vertical orifice and the last 10 inches ran almost parallel to the soil surface. Another curved sharply 3 inches below the surface, running sub-horizontal for a few inches, and then dropped almost vertically another 18 inches before the first cell was found. Still others curved weakly throughout their entire length. Below this first cell, which proved to be ant-infested, the path of the tunnel was nowhere evident and excavation was continued by carefully removing layers of soil from an area two feet in diameter. As many as five cells were uncovered from a single burrow, each lying on separate horizons below the last formed cell, and in no instances were these cells in line. The deepest cell was found 34 inches below ground level; cells from the nests examined were found to be separated by as much as 12 inches in a horizontal plane and 5 inches vertically. Smith's statements seem most logical to account for this pattern in inaequalis. The bee digs down from the first to the extreme depth of the burrow, then runs off to one side for two to four or rarely six inches, makes and fills a cell and lays an egg in it. Two or three inches higher another lateral is started, running in a different direction, and the sand taken from this lateral is dropped into the main tube whence it washes into the first lateral so that when the second is completed, the first is pretty well filled up. The second lateral is filled with material

from the third if a third is run and, finally, the entire tube is filled.

Five of the eleven cells unearthed were undamaged and were taken to the laboratory; three had been torn open in the process of removal, two were found infested with ants, and one had desiccated. The cell is approximately 15 mm. in length and 5 mm. in diameter with the apical end rounded and the basal end abruptly truncate, at times weakly concave. In texture the capsule, made presumably of salivary secretion, was thin and transparent, tending to show little pliability and tearing easily. It presumably serves to protect against soil organisms, dirt, and desiccation.

The food stored in the brood cells is a pasty mixture of nectar and pollen, probably derived from a number of sources visited by the female, i.e., Cercis canadensis, Salix, Prunus, etc. The cell is less than half-filled with food, and the egg, which is quite large and crescent-shaped, is attached at one side by one end and so curved that the opposite tip rests on the surface of the food mass. The egg is slightly more than 3 mm. in length. When the egg is laid, the upper end of the cell is closed by means of a flat disc which is set in a little from the ragged upper edge. Smith calculates that the interval from the beginning of the burrow until the first egg is laid seems to be from 18 to 20 days.

Two cells were found in which the larvae had just hatch-

ed and attempts were made to rear these through to maturity but these met with little success. The young larvae retained a position very similar to that of the egg for a long time, with the mouthparts resting on the surface of the soupy food mass. Many of the cells taken up a month after the active flight dates were undoubtedly from the earliest burrows, hence the egg stage is an unusually long one.

On July 1st Smith unearthed four cells in which the larvae were so far developed that they came near to filling the entire cell. The bulk of the food store had been devoured and growth must have been nearly completed. Unfortunately further samples could not be obtained later in the season, and the date of pupation is thus left undetermined. It is uncertain whether or not the insects reach the adult stage in the fall and winter in the ground, or whether they winter as pupae and change to adults very early in spring.

Malyshev, working with C. cuniculariius, reports the following observations on that species. ". . . At the end of July, July 27, 1917, in the vicinity of Kursk, I found a single cell occupied by Colletes which contained an unpigmented pupa. Three other cells were found in Borisowka on July 2, 1917 containing white pupae with pigmented eyes.

"The first young bee was noted in a nest in mid August which I had kept under observation since April. By digging the thawed out earth (March 29, 1916 in Borisowka) I found

a matured male. Excavations on April 6, 1917 yielded two cells with females prepared for flight, four cells with mature, living larvae and more earth filled cells from previous years. Thus the development of the larvae was observed. On the 8th of July, 1917 the larva transformed into a pupa and on the 22nd of July, that is two weeks later, it had wings and had transformed into the adult female. The latter overwinters without leaving the cell. C. cunicularius overwinters either in a mature stage (which appears to be customary) or in a stadium of the resting larva (diapause). . . "

In view of the close relationship which exists between cunicularius and inaequalis, it would not be surprising to find inaequalis exhibiting similar variability in its overwintering form.

C. daviesanus, differing greatly from the above, was found by Friese (1912) to tunnel "in vertical sand stone and clay walls. The circular path runs diagonally down in the layer of sand and curls to one side at the end, reaching almost 10 cm. into the wall. The inner wall of this round burrow is painted with a hardened liquid which upon examination proved to be a very fine spun lining which covers the inner wall of the nest and then painted with saliva. In this setting the bee deposits the gathered pollen and seals off the single cell with a hyaline lid, which is arched toward the next cell and forms the arched base of the follow-

ing cell; in this way the individual cells form a tube, with one segment projecting into the other. . . . One finds as many as 10 such cells joined in a brood chamber but more often less; other authors have reported 20 cells per brood chamber. . . . The nests, which were formed during the previous July and August, have half-grown larvae by the spring of the next year (March 28). With the advent of warmer weather, the larvae begin to eat the remaining pollen, working from the centre to the outside of the cell, and reach their full growth by middle May. I observed the first pupae, with only the eyes pigment on June 11th . . . and by the beginning of July the pupae were further pigmented and hardened so that I expected free flying stages by middle July; however it was July 27th before there were abundant numbers in flight."

Observations on C. succinctus L. by Mayet (1875) indicate that the males are first to emerge, and search for the females much as in inaequalis. Once fertilized, the females begin to construct their nests, employing a used burrow or starting at a new site. The sand is loosened with the mandibles and is ejected from the burrow by means of the legs and by curving the abdomen under the body to give them a greater surface. A gallery may be constructed in a single day when new nests are being formed or in several hours when the bee utilizes an old burrow. The cell is formed as in inaequalis and requires eight to ten trips to fill. The bee disgorges the nectar with some force and a specimen

placed in a glass tube dispelled the nectar in a small stream clear to the end of the tube. After the egg is laid, the cell is closed and covered with several layers of material similar to that which forms the rest of the cell. The larva of this autumnal species begins feeding in the fall and continues to develop the following spring. Pupation occurs about the middle of August. The adult bee emerges fifteen days after pupation and remains within the cell for about six days. It then breaks its way into the gallery where it remains for ten to twelve days before emerging to mate.

Michener (in litt.) reports that C. fulgidus Swenk at Montara, California, nests in great numbers in banks and that the cells are constructed end to end in the burrows as in C. daviesanus.

A few nests were unearthed in the vicinity of Ottawa, Canada, during the summer of 1950 and were found to have the tunnel lined with a material of cellophane-like texture. The species is not known but is believed to be C. kincaidii Cockerell.

Noskiewicz is obviously in error in stating that all Colletes have but one generation per year, for among the American species, and I see no reason why the Palearctic groups should differ, the list of species with a spring and fall generation is long, i.e., texanus Cresson, wickhami Timberlake, birkmanni Swenk, louisae Cockerell, daleae

Cockerell, etc. The presence of spring (inaequalis Say), summer (kincaidii Ckll., etc.), and fall (compactus Cress., etc.) emergent species well fills the seasonal time niches available to them.

Of the Nearctic species many are recorded from only one host plant but considerable field observation will be necessary upon most of these for which a single plant record exists. However, abundant data are available for several species, which, while not conclusive, imply their oligolectic tendencies. I am reasonably certain that the unique species C. aestivalis Patton and C. andrewsi Cockerell are oligolectic on the flowers of Heuchera, having been taken from both H. americana and H. hispida. Several listed below will be considered oligolectic until collection information proves otherwise.

C. albescens Cresson on Amorpha

C. distinctus Cresson on Ilex

C. ochraceus Swenk on Eriogonum

C. wilmattae Cockerell on Petalostemon

C. saritensis Stephen on Dalea.

Other species exhibit preference for one or more families of flowers, but the great majority are polylectic, deriving their food from a variety of unrelated plants.

The knowledge of the parasites of Nearctic Colletes is very meagre, and except for a few records scattered through the literature nothing has been done. Parker and Boving's

paper (1924) on the life history of Tricrania sanguinipennis on C. rufithorax is unique in this phase of Colletes biology. The principal parasites of Colletes are the members of the genus Epeolus, but so sketchy is our information that we have no idea of the degree of infestation under normal conditions, nor any data on their biologies.

Bischoff (1930) reporting on Epeolus in the European region found considerable minor polymorphism among the members of a single species, and says on this topic, "a problem for the future will be to ascertain the existing and failing constancy of our middle European species to the native hosts and to what extent these same species can live on different hosts". He is apparently uncertain of the cause of this polymorphism, stating, "about the minor differences of the individual form, one can be in doubt whether it is a question of food or different host species". Without settling the question raised by Bischoff, Noskiewicz, on the basis of observation, is of the opinion "that in many cases one and the same Epeolus species can have different Colletes species as the same host".

In addition to the two genera mentioned above, Blair (1920) records the following to be found as parasites of C. daviesanus Smith: Diptera; Bombylius minor L., Miltogramma punctata Meig.: Coleoptera; Meloe: and Hymenoptera; Chrysis cyanea L.

DISTRIBUTION AND PHYLOGENY

Generalizations and deductions are always subject to severe criticism because of their tentative nature. The possibility is remote that there can be conclusive substantiation for any phylogenetic "tree" rooted beyond the near past. However, the accumulation of a multitude of implications, meaningful but far from complete, cannot be ignored. An attempt is made to interpret the data at hand without resorting to dogmatic conclusions.

While some difference of opinion exists concerning the most primitive group of Apoids, there is little doubt that members of Paracolletini are the progenitors of the Colletini. The present distribution of this primitive group is panaustral; they are found in South America, Australia, and Africa. Colletes, however, is found throughout the world with the exception of Australia, suggesting that the genus arose after the submergence of the land bridge between Australia and continental Asia, probably during the late Cretaceous. This would still have permitted the genus to originate in Africa, South America or some marginal locality of its Paracolletes-like predecessor.

It is frequently possible to ascertain the centre of origin of a group, with some reliability, from distribution patterns. However, many genera display a centre of variation and species frequency far removed from their point of origin. This appears to be the case in Colletes, for while there is

a distinct numerical superiority of species in western North America, such diversity is found throughout areas exhibiting similar habitat diversification (Spain, Turkestan). In these areas, the isolation of small populations has probably resulted in rapid fixation or even in non-adaptive genetic combinations which alone would hardly offer suitable evidence from which one could determine a generic center.

The following text includes 108 species and subspecies, the great majority of which are restricted to continental America north of Mexico. Eleven species are known to extend into Mexico but further collections should reveal upwards of 45 species or subspecies occurring in both the United States and Mexico. Only one species is suspected to be common to the Holarctic region. This species, C. impunctatus Nylander, is found across the northern portions of Asia and Europe while its Nearctic counterpart, C. impunctatus lacustris Swenk, appears to be restricted to the Hudsonian and Canadian zones of America. Further consideration is given the problem later in the text.

Adhering closely to distributional patterns of Nearctic insects, the species of Colletes are numerically superior in the broadly diversified habitats west of the 105th meridian. Of the 108 species, 72 are known to occur in this region with approximately 55 being restricted to this region. I strongly contend that the majority of species of this region, certainly the daleae and consors groups, resulted from the northward migration of parental stock from the Mexican

Plateau at some time during the tertiary.

Noskiewicz' illustrations of the seventh ventral plates of Palearctic Colletes, show less diversification of basic form than exhibited by Nearctic species; and the derivation of the Palearctic fauna, treated by him, from Nearctic sources is well within the realm of probability. He states: "According to our present knowledge it appears that the genus Colletes is much stronger in Asia than Europe or Africa. Of the 123 species worked by me, 54 are purely asiatic, 20 european, 15 north african: 19 species are eurasian, 6 eurafrican, 8 occur in Europe, Asia and Africa and only one species is found exclusively in Africa and Asia. If these numbers are totalled we have 82 [species] in Asia, 53 in Europe and 30 in North Africa." When these figures are considered with the 108 species found in North America we find the genus conforming loosely to the controversial "Age and Area" theory of Willis. North America is obviously not the focal point from which specific radiation has taken place. Rather, it offered a sufficiently diversified habitat in which the original increase of variability occurred, followed by an increase of adaptive subspecies and species. The progressive numerical decrease in species number and the reduction in morphological complexity as one retreats from North America towards Africa lend additional weight to the claim for a New World origin of the genus.

On the same topic it is interesting to note that the nigricans group (Noskiewicz) which predominates in the Medit-

erranean regions has undergone a tremendous reduction in morphological complexity, particularly in the copulatory structures of the male: the volsellae (fig. 1, plate XIV, Nosk.) appear to be absent but are probably greatly reduced; the gonocoxites are simple, composed of what appears to be an uninterrupted segment; the gonostyli are broadly fused to the gonocoxites with no evident delineation and the eighth sterna (seventh ventral plates of the metasoma) are weakly lobate, lacking the complexities of the more primitive types.

Radoszkowski (1891) was first to refer to this difference and Morice (1904) contributed the following comments on its unique nature: "Perhaps the best thing in Radoszkowski's "Révision" is this recognition of a distinct group of species in which the stipites of the armature are simple, i.e. not divided by a deep sulcation into two apparently distinct portions - an apical and a basal. This is an easy character to see and I think it is an important one, though I do not believe that all the other species - those with divided stipites - should be regarded as forming a single group. The species with simple stipites are certainly, to some extent, united by other characters also; and I believe that they are confined to the warmer parts of the palearctic region. None of them occur in Great Britain, nor, apparently in Scandanavia. On the other hand, species with divided stipites are found throughout the whole region, and among

them are some which seem to have hardly anything else in common (e.g. cuniculariua and fodiens)." This group, including all species with unsegmented gonocoxites, is restricted to the regions about the Mediterranean Sea extending from the Canary Islands on the west to Transcaspia on the east. It appears to be superimposed upon a continuum of diverse species having the single common characteristic of segmented gonocoxites. Such a localized group evolving towards lines of greatly increased simplicity, in one of the two areas harboring the primitive paracolletine ancestral types, would minimize, but not eliminate, the probability of African origin.

There is little doubt in my mind that the major part of the North American Colletes fauna originated as successive invasions of South American forms (i.e. americanus, simulans, latitarsis, consors, daleae, and hyalinus groups). Their distribution is restricted to the southern spheres of the region and in each instance they appear to stem from the northern faces of the Mexican Plateau. The uniqueness of these groups, the absence of close Palearctic relatives, and the close Central American derivatives, contribute to such a hypothesis.

However, in contrast to these groups, relatively recent in origin, there exist species bearing close resemblance to each other in both parts of the Holarctic region. The broadly distributed species of the inaequalis group in North America (particularly inaequalis Say and validus

Cresson) have a close morphological and biological resemblance to the groups formosus, cariniger, and cuniculariius as described by Noskiewicz. [A detailed examination of the descriptions of the species in the latter groups as well as the illustrations of the seventh ventral plates for each species convinces me that Noskiewicz has overdone his subdivisions at the group level. The three groups, comprising a total of five species, have a continuous, non-overlapping distribution from Siberia to north Africa; they are, without exception, early spring bees like C. inaequalis, and are very close morphologically. It appears that he has used single characters of perhaps no more than subspecific importance to differentiate groups and even subgenera. For example, the three groups mentioned are separated from a close ally, the acutus group, on the basis of the length of the malar space, the color of the hind legs and tarsi, absence of abdominal fasciae and length and density of body pile. I have found none of these characters to be useful except for species separation. C. cuniculariius, which resembles inaequalis most closely, is found from Siberia to Germany, its subspecies C. c. infuscatus in Spain and Italy; C. formosus is known from Tripoli and Algeria while C. cariniger (seventh plates identical with those of formosus) has been taken from Syria and Egypt. In each species mentioned there is a progressive loss of the trilobate aspect of the seventh ventral plates with the median lobe undergoing greatest reduction.]

If it is assumed that simplicity and reduction are indicative of recent origin, inaequalis Say could be considered the most primitive species of these groups. Its broad distribution throughout the Nearctic region, the polylectic habits of the species, and its stability in America suggest an invasion of the Palearctic region probably during early tertiary times, giving rise to the members of the four groups listed above.

The reverse seems the case with C. lacustris Swenk, common to the boreal region of North America, and C. impunctatus Nylander from Siberia, which are so close morphologically that I do not hesitate to reduce the former to a subspecies of the latter. This distribution, unlike that of the inaequalis-cunicularius complex, is presently continuous or nearly so. Here, however, the broad dispersal of forms allied to impunctatus from Switzerland and Sweden to India and Siberia, accompanied by the restricted zone occupied by lacustris in North America and its lack of close relatives in America, would indicate a past or present continuum with its Palearctic predecessors.

Although I have had little opportunity to examine Old World material, I expect that further investigation will reveal that members of the hyalinus group, and possibly others, have Holarctic distribution and that one or perhaps several independent migrations to and from America have taken place during the middle and late tertiary.

Repeated attempts to compare Nearctic species with

suspected Palearctic relatives, through descriptions in the Noskiewicz work, have produced no positive results except for impunctatus. However, the use of the Noskiewicz paper as a morphological standard of comparison has sufficed only for generalizations.

Nearctic Distribution:

The distributional patterns of the genus in America are similar to those of a number of other genera. The most common of these patterns is exemplified by the two species complexes lutzi and consors (see maps 6 and 7) which abound in the higher altitudes of California, about the northern edge of the Great Basin and along the Continental Divide. No doubt the consors group, restricted to a montane habitat, follows the migratory path of the boreal and transitional zones through Colorado and Wyoming whence it skirts the Great Basin to terminate in the Cascades of Washington and Sierra Nevadas of central California. On the basis of present data lutzi follows a pattern similar to consors, beginning in Colorado and terminating in California.

A third species, hyalinus, for which two subspecies have been erected, presents a disjunct and confusing pattern. The species, as known to date, occupies the northern plains region of America and the extreme western coastal plain of California and Oregon (map 5). To my knowledge, no explanatory continuum exists between h. hyalinus, east of the Divide, and either h. oregonensis or h. gaudialis on the west,

but the resemblance is so apparent that I must agree with Timberlake (1951) when he says, "Renewed study of C. hyalinus (sensuo stricto) and C. gaudialis convinces me that they are similar enough to be races of one species and the probability of intergradation is enhanced by the presence in Oregon and along the coast of northern California of the somewhat intermediate form C. h. oregonensis." Records from Matanuska on the coast of Alaska and White Horse in the Yukon may prove the species to extend up the coast to the north forming a continuum in the far north. While this is quite possible, it appears equally probable that further collections may reveal a continuous cline to extend through a series of river channels and mountain valleys from east to west.

A fourth pattern, taken from the distribution of simulans, is thought to have its stem in Mexico. The northerly migration into America follows a three-pronged route from the southern Rocky Mountain region: (1) a northerly mountain route into Colorado and Wyoming, (2) a westerly path into the lowlands of Nevada and California whence it has migrated as far north as the valleys of British Columbia, and (3) a broad adaptation to the plains regions of America east of the Continental Divide (map 1).

One of the common distributions for a number of species, especially of the texanus subgroup, is shown on map 9 . The

region of origin is obscure but their close relationship to the rest of the consors group would weigh heavily in favor of a thesis supporting their derivation from Mexican consors-like predecessors. They are without exception restricted to the lower Sonoran zone from western Texas to California (map 9).

A number of distribution maps have been included in the present work in an attempt to clarify the range of those species in which confusion has already arisen or is likely to arise. In most instances two or more sibling, or closely related, species have been plotted on the same map to illustrate more clearly areas of overlap and limits of the range. Other maps have been prepared for species in which subspeciation has given rise to complex patterns, e.g. simulans, consors, hyalinus. Known marginal records have been plotted for the more common species. Areas are shaded to indicate the recorded as well as suspected range of the group in question.

A similar procedure has been followed in presenting distributional data in the text. When the range is broad and material abundant, only peripheral localities are noted, but for the less common and new species complete collection information is recorded. For the most part the two recorded extremes serve to delimit the seasonal flight period of the species and where information is available the peak of the flying population is noted.

GEOGRAPHICAL VARIATION

The observed details of geographical variation among the various species have been recorded under the species. It is interesting to note that most of the widespread species seem to vary to some degree geographically; only in cases where the variation is rather obvious and consistent are subspecies recognized. In a few instances subspecies are listed which would probably not have been recognized except for the fact that names had already been applied to them.

There is no obvious consistent correlation of the variations with geographic or climatic factors. Thus no ecological rules, such as those readily devised for coloration, size, and proportions in various groups of vertebrates, wasps, butterflies, etc. apply consistently to the variations in Colletes. Generally, the populations from arid western habitats are paler, both in ordinary body pile, in the pale covering of the abdomen, and in the wings than their relatives from more humid areas. C. c. mesocopus and C. nigrifrons may be cited as exceptions to this general rule, in which paler forms are found in more humid areas. There are, of course, a few widespread rather invariable species as well.

METHODS AND MEASUREMENTS

Frequent reference is made to the length of the antennal or flagellar segments in both the descriptions and the keys. Unless indicated otherwise, the dorsal surface of any of the medial flagellar segments is taken as a standard.

Considerable difficulty was encountered in measuring the length of the malar space. In all species the width of the malar space is the distance between the anterior and posterior mandibular articulations. For the most part the length is considered to be the distance represented by a perpendicular line running from the anterior mandibular articulation to the compound eye (fig.85). However in many species the compound eye is strongly narrowed below, and if the malar space is broad this perpendicular line reaches well up along the inner orbital margin. In such cases the length is taken as the distance between the line joining the mandibular articulations and a parallel line running through the medio-basal corner of the compound eye (fig.84). The corner is hardly angulate but sharply rounded and distinct.

DESCRIPTION OF THE GENUS

Swenk (1908) has given an excellent account of the history of the name Colletes and of its genotype (C. succinctus L.) while Griffin (1935, 1938) has verified information on the dating of the principal works involved.

The subgenera proposed by Cockerell, Friese, and Noskiewicz are for single species or very small groups (up to 3 species) which are aberrant in certain respects. In no way do they represent major divisions of the genus into its principal phyletic lines, but rather are names provided for unusual terminal branches of these lines. As yet the phylogeny of the genus as a whole has not been sufficiently elucidated to make recognition of the principal lines of descent possible. Until this is done, it seems best to synonymize the subgeneric names.

Colletes Latreille, 1802, Histoire naturelle des fourmis, p. 423.

Type: Apis succincta Linnaeus. Monob.

Colletes Latreille, 1802, Histoire naturelle generale et particulaire des Crustaces et des Insectes, p. 372.

Type: Apis succincta Linnaeus.

Evodia Panzer, 1806, Krit. Rev. Insektenfauna Deutchlands, vol. 2, p. 207.

Type: (Apis calendarum) = Apis succincta Linnaeus.

Colletes subg. Rhinocolletes Cockerell, 1910, Entomologist, vol. 43, p. 242.

Type: Colletes nasutus Smith. Monob.

Colletes subg. Ptilopoda Friese, 1921, Stettiner Ent. Zeitung, vol. 82, p. 83.

Type: (Colletes maculipennis Friese) = Colletes spiloptere Cockerell. Monob.

Colletes subg. Denticolletes Noskiewicz, 1936, Prace Nauk. Wydawnictwo Towarzystwa Nauk. Lwowie, ser. 2, vol. 3, p. 486.

Type: Colletes graeffei Alfken. Monob.

Colletes subg. Punctiolletes Noskiewicz, 1936, Prace Nauk. Wydawnictwo Towarzystwa Nauk. Lwowie, ser. 2, vol. 3, p. 490.

Proposed without genotype designation and therefore invalid under article 25 C of International Rules of Zoological Nomenclature.

Genus Colletes Latreille

Head and thorax with pile long and dense; metasomal terga usually fasciate; posterior femora of female with long dense pollen brush; labrum broader than long with median concavity, often delimited by thickenings on either side; subantennal sutures directed towards inner margins of antennal sockets; facial foveae present, most evident in female, of variable width, non-pilose and depressed; galea short; submentum broad and elongate; labial palpi short, 4-segmented, first segment 1 1/4 times as long as second, others subequal; glossa short, broad, bifid, strongly emarginate medially; maxillary palpi 6-segmented; eyes concave along inner orbital margins; pre-episternal sutures complete; metanotum horizontal, in same plane as scutellum and basal area of propodeum; propodeum with narrow

horizontal basal area, smooth or longitudinally carinate, posterior face with a 3-cornered, shiny, depressed, non-plumose median area, pointed below; wings hairy; pterostigma large; marginal cell with apex not on wing margin; fore wings with three submarginal cells, first equal to second and third in length, second and third subequal in length; vein second m-cu at right angles to Cu_1 and strongly arcuate outward in posterior portion; pygidial and basitibial plates absent; inner hind tibial spur strongly toothed or combed; eighth metasomal (ninth abdominal) sternum of male roughly equilaterally triangular; capsule with gonocoxites usually transversely divided (always in Nearctic species); gonostyli usually distinct and pilose apically; gonobase large; penis valves enlarged basally, tapered apically with dorsal and/or ventral "wings"; volsellae large and distinct (in Nearctic species).

KEY TO THE MALES

In order to facilitate the separation of the species, the genus was divided into three rather distinctive natural groups. Some difficulty was encountered in keying both sexes to these major groupings, as evidenced in couplets one, two, and three, for it was impossible to settle on one or two obvious characters which were applicable to all species in the group. Thus brief descriptions of the groups are given previous to the keys, which is meant to

supplement the principal characters listed and assist in species separation.

americanus group

Malar space no longer than broad; clypeus densely punctate, punctures striate to ovate; prothoracic spines short and sharp; flagellar segments one and one-quarter to one and three-quarters times as long as broad; propodeum with latero-posterior margins abrupt or ridged, not rounded; pile of body usually white to dusky to tinged with ochreus.

Seventh ventral plates with discs large, quadrate to weakly triangular, usually well covered with short fine pile.

Penis valves with only narrow ventral wings, membrane usually truncate apically; gonocoxites pilose along medio-apical margins; volsellae long, extending two-thirds of way to apices of gonostyli; gonostyli short, triangular.

consors group

Propodeum with basal area narrow and sloping rather sharply ventrally, lateral and posterior faces finely striate and roughened, rounded at latero-posterior margins; flagellar segments short, about as long as broad; malar space no longer than seven-eighths as long as broad; pile of body long and dusky grey, often intermixed with black on head and thorax; mesepisterna

usually shallowly and closely punctate.

Seventh ventral plates roughly quadrate, or reduced to short transverse discs, discs with pile longest and most dense across base.

Penis valves with broad dorsal and ventral wings; apices of gonocoxites and gonostyli pilose; gonostyli short, roughly triangular; volsellae long, extending two-thirds of way to apices of gonostyli.

daleae group

Propodeum with basal area smooth and broad, usually not sharply pitted but with a few weak longitudinal rugae, lateral and posterior faces shiny with numerous fine punctures; clypeus elongate with longitudinal median sulcus bordered by lateral shiny, sparsely punctate rims; sulcus densely punctate, rims sparsely punctate with round punctures; malar space at least as long as broad; flagellar segments at least as long as broad; body covered with long white pile; species all small, less than 9 mm. in length, found only in western great plains and lower austral zone of North America.

Seventh ventral plates quadrangular or weakly modified to triangular; discs covered with fine short pile.

Penis valves with only ventral wings, wings small; gonostyli virtually absent, evident as slightly expanded apical processes; gonocoxites with only extreme apices pilose; penis valves with bases as long as rods or longer;

volsellae long, extending two-thirds of way to apices of gonostyli.

1. Metapleura each with dorsal prominence or horizontal carina, usually with testaceous rim - - - - - - - - - - - - - - - - - 69 (*americanus* group)

Metapleura with no dorsal prominence or if weakly prominent with carina curving ventrally well in front of posterior margins - - - - - - - - - - 2

2(1). Median flagellar segments usually as long as broad or slightly longer, and penis valves with broad dorsal and ventral wings - - - - - - - - - - - - - - - - - 87 (*consors* group)

Median flagellar segments usually at least one and one-half times as long as broad, if shorter, penis valves lacking dorsal wing - - - - 3

3(2). Clypeal punctures sparse and round and clypeus with longitudinal median sulcus; propodeum with basal area broad and smooth, occasionally with a few weak longitudinal rugae - - - - - - - - - - - - - - - - - - 104 (*daleae* group)

Clypeal punctures elongate, at least apically, or if not, clypeus without sulcus; propodeum with basal area deeply pitted - - - - - - - 4

4(3). Mesoscutum, scutellum or inner orbital margins with varying amounts of black pile - - - - 5

Mesoscutum, scutellum and inner orbital margins with pile all light - - - - - - - - - 28

5(4). Malar space at least as long as broad, usually longer - 6

Malar space no longer than three-quarters as long as broad - - - - - - - - - - - - - - - 12

6(5). Malar space at least one and three-quarters times as long as broad; mesepisterna dull and roughened. (Prothoracic spines absent.) - - - - - - - - - - - - - - - - - - validus Cresson

Malar space less than one and one-half times as long as broad; mesepisterna punctate with shiny interspaces - - - - - - - - - - - - - - - 7

7(6). Metasomal sterna two to four emarginate medially; pile of body dusky; malar space slightly longer than broad. (Tergal fasciae very weak and dusky.) - - - - impunctatus lacustris Swenk

Metasomal sterna two to four with posterior margins entire; pile of body white to tawny; malar space one to one and one-half times as long as broad - - - - - - - - - - - - - - - - 8

8(7). Mesepisterna dull and roughened, obscurely punctate - - - - - - - - - - - - - - - - - - 9

Mesepisterna coarsely punctate with shiny interspaces - 10

9(8). Propodeum with posterior face outside of triangle rugosely pitted above; metasomal terga

with discs having abundant short erect black pile; thorax with pile long dense and ochreus - thoracicus Smith

Propodeum with posterior face outside of triangle dull and roughened; metasomal terga with discs having pile white to pale grey; thorax with pile long fine and pale grey on periphery - - - - - - - - - - - - inaequalis Say

10(8). Inner orbital margins with strong admixture of black pile. (Malar space one and one-quarter times as long as broad; clypeus with deep median longitudinal sulcus and impunctate lateral rims.) - - - - - - - - - compactus Cresson

Inner orbital margins with pile all light - - 11

11(10). Malar space one and three-eighths times as long as broad; seventh ventral plates laterally quadrate with long latero-basal "tail" and distinct neck. (Metasomal terga one and two coarsely and densely, almost contiguously punctate.) - - - - - - - - - - - skinneri Viereck

Malar space as long as broad; seventh ventral plates longitudinally quadrate, lacking necks between discs and articulatory condyles, discs about twice as long as broad - - - - - - - - - - - - - - - - - bryanti Timberlake

12(5). Posterior basitarsi short, no more than two and one-half times as long as broad - - - - - - 13

Posterior basitarsi about four times as long as broad - - - - - - - - - - - - - - - - - - 15

13(12). First metasomal tergum shiny, weakly follicul-ated (with a distinct metallic blue lustre); posterior basitarsi two and one-half times as long as broad - - - - intermixtus Swenk

First metasomal tergum densely punctate with shiny interspaces, punctures about one puncture width apart; posterior basitarsi two times as long as broad - - - - - - - - - - - - - - - - 14

14(13). Wings pictured; neotropical, reaching southern Texas - - - - - punctipennis maurus Stephen, new subspecies

Wings not pictured; American great plains - - - - - - - - - - - - - - latitarsis Robertson

15(12). Dorso-lateral fringes of propodeum with strong admixture of black pile - - - - - - - - - - 16

Dorso-lateral fringes of propodeum with pile all light - - - - - - - - - - - - - - - - - - 17

16(15). Length 8.5 mm.; mesepisterna with pile exclus-ively light; metasomal tergum one sparsely and finely punctate on anterior median face - - - - - - - arizonensis Stephen, new species

Length 13.5 mm.; mesepisterna with abundant black pile on upper faces; metasomal tergum one uniformly densely punctate, punctures no more than one puncture width apart - - - - - - - - - - - - - - vandykei Timberlake

17(15). Prothoracic spines long and sharp, at least as long as width across bases - - - - - 18

Prothoracic spines short, vestigial or obliquely truncate - - - - - - - - - - - - 23

18(17). Vertex and mesoscutum with abundant black pile; length 11-14 mm. (Body coarsely punctate.) - - - - - - - - - - - - - - - 19

Vertex with pile all light; mesoscutum with but few black hairs; length 8-10 mm. - - 20

19(18). Metasomal tergum two with sharp basal depression; metasomal tergum one deeply, almost contiguously punctate; clypeus striately punctate with shiny interspaces - - - - - - - - - - - - - - - - - gilensis Cockerell

Metasomal tergum two not depressed basally; metasomal tergum one shiny, punctures deep but separated by at least one and one-half puncture widths; clypeus deeply, contiguously punctate with no shiny interspaces - - - - - - - - - - - - - - - - - - - nudus Robertson

20(18). Propodeum with basal area flat and smooth with few longitudinal rugae, not at all quadrately pitted; metasomal tergum one shiny, impunctate - - - - - - - perileucus Cockerell

Propodeum with basal area deeply quadrately pitted; metasomal tergum one finely punctate - 21

21(20). Metasomal tergum one finely and sparsely punctate, punctures one and one-half to two puncture widths apart; seventh ventral plates short, roughly triangular - - - - - - - - - - - - - - - *hyalinus* Provancher

Metasomal tergum one coarsely and densely punctate, punctures no more than one puncture width apart; seventh ventral plates elongate, at least twice as long as broad, quadrate - 22

22(21). Penis valves with ventral wings truncate apically, coterminal with valve apices; seventh ventral plates quadrate with apical margins strongly expanded, almost lobate - - - - - - - - - - - - - - - - *simulans* Cresson

Penis valves with ventral wings narrowed apically, weakly pointed; seventh ventral plates quadrate with apices broadly rounded, not lobate (see fig.16) - - - *fulgidus* Swenk

23(17). Prothoracic spines obliquely truncate with posterior margins extending beyond anterior. (Second metasomal tergum with weak basal fascia.) - - - - - - - - - - *angelicus* Cockerell

Prothoracic spines short or absent, not truncate - - - - - - - - - - - - - - - - - - - 24

24(23). Propodeum with posterior face shiny, striately rugose, forming deep pits dorsally outside of triangle - - - - - - - - - - - - - - - - 25

Propodeum with posterior face dull and roughened, not striate or pitted outside of triangle - - - - - - - - - - - - - - - - - 26

25(24). Seventh ventral plates laterally extended, median and lateral margins strongly reflexed; discs of plates about twice as broad as long; malar space three-quarters as long as broad - - - - - - - - - - - *carolinus* Mitchell

Seventh ventral plates elongate, at least twice as long as broad with strong latero-basal projections; malar space five-eighths as long as broad - - - - - - - - - *fulgidus* Swenk

26(24). Mesepisterna dull and roughened, punctures obscure; sternal fasciae weak and incomplete - - - - - - - - - - - - - *inaequalis* Say

Mesepisterna coarsely punctate with shiny interspaces, punctures about one-half puncture width apart; sternal fasciae complete, dense and white - - - - - - - - - - - - - - 27

27(26). Propodeum quadrately pitted with deep shiny pits outside of triangle; black pile restricted to a few black hairs on scutellum; mesepisterna weakly rugosely punctate; seventh ventral plates roughly quadrate - - - - - - - - - - - - - - - - - *rudis* Timberlake

Propodeum with basal area smooth, not pitted

outside of triangle; black pile abundant on mesoscutum and scutellum; mesepisterna coarsely punctate with shiny interspaces; seventh ventral plates broadly triangular with apical margins broadly rounded - - - - - - - - - - - - - - - - cercidii Timberlake

28(4). First metasomal tergum shiny, impunctate, or if punctate with a few scattered follicle-like punctures especially laterally - - - 29

First metasomal tergum closely punctate, punctures no more than two puncture widths apart - 41

29(28). Eyes with inner orbital margins nearly parallel. (Mesepisterna and metasomal terga dull, obscurely punctate.) - - - - - - - - 30

Eyes with inner orbital margins strongly convergent below. (First flagellar segment no more than one-half as long as second.) - - 31

30(29). Posterior basitarsi very long and broad, about two and seven-eighths times as long as broad; prothoracic spines absent; length 13-15 mm. - - - - - - - - - - - - - - - - andrewsi Cockerell

Posterior basitarsi long and narrow, about four times as long as broad; prothoracic spines short and sharp; length 11-12 mm. - - - - - - - - - - - - - - - - aestivalis Patton

31(29). Malar space at least as long as broad - - - 32

Malar space shorter, no more than three-quarters as long as broad - - - - - - - - - 33

32(31). Metapleura protuberant above with narrow black rim; propodeum coarsely rugose with large pits on posterior and latero-posterior faces outside of triangle - *productus* Robertson

Metapleura not protuberant above; propodeum finely roughened, not pitted outside of triangle - - - - - - - - - - *hyalinus* Provancher

33(31). Propodeum coarsely rugose, roughened, forming large pits on upper posterior face outside triangle; mesepisterna coarsely rugosely punctate - - - - - - - - - - - - - - - - - - 34

Propodeum finely roughened or smooth outside triangle, never pitted; mesepisterna deeply punctate with shiny interspaces - - - - - 36

34(33). Flagellar segments short, as long as broad; malar space linear - - - - *titusensis* Mitchell

Flagellar segments about one and one-half times as long as broad; malar space at least three-eighths as long as broad - - - - - - - - - 35

35(34). Malar space three-quarters as long as broad; seventh ventral plates with discs broader than long, weakly quadrate - *brimleyi* Mitchell

Malar space three-eighths as long as broad; seventh ventral plates longer than broad,

roughly triangular - - - - distinctus Cresson

36(33). Flagellar segments about as long as broad. (Seventh ventral plates with discs transverse and narrow, sharply excavated apically (see fig. 75)) - - aridus Stephen, new species

Flagellar segments at least one and one-half times as long as broad - - - - - - - - - - - 37

37(36). Penis valves with broad dorsal and ventral wings; seventh ventral plates elongately rectangular, twice as long as broad (see fig. 67) - - - - - - - - - - wickhami Timberlake

Penis valves lacking dorsal wing; seventh ventral plates never longer than wide - - 38

38(37). Prothoracic spines short or vestigial; nervures light brown; length 11-14 mm. - - - - 39

Prothoracic spines long and sharp; nervures dark brown to black; length 8.5-9.5 mm. - 40

39(38). Malar space two-thirds as long as broad; metasomal terga impunctate - larreae Timberlake

Malar space one-half as long as broad; metasomal terga with sparse coarse punctures - - - - - - - - - - - - - turgiventris Timberlake

40(38). Propodeum with basal area deeply quadrately pitted; metasomal tergum one sparsely punctate; terga shiny black; metasomal fasciae weak and narrow; head and thorax with pile

fuscous and sparse. (Length 8.5 mm.)
- - - - - - - - - - - - - - - - - hyalinus Provancher

Propodeum with basal area nearly smooth, not pitted; metasomal tergum one impunctate; terga shiny blue-black; metasomal fasciae dense and white; head and thorax with pile white - - - - - - - - - - perileucus Cockerell

41(28). Malar space linear to one-quarter as long as broad; metasomal terga closely, often contiguously punctate to lateral margins. (Apical fasciae in abrupt declivous depressions.) - 42

Malar space at least one-third as long as broad; metasomal terga variable, never contiguously punctate - - - - - - - - - - - - 46

42(41). Prothoracic spines short or absent; pile of head and thorax short, dense and tinged with ochreus; metasomal tergum one very finely punctate - - - - - - - - - - - - - - - 45

Prothoracic spines at least as long as width across base; pile of head and thorax long and white; metasomal tergum one coarsely punctate - - - - - - - - - - - - - - - - - 43

43(42). Seventh ventral plates transverse, apical margins broadly excavated and fringed with long, light ochreus pile
- - - - - - - - - - - - - - robertsonii Dalla Torre

Seventh ventral plates with apical margins expanded or complex - - - - - - - - - - - - 44

44(43). Seventh ventral plates with basal portions transverse as in robertsonii but with transverse lobes attached to medio-apical processes (see fig.30) - - - - metzi Timberlake

Seventh ventral plates with apical margins expanded, tending to membranous, plates roughly quadrate, narrowed laterally (see fig.31) - - - - - - - - timberlakei Stephen, new species

45(42). Mesepisterna dull, shallowly obscurely punctate especially below; seventh ventral plates fully semilunar; tegulae light hyaline; penis valves with ventral membranous wings absent except for small preapical piece - - - - - - - - - - - - - - - - - ciliatus Patton

Mesepisterna distinctly punctate with shiny interspaces; seventh ventral plates narrowed, almost sickle-shaped (see fig.73); tegulae deep brown; penis valves with broad ventral wings - beamerorum Stephen, new species

46(41). Posterior basitarsi short, about two and three-quarters times as long as broad and curved longitudinally; posterior tibiae expanded medially, constricted towards base and apex. (Clypeus long, flat, shiny,

sparsely and finely punctate; seventh ventral plates roughly triangular with apices sharply emarginate.)

- - - - - - - bulbotibialis Stephen, new species

Posterior basitarsi at least three and one-half times as long as broad and straight; posterior tibiae not constricted apically - - 47

47(46). Metasomal tergum two uniform from base to apex, not depressed basally - - - - - - - - 48

Metasomal tergum two depressed basally, with or without basal fascia - - - - - - - - - - 49

48(47). Mesoscutum and scutellum with dense covering of ochreus to yellow pile, obscuring surface; mesepisterna dull, roughened; malar space three-quarters as long as broad - - - - - - - - - - - - - - - - thoracicus Smith

Mesoscutum and scutellum with pile white to tawny; mesepisterna coarsely punctate with shiny interspaces; malar space one-half as long as broad - - - - turgiventris Timberlake

49(47). Malar space at least seven-eighths as long as broad - - - - - - - - - - - - - - - - - 50

Malar space no more than three-quarters as long as broad - - - - - - - - - - - - - - - 59

50(49). Metasomal tergum one with punctures deep, punctures about one puncture width apart or less - - - - - - - - - - - - - - - - - 53

Metasomal tergum one with punctures fine, shallow and separated by at least two puncture widths - - - - - - - - - - - - - - - - 51

51(50). Prothoracic spines long and sharp, at least one and one-half times their width across base - - - - - - - - - - - - - - - - - - - 52

Prothoracic spines short, triangular. (Wings whitish hyaline; seventh ventral plates with discs cordate and with latero-basal projection at base of discs and necks.) - - - - - - - - - - - - - - - - louisae Cockerell

52(51). Seventh ventral plates as long as broad, roughly triangular; gonostyli about as long as width across base - - - hyalinus Provancher

Seventh ventral plates with discs twice as long as broad, roughly quadrate with lateral margins broadly rounded; gonostyli two and one-half times as long as broad - - - - - - - - - - - - - - - - sleveni Cockerell

53(50). Malar space long, about one and one-quarter times as long as broad. (Metasomal terga with discs covered with white or light grey pile; tegulae light ochreus hyaline.) - - - - - - - - - - - - - - - - wootoni Cockerell

Malar space about as long as broad, or shorter - - - - - - - - - - - - - - - - - - 54

54(53). Seventh ventral plates at least twice as long as broad; gonostyli two and one-half times as long as broad - - - - - - - - - - - - - 57

Seventh ventral plates short and broad, about as broad as long; gonostyli no longer than broad - 55

55(54). Malar space as long as broad; metasomal tergum two strongly depressed basally with weak basal fascia. (Seventh ventral plates with discs slightly broader than long, surface with uniform covering of fine pubescence (see fig.54)) - - - - phaceliae Cockerell

Malar space no longer than three-quarters as long as broad; metasomal tergum two with no basal fascia - - - - - - - - - - - - - - 56

56(55). Length 8 mm.; body densely plumose with long white pile; seventh ventral plates with lateral hair bands strongly developed and broadly united to median band basally; lowland species - - - - - hyalinus Provancher

Length 7 mm.; body with pile sparse and grey; seventh ventral plates with lateral hair bands weakly developed, not broadly united to median band basally, pile of lateral bands short; montane species - - - lutzi Timberlake

57(54). Seventh ventral plates with distinct petiolate necks between discs and articulatory condyles - 58

Seventh ventral plates lacking necks between discs and condylar articulations, discs broadly united to condyles. (Mesepisterna densely, coarsely, contiguously punctate above; body with pile usually strongly tinged with ochreus.) - - - - - - bryanti Timberlake

58(57). Seventh ventral plates with abrupt lateral shoulders at latero-basal margins of discs, strongly emarginate beneath (see fig. 23) - - - - - - - - - - - - - - - kincaidii Cockerell

Seventh ventral plates uniformly curved about lateral margins of discs (see fig. 22) - - - - - - - - - - - - - - - - - eulophi Robertson

59(49). Seventh ventral plates with discs as broad as long; gonostyli short, no more than one and one-half times as long as width across the bases - - - - - - - - - - - - - - - - - - - 60

Seventh ventral plates with discs twice as long as broad, roughly quadrate; gonostyli long and slender, two and one-half times as long as width across base - - - - - - - - 63

60(59). Malar space one-third as long as broad; penis valves with narrow dorsal wings; gonostyli

broader than long - - - *ciliatioides* Stephen, new species

Malar space at least one-half as long as broad; penis valves with no dorsal wings; gonostyli about one and one-half times as long as broad - 61

61(60). Metasomal tergum two with weak basal fascia; seventh ventral plates with discs slightly broader than long, lateral margins broadly rounded, discs with uniform covering of fine pubescence (see fig. 54) - *phaseliae* Cockerell

Metasomal tergum two with no basal fascia; seventh ventral plates with discs roughly triangular, lateral margins straight, discs with pile most dense along lateral and median margins - - - - - - - - - - - - - 62

62(61). Body densely pilose with long white pile; seventh ventral plates with lateral hair bands well developed and broadly united to median bands basally, pile of lateral bands long; lowland species - - - - - - - - - - - - - - - - *hyalinus* Provancher

Body with pile sparse and tawny to white; seventh ventral plates with lateral hair bands weakly developed, not broadly united to median band basally, pile of lateral bands short; montane species - - - *lutzi* Timberlake

63(59). Prothoracic spines vestigial, triangular or obliquely truncate - - - - - - - - - - - - - 64

Prothoracic spines long and sharp, at least as long as width across base - - - - - - - - 68

64(63). Prothoracic spines obliquely truncate with posterior margins extending beyond anterior. (Metasomal tergum two with weak basal fascia; seventh ventral plates with strong latero-basal projections.) - - - angelicus Cockerell

Prothoracic spines sharply pointed or vestigial - - - - - - - - - - - - - - - - - - 65

65(64). Malar space three-quarters as long as broad; wings whitish hyaline with little pubescence; metasomal tergum one with few coarse punctures, at least two puncture widths apart on disc. (Seventh ventral plates with long necks between discs and condyles, discs cordate with latero-basal projections at junction of discs and necks.) - - - - - - - - - - - - - - - - louisae Cockerell

Malar space less than five-eighths as long as broad; wings dusky with abundant testaceous pubescence; metasomal tergum one distinctly punctate with punctures one and one-half puncture widths apart - - 66

66(65). Seventh ventral plates elongate, roughly ovate with short neck and lacking latero-

basal projection - - - - - - - - birkmanni Swenk

Seventh ventral plates elongate, roughly quadrate, with no neck between discs and condyles - - - - - - - - - - - - - - - - - - - 67

67(66). Metasomal tergal discs four to six with long erect light pile; metasomal terga one and two with apical fasciae narrow and weak; seventh ventral plates lacking latero-basal projections - - - - - - rufocinctus Cockerell

Metasomal tergal discs four to six with erect fuscous to black pile; metasomal terga one and two with apical fasciae broad and dense; seventh ventral plates with strong latero-basal projections - - - fulgidus Swenk

68(63). Seventh ventral plates elongate, roughly ovate, weakly shouldered but with no latero-basal projections - - - birkmanni Swenk

Seventh ventral plates elongate, roughly quadrate, expanded apically with strong latero-basal projections - - simulans Cresson

69(1). Lower edge of metapleural prominence with a broad rim which hangs down and obscures surface beneath it in lateral view - - - - 73

Lower edge of metapleural prominence weakly protuberant with a narrow rim which projects laterally - - - - - - - - - - - - 70

70(69). Seventh ventral plates transverse, narrow, with long dense apical fringe of fuscous pile; tegulae black; metapleural prominence abrupt, heavily rugose including rim - - - - - - - - kansensis Stephen, new species

Seventh ventral plates roughly quadrate in form; tegulae light brown hyaline; metapleural prominence weakly protuberant, not rugose - 71

71(70). First metasomal tergum impunctate or weakly punctate - - - - - - - - - - - - - - - - - - 72

First metasomal tergum densely punctate. (Malar space three-quarters as long as wide; abdomen and thorax with pile dusky to yellow; length 10-11 mm.) - - howardi Swenk

72(71). Malar space three-quarters as long as broad; body covered with long, dense, white pile; seventh ventral plates quadrangular, weakly rounded laterally; length 9-10 mm. - - - - - - - - - - - - - - gypsicolens Cockerell

Malar space one-third as long as broad; body covered with short, sparse, dusky pile; seventh ventral plates almost square; length 7-8 mm. - - - mitchelli Stephen, new species

73(69). First metasomal tergum with disc distinctly punctate, punctures no more than three puncture widths apart at mid line - - - - 74

First metasomal tergum with disc impunctate and shiny, or if punctate, punctures weak and very sparse - - - - - - - - - - - - - - 78

74(73). Femora, tibiae and tarsi yellow testaceous. (Mesepisterna distinctly punctate with shiny interspaces; metasomal terga two to five with discs having abundant erect ferrugineous pile.) - - - wilmattae Cockerell

Femora and tibiae dark or largely so, tarsi occasionally tinged with yellow - - - - - 75

75(74). Anterior edge of pronotum raised and protruding as an erect plate, most evident as an abrupt process above the coxal bases; prothoracic tergum very broad with anterior and posterior edges raised slightly to form a broad weakly convex tergum. (Prothoracic spines absent.) - - - - - aberrans Cockerell

Anterior edge of pronotum flat, tergum narrow and flat - - - - - - - - - - - - - - - - - - 76

76(75). Flagellar segments short, about one to one and one-quarter times as long as wide; first metasomal tergum with disc deeply punctate, punctures no more than two puncture widths apart at mid line - - - - - - 77

Flagellar segments long, at least one and one-half times as long as wide; first metasomal tergum with punctures three puncture

widths apart at mid line. (Prothoracic spine long; nervures dark brown.)
- - - - - - - - - - - - - - - - mandibularis Smith

77(76). Second metasomal tergum with broad basal fascia; first metasomal tergum densely and uniformly punctate, punctures no more than one puncture width apart; prothoracic spine absent; nervures yellowish
- - - - - - - - - - - - - - - - - - susannae Swenk

Second metasomal tergum with no basal fascia; first metasomal tergum with disc coarsely punctate, punctures about two puncture widths apart; prothoracic spine short and sharp; nervures deep brown - - - saritensis Stephen, new species

78(73). Vertex with strong admixture of black pile; hypoepimeral area abruptly protuberant; flagellar segments short, about as long as broad - - - - - - - - - thysanellae Mitchell

Vertex with no black hairs intermixed; hypoepimeral area not markedly protuberant; flagellar segments about one and one-half times as long as broad - - - - - 79

79(78). Malar space at least as long as broad; first metasomal tergum impunctate - - - - - - - 80

Malar space no more than three-quarters as long as broad; first metasomal tergum variable - - - - - - - - - - - - - - - - - - 81

80(79). Malar space one and one-half times as long as broad; clypeus very long with a longitudinal median sulcus; pile of body sparse and dusky grey - - - - - - - - - productus Robertson

Malar space as long as broad; clypeus short and uniformly convex; pile of body dense, long and white - - - - - - - - albescens Cresson

81(79). Mesoscutum with punctures mesad from parapsidal lines, shallow and at least two puncture widths apart - - - - - - - - - - - 82

Mesoscutum with punctures mesad from parapsidal lines no more than one puncture width apart. (Mesepisterna with punctures coarse and dense on upper half.) - - - - - - - - 83

82(81). Wings whitish hyaline; metapleural prominence with very broad testaceous rim, deeply concave beneath; posterior basitarsi approximately six times as long as wide; mesoscutum and mesepisterna sparsely punctate with fine punctures at least three puncture widths apart; pile sparse and white on mesoscutum - - - - - - - - micheneri Stephen, new species

Wings dusky hyaline; metapleural prominence with a narrow, deep testaceous to brown rim, not sharply concave beneath; posterior basitarsi five times as long as wide; mesoscutum and mesepisterna with punctures fine, no

more than two puncture widths apart; pile of mesoscutum ochreus to deep yellow - - - - - - - - - - - - - - - - - solidaginis Swenk

83(81). Wings whitish hyaline with pubescence light - 84

Wings dusky with abundant dusky pubescence - 86

84(83). Seventh ventral plates roughly quadrangular with apical margins broadly rounded, pilose on median and lateral reflexed faces; malar space three-eighths as long as broad - - - - - - - - - - - - - laticinctus Timberlake

Seventh ventral plates quadrate with apical margins truncate; variably pilose; malar space one-quarter as long as broad - - - - 85

85(84). Propodeum with basal area sloping sharply ventrally, not pitted but having irregular longitudinal rugae; seventh ventral longer in base to apex ratio than the width from median to lateral extremities, plates quadrate with narrow hyaline non-plumose area at the latero-basal margins (see fig.37) - - - - - - tectiventris Timberlake

Propodeum with basal area not sloping sharply ventrally, broadly quadrately pitted; seventh ventral plates short, slightly broader than long with lateral margins weakly rounded and pilose (see fig.36) - - annae Cockerell

86(83). Mesepisterna coarsely contiguously punctate on upper half; pile of body dense, partially concealing surface; southern coastal areas of California - - - - - - - - - ochraceus Swenk

Mesepisterna with punctures above, separated by narrow, roughened, shiny interspaces; pile of body sparse, not concealing the surface; America east of Continental Divide - - - - - - - - - - - - - - - americanus Cresson

87(2). Face with black pile intermixed along inner orbital margins; legs with strong admixture of black or fuscous pile - - - - - - - - - - 88

Face with pile white to tawny grey; legs with pile white to pale grey (except c. consors) - - - - - - - - - - - - - - - - - - - 91

88(87). Prothoracic spine long and sharp; mesepisterna with pile entirely black; metasomal terga with no apical fasciae - californicus Provancher

Prothoracic spine short or vestigial; mesepisterna with pile pale grey; metasomal terga with white apical fasciae at least on first two segments - - - - - - - - - - - 89

89(88). Legs and discs of metasomal terga three to six with abundant erect black pile - - - - 89

Legs and discs of metasomal terga three to six with pile white to pale grey - - - - - - - - - - - - paniscus paniscus Viereck

90(89). Malar space one-half as long as broad; mesoscutum and scutellum with pile tawny grey, no dark hairs intermixed; seventh ventral plates roughly quadrate, densely covered with long, laterally directed pile - - - - - - - - - - consors pascoensis Cockerell

Malar space three-quarters as long as broad; mesoscutum and scutellum with pile tawny, intermixed with a few black or dark hairs on the disc; seventh ventral plates with apical margins broadly rounded, latero-basal margins weakly pointed, plates with transverse median bands of pile - paniscus Viereck

91(87). First metasomal tergum coarsely and densely punctate, punctures no more than one puncture width apart; mesoscutum coarsely, densely, almost contiguously punctate - - 92

First metasomal tergum with punctures fine or absent, when present punctures at least two puncture widths apart, surface at times roughened and punctures obscure - - - - - 98

92(91). Metapleura weakly protuberant above, protuberance strongly rugose; body very coarsely and densely punctate; metasomal terga with discs having abundant short erect black pile - - - - - - - - - - - - - 93

Metapleura not protuberant above; body variably punctate, punctures not uniformly coarse over entire body; metasomal terga with discs having covering of light pile - 94

93(92). Metasomal terga one to three with distinct narrow preapical grooves followed by raised flange-like margins; antennal segment three one and one-half times as long as four; malar space linear - - - breviocornis Robertson

Metasomal terga one to three with apex smooth, not grooved; antennal segment three subequal to four; malar space one-third as long as broad - - - - - willistoni Robertson

94(92). Malar space at least one-half as long as broad, usually longer; mesepisterna coarsely punctate with shiny interspaces - - - - - - - 95

Malar space no more than one-third as long as broad; mesepisterna finely and shallowly punctate or rugosely punctate above - - - 96

95(94). Prothoracic spines long and needle-like, at least twice as long as width across the base; malar space seven-eighths as long as broad - - - - - - - - - - - - texanus Cresson

Prothoracic spines short and sharp, roughly triangular; malar space one-half as long as broad - - - - - - wickhami Timberlake (see 5)

96(94). Posterior basitarsi four and one-quarter times as long as broad; penis valves lacking dorsal wing; vertex finely and densely punctate - - - - - beamerorum Stephen, new species

Posterior basitarsi three and one-quarter times as long as broad; penis valves with broad dorsal wing; vertex impunctate or very sparsely punctate - - - - - - - - - - - - - 97

97(96). Propodeum with lateral faces shiny, obscurely punctate; basal area of propodeum shallowly pitted, sloping sharply basally; first metasomal tergum with median line of disc shiny and impunctate; seventh ventral plates long and roughly quadrate with apical end narrowed and having long fringes of pile - - - - - - - - - - - - sphaeralcaea Timberlake

Propodeum with lateral faces dull, weakly striate; basal area of propodeum with deep quadrate pits not sloping sharply ventrally; first metasomal tergum without shiny impunctate longitudinal mid line; seventh ventral plates short, semi-lunar, with apices broadly rounded - - - - - - nigrifrons Titus

98(91). Metasomal terga with apical and basal fasciae absent. (Malar space one-third as long as broad; propodeum with lateral and posterior

faces dull and weakly roughened.)

- - - - - - - - xerophilus cismontanus Timberlake

Metasomal terga with fasciae broad and white - 99

99(98). Tibiae and tarsi with strong admixture of black and fuscous pile; seventh ventral plates square with apical margins weakly rounded, long pile over disc except on extreme median margins (see fig.61) - consors consors Cresson

Tibiae and tarsi with pile white or tawny; seventh ventral plates semi-lunar or elongately rectangular - - - - - - - - - - - - 100

100(99). Metasomal terga three to six with discs having abundant erect black or fuscous pile - 101

Metasomal terga three to six with discs having pile white or pale grey - - - - 102

101(100). First metasomal tergum shiny impunctate, or sparsely and finely folliculated; seventh ventral plates small, roughly quadrate with apex broadly rounded, discs densely covered with long, laterally sloping pile - - - - - - - - - - - - - consors mesocopus Swenk

First metasomal tergum shiny, distinctly punctate with punctures one to two puncture widths apart; seventh ventral plates diamond-shaped with median and lateral margins re-

flexed, sparsely covered with short erect pile (see fig. 63) -- *nitescens* Timberlake

102(100). Mesoscutum and scutellum with admixture of black pile; mesepisterna very coarsely and densely punctate, punctures no more than one-half puncture width apart above, almost contiguous. (Seventh ventral plates broad with large membranous apical expansion.) ----- *swenki* Stephen, new species

Mesoscutum and scutellum with pile entirely light; mesepisterna with punctures variable, fine not contiguous, separated by shiny interspaces ---------- 103

103(102). Flagellar segments as long as broad; first metasomal tergum and mesepisterna with discs distinctly punctate, punctures one-half puncture width apart on mesepisterna ---------- *nigrifrons* Titus

Flagellar segments one and one-quarter times as long as broad; first metasomal tergum shiny, virtually impunctate except for shallow scattered punctures; mesepisterna with punctures about one puncture width apart on discs ---- *xerophilus* Timberlake

104(3). Malar space at least one and one-half times as long as wide - - - - - - - - - - - - - 107

Malar space about one and one-eighth times as long as wide or shorter - - - - - - - 105

105(104). Antennae with flagellum light brownish yellow beneath; flagellar segments less than one and one-half times as long as broad. (Clypeus closely punctate on basal portion with broad shiny impunctate areas on either side of mid line; length 6.5-7.5 mm.; seventh ventral plates quadrate with apical margins sloping basally toward median edge.) - - - - - - prosopidis Ckll.

Antennae with flagellum dark brownish black or reddish brown beneath; flagellar segments more than one and one-half times as long as wide; mesepisterna with distinct punctures above, approximately one puncture width apart - - - - - - - - - - 106

106(105). Mesepisterna with discs deeply punctate, punctures about one puncture width apart; metasomal terga black with reddish tinge, second and third metasomal terga with very broad apical fascial depressions; seventh ventral plates broadened apically and abruptly truncate with inner apical

margins strongly reflexed (fig.76);
malar space broad, slightly longer than
broad; clypeus long with broad shiny
impunctate areas on either side of the
mid line - - - - - - - - - - algarobiae Ckll.

Mesepisterna with discs having punctures
two puncture widths apart; seventh
ventral plates broadened and rounded
apically (fig.83); malar space narrow,
slightly shorter than broad; clypeus short
and closely punctate across base, shiny
areas on either side of mid line with
coarse scattered punctures
- - - - - - - - - - - - deserticola Timberlake

107(104). Seventh ventral plates with apical margins
convex - - - - - - - - - - - - - - - - 108

Seventh ventral plates with apical margins
truncate or slightly concave. (Far
western and southwestern.) - - - - - - 109

108(107). Mesepisterna with disc deeply punctate,
punctures less than one puncture width
apart; seventh ventral plates shorter,
apices more strongly convex (see fig.81);
western great plains - petalostemonis Swenk

Mesepisterna with disc more finely punc-
tate, punctures more than one puncture

width apart; seventh ventral plates longer, apices less strongly convex (see fig. 79); southwestern deserts - salicicola Cockerell

109(107). Malar space at least twice as long as broad; flagellar segments strongly tinged with yellow beneath; tarsi black. (Flagellar segments about two times as long as wide; clypeus with deep median sulcus, densely and finely punctate; seventh ventral plates much as in algarobiae, slightly expanded apically and broadly rounded with long lateral and median fringes of hair; length 8.5-9.5 mm.) - - - - - - clypeonitens Swenk

Malar space approximately one and one-half times as long as broad; flagellar segments strongly tinged with ferrugineous beneath; tarsi variable - - - - - - - 110

110(109). Flagellar segments approximately one and three-quarters times to twice as long as broad; metasomal terga black tinged with testaceous at apical fascial depressions; length 8-9 mm. - - - - - - - 111

Flagellar segments approximately one and three-eighths times as long as broad; metasomal terga strongly tinged with blue to give discs bluish black lustre; length 7 mm. (Seventh ventral plates short with

lateral fringes of pile as well as a long clump of pile arising at upper lateral face immediately beneath articulatory condyle (see fig.80) - - - - *daleae* Cockerell

111(110). Second metasomal tergum with disc deeply punctate, punctures about two puncture widths apart; seventh ventral plates long, expanded and slightly rounded at apex, about twice as long as wide; length 8 mm. - - - - - - - - - *salicicola* Cockerell

Second metasomal tergum with disc smooth, shiny and impunctate; seventh ventral plates slightly expanded apically, apex truncate, about one and one-quarter times as long as wide; length 8 mm. - - - - - - - - - - - - - *covilleae* Timberlake

KEY TO THE FEMALES

Supplementary information to key couplets one, two and three.

americanus group

Malar space no more than one-half as long as broad; clypeus densely punctate, punctures striate to ovate; prothoracic spines short and sharp; flagellar segments about three-quarters as long as broad; propodeum with latero-posterior margins abrupt or ridged, not rounded; pile of body usually white to dusky to tinged with

ochreus.

consors group

Malar space no longer than one-half as long as broad; clypeus variably punctate, punctures ovate to striate; flagellar segments short, about one-half as long as broad, sometimes slightly longer; propodeum with basal area narrow and sloping sharply ventrally, lateral and posterior faces finely striate and roughened, latero-posterior margins rounded; pile of body long and dusky, often intermixed with black on head and thorax.

daleae group

Malar space no longer than three-quarters as long as broad; clypeus elongate with longitudinal median sulcus bordered by lateral shiny, sparsely punctate rims; median sulcus densely punctate, rims sparsely punctate with round punctures; flagellar segments at least three-quarters as long as broad, usually much longer; propodeum with basal area smooth and broad, usually not sharply pitted but with a few weak longitudinal rugae, lateral and posterior faces shiny with numerous fine punctures, latero-posterior margins rounded; pile of body long and white; species small, less than 10 mm., and found only in western great plains and lower austral zone of North America.

1. Metapleura each with dorsal prominence or horizontal carina usually with testaceous rim - - - - - - - - - - - - 57 (*americanus* group)

Metapleura with no dorsal prominence, or if weakly prominent with carina curving ventrally well in front of posterior margins - - - - - 2

2(1). Median flagellar segments short, usually one-half to three-quarters as long as broad when viewed from above, *and* last exposed sternum with apical portion strongly depressed with basal arcuate band of overhanging pile - - - - - - - - - - - - - - - - 76 (*consors* group)

Median flagellar segments usually as long as broad when viewed from above; last exposed sternum usually lacking depressed apical portion - - - - - - - - - - - - - - - - 3

3(2). Clypeal punctures sparse and round, and clypeus with longitudinal median sulcus (sulcus not evident in some specimens of *algarobiae*); propodeum with basal area broad and not distinctly quadrately pitted - - 95 (*daleae* group)

Clypeal punctures elongate, at least apically, or if not, clypeus lacking median sulcus; propodeum with basal area usually deeply pitted - 4

4(3). Mesoscutum and/or scutellum with admixture of black pile - - - - - - - - - - - - - - - - - 5

Mesoscutum and scutellum with no black pile - - 33

5(4). Malar space at least three-quarters as long as broad - - - - - - - - - - - - - - - - - - 6

Malar space usually one-half as long as broad or less - - - - - - - - - - - - - - - - - - 9

6(5). Malar space one and three-eighths times as long as broad. (Metasomal tergum one coarsely punctate; mesepisterna dull, finely roughened; length 11-13 mm.) - - - validus Cresson

Malar space no more than three-quarters as long as broad - - - - - - - - - - - - - - - - 7

7(6). First metasomal tergum coarsely and densely punctate, punctures no more than one puncture width apart. (Propodeum with basal area very narrow, obscurely pitted.) - - skinneri Viereck

First metasomal tergum shiny impunctate or sparsely folliculated - - - - - - - - - - - - 8

8(7). Mesoscutum and mesepisterna dull, weakly rugose, punctures becoming less distinct on upper half of mesepisterna; metasomal terga four and five with discs covered with short, erect, black to fuscous pile; propodeum with basal area narrow with close longitudinal striae, posterior face dull and roughened - - - - - - - - - - - impunctatus lacustris Swenk

Mesoscutum shiny, coarsely punctate; mesepisterna with punctures deep, close and contiguous above; metasomal terga four and five with discs covered with white to tawny pile; propodeum with basal area wide, deeply quadrately pitted, posterior face with upper half shiny, weakly striate - longifacies Stephen, new species

9(5). First metasomal tergum very finely punctate, punctures follicle-like and at least two puncture widths apart on discal area - - - - 10

First metasomal tergum deeply punctate, punctures one to one and one-half puncture widths apart laterally, or punctures fine and contiguous - - - - - - - - - - - - - - - - - - - 20

10(9). Last metasomal sternum with elevated carinae curved mesad apically; first metasomal tergum with apical margin abrupt and rounded, fascia arising as apical fringe. (Prothoracic spines short and sharp.) - - - - arizonensis Stephen, new species

Last metasomal sternum uniform; first metasomal tergum with apex flattened and fascial hairs arising subapically - - - - - - - - - - - - 11

11(10). Prothoracic spines short and obliquely truncate with anterior margins extending beyond posterior. (Malar space one-fifth as long

as broad.) - - - - - - - - rufocinctus Cockerell

Prothoracic spines pointed, not at all truncate - 12

12(11). Mesoscutum and scutellum with pile long, dense, and erect, sparsely intermixed with dark hairs; mesepisterna with shiny interspaces above; procoxal spines short, about as long as broad - - - - - - - - - - hyalinus Provancher

Mesoscutum and scutellum with light pile restricted to peripheral portions, abundant black pile intermixed over discal areas; mesepisterna contiguously punctate and roughened; procoxal spines variable - - - 13

13(12). Second metasomal tergum with broad basal fascia - - - - - - - - - - - - - - - - - - 14

Second metasomal tergum with no basal fascia 16

14(13). Procoxal spines absent; propodeum with basal area longitudinally striate, not quadrately pitted - - - - - - - - perileucus Cockerell

Procoxal spines at least as long as wide; propodeum with basal area deeply quadrately pitted - - - - - - - - - - - - - - - - - - - 15

15(14). Wings whitish hyaline; vertex with pile all light; second metasomal tergum shiny almost impunctate laterally except for few follicles; clypeus striately punctate with broad shiny interspaces becoming larger basally; mese-

pisterna coarsely and rugosely punctate above with no interspaces evident - - - - - - - - - - - - - - - - - louisae Cockerell

Wings dusky hyaline; vertex with weak admixture of black pile; second metasomal tergum shiny, finely punctate with punctures about one and one-half puncture widths apart; clypeus closely, striately punctate to apex; mesepisterna densely and rugosely punctate but with evident interspaces on anterior faces - - - - - - - - - - - - - fulgidus Swenk

16(13). Malar space one-half as long as broad; mesepisterna coarsely, contiguously punctate. (Length 11-13 mm.) - - - - carolinus Mitchell

Malar space no more than one-third as long as broad; mesepisterna coarsely punctate with shiny interspaces - - - - - - - - - - - - - 17

17(16). Metasomal sterna coarsely and sparsely punctate, punctures at least two puncture widths apart, sterna with sparse, short, erect pile and broadly interrupted apical fasciae - - - - - - - - perileucus Cockerell

Metasomal sterna dull, finely punctate, sterna lacking apical fasciae - - - - - - 18

18(17). Clypeus short, strongly convex, densely punctate to apex; sterna with dense scopa;

compound eyes very large and broad; malar space linear - - - - - - - titusensis Mitchell

Clypeus long, flattened or sulcate medially, sparsely punctate with shiny interspaces; malar space one-quarter to one-third as long as broad - - - - - - - - - - - - - - - - - - - 19

19(18). Clypeus with deep longitudinal median sulcus, extending from base to apex; prothoracic spines very short and sharp; malar space one-third as long as broad - intermixtus Swenk

Clypeus not sulcate medially, but flattened; prothoracic spines at least as long as width across base; malar space one-quarter as long as broad - - chamaesarachae Cockerell

20(9). Last metasomal sternum with strong raised lateral longitudinal ridges extending to apex - 21

Last metasomal sternum simple, undifferentiated - - - - - - - - - - - - - - - - - - - 22

21(20). Prothoracic spines short and sharp; second metasomal tergum abruptly depressed basally; lateral ridges of last sternum weak and arcuate - - arizonensis Stephen, new species

Prothoracic spines vestigial; second metasomal tergum not depressed basally; lateral ridges of last sternum strong and straight - - - - - - - - - - - - - - - - compactus Cresson

22(20). Posterior basitarsi twice as long as broad. (Clypeus flattened, obscurely striately punctate; malar space one-third as long as broad.) - - - - - - - - latitarsis Robertson

Posterior basitarsi at least three times as long as broad, usually longer - - - - - - 23

23(22). Prothoracic spines long and sharp, longer than width across base of spine - - - - - 24

Prothoracic spines short, absent or obliquely truncate, never terminating in a needle-like point to edge of head - - - - - - - 28

24(23). Fore coxae with long spines, at least as long as broad - - - - - - - - - - - - - - - 25

Fore coxae lacking spines - - - - - - - - - 26

25(24). Scutellum striately punctate; prothoracic spines long and sharp, protruding to sides of head; first metasomal tergum closely punctate, punctures approximately one puncture width apart - - simulans Cresson

Scutellum coarsely punctate, punctures not at all striate; prothoracic spines sharp, not protruding to sides of head; first metasomal tergum with punctures sparse and weak - - - - - - - - - - - - fulgidus Swenk

26(24). Clypeus long, flat, dull and roughened; flagellar segments short, about one-half as long as broad - - - - willistoni Robertson

Clypeus short, convex, coarsely punctate with shiny interspaces; flagellar segments about as long as broad - - - - - - - - - - 27

27(26). Malar space linear; propodeum strongly ridged on upper posterior face outside of triangle; apical fasciae narrow and weak, often absent medially - - - - - - - - - nudus Robertson

Malar space one-third as long as broad; propodeum with posterior face dull and roughened outside of triangle; apical fasciae broad, dense and white - - gilensis Robertson

28(23). Procoxal spines long, at least three times as long as broad - - - - - - - - - - - - - - 29

Procoxal spines vestigial or absent - - - - 30

29(28). Prothoracic spines obliquely truncate, with posterior margins extending beyond anterior; first metasomal tergum with abundant long erect ochreus pile - - - - angelicus Cockerell

Prothoracic spines short, blunt to truncate with anterior margins extending beyond posterior; first metasomal tergum with little discal pile except for short lateral fringes - - - - - - - - rufocinctus Cockerell

30(28). Antennae very short, flagellar segments one-half as long as broad; length 9-10 mm. - - 31

Antennae long, flagellar segments as long as broad; length 12-14 mm. - - - - - - - - - 32

31(30). Metasomal terga one to three with distinct narrow preapical groove, followed by raised flange-like margins; clypeus closely punctate - - - - - - - - - - - - <u>brevicornis</u> Robertson

Metasomal terga one to three with apical margins entire and smooth, broadly fasciate; clypeus flat, dull and weakly roughened - - - - - - - - - - - - - - - - <u>willistoni</u> Robertson

32(30). Mesepisterna dull, roughened, obscurely punctate; first metasomal tergum with punctures close and dense, no more than one puncture width apart; metasomal fasciae weak and tinged with ochreus - - - - - - - - - - - <u>inaequalis</u> Say

Mesepisterna shiny, deeply and coarsely punctate with punctures about one-half puncture width apart; first metasomal tergum finely punctate with punctures about one puncture width apart; metasomal terga tinged with metallic blue; metasomal fasciae broad, dense and white - - - - - <u>cercidii</u> Timberlake

33(4). Prothoracic spines long and sharp, at least as long as width across base - - - - - - - - 34

Prothoracic spines short or absent, never as long as width across base - - - - - - - - - 47

34(33). First metasomal tergum shiny with few scattered fine punctures - - - - - - - - - - - - - 35

First metasomal tergum distinctly punctate, punctures about one and one-half puncture widths apart - - - - - - - - - - - - - - - - 37

35(34). Second metasomal tergum uniform, with very narrow inconspicuous white basal fascia, most evident laterally; first metasomal tergum with a few weak follicle-like punctures - - - - - - - - - - - hyalinus Provancher

Second metasomal tergum weakly depressed basally with broad basal fascia; first metasomal tergum variably punctate, punctures usually coarse - - - - - - - - - - - - 36

36(35). First metasomal tergum with apical fascial margin not depressed medially; metasomal terga five and six with pile of discs light ochreus to golden; first metasomal tergum shiny, a few coarse punctures scattered over surface - - - - - - - - birkmanni Swenk

First metasomal tergum with apical fascial margin abruptly depressed throughout its breadth; metasomal terga five and six with pile of discs deep fuscous to black; first metasomal tergum with punctures concentrated on median discal area - - - sleveni Cockerell

37(34). Malar space linear; body very coarsely, densely contiguously punctate; metasomal terga one and two with punctures as coarse

as those on mesoscutum
- - - - - - - - - - - - robertsonii Dalla Torre,
and timberlakei Stephen, new species

Malar space one-third as long as broad; body variably punctate; metasomal terga one and two with punctures much finer than those of mesoscutum - - - - - - - - - - - - 38

38(37). Metasomal tergum three without basal fascia; metasomal terga four and five with discs having deep fuscous to black pile; scutellum coarsely punctate over posterior three-quarters, weakly striate on anterior half - 39

Metasomal tergum three with basal fascia; metasomal terga four and five with discs having tawny to ochreus pile; scutellum shiny, sparsely punctate - - - - - - - - - - 44

39(38). Second metasomal tergum with deep basal depression and weak white fascia, depression deepest medially; malar space about one-half as long as broad - - - - - - - - 40

Second metasomal tergum shallowly or not depressed basally with weak white fascia; malar space less than one-half as long as broad - - - - - - - - - - - - - - - - - - 41

40(39). First metasomal tergum with apex abruptly depressed, disc shiny, finely and sparsely

punctate with punctures two to four puncture widths apart - - - - - - sleveni Cockerell

First metasomal tergum not strongly depressed apically, disc densely and coarsely punctate to apex, with punctures one puncture width apart - - - - - - - wootoni Cockerell

41(39). Scutellum with anterior half weakly, longitudinally striate or punctate to edge; first metasomal tergum finely punctate with punctures one to two puncture widths apart - - - - - - - - - - hyalinus gaudialis Cockerell

Scutellum with anterior one-third non-punctate, non-striate; first metasomal tergum with punctures uniformly dense, no more than one puncture width apart - - - - - - - - - - - - 42

42(41). Length 8-9 mm.; metasomal terga one and two punctate with interspaces dull; montane species from southern California - - - - - - - - - - - - lutzi pinorum Timberlake

Length 10-12 mm.; metasomal terga one and two punctate with shiny interspaces - - - - - 43

43(42). Sternal discs rather dull, with a few fine punctures; mesepisterna with punctures separated, about one puncture width apart; northern and western species - - - - - - - - - - - - - - - kincaidii Cockerell

Sternal discs shiny and usually coarsely

punctate, punctures about one and one-half puncture widths apart; mesepisterna with punctures closer and almost contiguous on upper half; southern half of United States - - - - - - - - - - - - - - - - - eulophi Robertson

44(38). Metasomal terga two to four with broad white basal fasciae covering more than one-half of disc - - - - - - - - - - - - - - - - - - - 45

Metasomal terga two and three with basal fasciae no broader than apical fasciae; tergum four lacking basal fascia - - - - - 46

45(44). Length 9 mm.; clypeus with sparse coarse longitudinal punctures to apex; second metasomal tergum densely punctate with punctures about as coarse as those of tergum one; antennal segments about as long as broad, flagellum dark brown below - - - - - - - - - - - - - - - phaceliae Cockerell

Length 7 mm.; clypeus with apical one-half shiny impunctate laterally; second metasomal tergum finely folliculated, dull; antennal segments two-thirds as long as broad, flagellum yellow brown below - - - - - - - - - - - - - - - - lutzi Timberlake

46(44). Length 9 mm.; clypeus sparsely, coarsely, longitudinally punctate to apex; second metasomal tergum shiny, densely punctate

with punctures as coarse as those on tergum one; antennal segments as long as broad, flagellum dark brown below - phaceliae Cockerell

Length 7 mm.; clypeus with apical one-half shiny impunctate, especially laterally; second metasomal tergum finely folliculated and dull; antennal segments about three-quarters as long as broad, flagellum yellow brown below - - - - - - - - - lutzi Timberlake

47(33) Eyes with inner orbital margins nearly parallel; mesepisterna dull, shallowly, obscurely punctate - - - - - - - - - - - - - - 48

Eyes with inner orbital margins strongly convergent below; mesepisterna shiny to variable - - - - - - - - - - - - - - - - - - - 49

48(47). Posterior basitarsi three and one-half times as long as broad; mesoscutum with pile ochreus; length 13 mm.; western great plains - - - - - - - - - - - andrewsi Cockerell

Posterior basitarsi four and one-quarter times as long as broad; mesoscutum with pile tawny; length 11 mm.; eastern seaboard - - - - - - - - - aestivalis Robertson

49(48). Metapleura strongly protuberant above, protuberances with narrow black rims; malar space as long as broad - - productus Robertson

Metapleura not protuberant above; malar space less than three-quarters as long as broad - - - - - - - - - - - - - - - - - - - 50

50(49). Mesepisterna dull, obscurely or finely and densely punctate; mesoscutum with pile bright ochreus - - - - - - - - - - - 51

Mesepisterna rugosely punctate with shiny, although sometimes roughened, interspaces; pile variable in colour - - - - - 52

51(50). First metasomal tergum finely and densely punctate, punctures one-half puncture width apart; tergal fasciae complete and white; length 11 mm. - - - - - ciliatus Patton

First metasomal tergum shiny impunctate to sparsely folliculated; tergal fasciae absent or evident only as lateral fringes; length 14-15 mm. - - - - - - thoracicus Smith

52(50). Apical metasomal sternum with posterior half sharply depressed, apex hyaline non-plumose with long pile overhanging depressed area - - - - - - - - - - - - - - - 53

Apical metasomal sternum simple, not longitudinally differentiated or with weak lateral longitudinal ridges - - - - - - - - - - 54

53(52). Malar space linear; metasomal terga two and three with no evident basal fasciae;

nervures and stigma dark brown to black - - - - - - - - - *turgiventris* Timberlake

Malar space half as long as broad; metasomal terga two and three with weak basal fasciae; nervures and stigma brown - - - - - - - - - - - - - - - *larreae* Timberlake

54(52). First metasomal tergum coarsely and densely punctate, punctures no more than one puncture width apart - - - - - - - - - - - 55

First metasomal tergum shiny, sparsely punctate or finely folliculated - - - - - - - 56

55(54). Metasomal tergum two deeply depressed basally throughout; malar space one-half as long as broad; posterior tibiae with pile light - - - - - - - - - - - - - - - - *wootoni* Cockerell

Metasomal tergum two shallowly depressed basally, depression not evident medially; malar space one-third as long as broad; posterior tibiae with admixture of black pile - - - - - - - - - - - - *bryanti* Timberlake

56(54). Last metasomal sternum with weak elevated lateral longitudinal carinae curved medially at apex; second metasomal tergum finely and densely folliculated; tegulae black - - - - - - *distinctus* Cresson

Last metasomal sternum lacking carinae;

second metasomal tergum sparsely follic-
ulated; tegulae brown hyaline
- - - - - - - - - - - - - - - - - brimleyi Mitchell

57(1). Mesoscutum covered with short, dense, plumose pubescence giving the surface a moss-like mat appearance - - - - - - - - - - - - - - - 58

Mesoscutum covered with moderately long pile, not dense and crowded to conceal surface - - - - - - - - - - - - - - - - - - 60

58(57). Anterior edge of pronotum raised and protruding as an erect plate, most evident as an abruptly protruding plate above the coxal bases; pronotum very broad; metapleural prominence with broad testaceous rim - - - - - - - - - - - - aberrans Cockerell

Anterior edge of pronotum not protruding as an erect plate above the coxal bases; metapleural prominence with narrow testaceous or dark brown rim - - - - - - - - - - - 59

59(58). Metasomal terga one to five covered with short, dense, appressed pubescence concealing the surface; legs yellow to light brown-yellow apically from trochanter; western great plains - - - wilmattae Cockerell

Metasomal terga one to five not completely covered with appressed pubescence, a narrow

pre-fascial area on each disc free from pile; legs reddish brown, tending to darker brown basally; metapleural prominence weakly protuberant with a narrow dark brown rim; known only from North Carolina - howardi Swenk

60(57). Wings whitish hyaline, bare or covered with short white pubescence - - - - - - - - - - 61

Wings dusky hyaline covered with short, deep ochreus to dusky pubescence - - - - - - - 64

61(60). First metasomal tergum with disc closely punctate, punctures shallow and about one puncture width apart on lateral faces; metasomal terga with short sparse pubescence over surface - - - - - - susannae Swenk

First metasomal tergum shiny impunctate, finely folliculated laterally with follicles at least two follicle widths apart; metasomal terga with at most the basal half covered with appressed pubescence - - - - 62

62(61). Malar space one-half as long as wide; mesepisterna and mesoscutum with discs deeply and coarsely punctate, punctures no more than one puncture width apart - - - - - - - - - - - - - - - albescens Cresson

Malar space one-quarter as long as wide or less; mesepisterna and mesoscutum with discs obscurely punctate - - - - - - - - - - - - 63

63(62). Metasomal terga one to four covered with short, dense, appressed pubescence, completely concealing the surface - tectiventris Timberlake

Metasomal terga one to four with discs bare except for basal fascia to second metasomal tergum - - - - micheneri Stephen, new species

64(60). Metasomal terga one to four covered with short appressed pubescence completely concealing the surface - - - - - - - - - - - - 65

Metasomal terga with discs bare, or partially covered with semi-erect pile not concealing the surface - - - - - - - - - - - - - - - - 67

65(64). Mesepisterna shiny and distinctly punctate, punctures at least one puncture width apart; mesoscutum sparsely and very shallowly punctate, punctures about three puncture widths apart; metasomal terga with pubescence sparse but complete and appressed. (Pile of head and thorax yellow.) - - - - - - - - - - - - - - - - solidaginis Swenk

Mesepisterna dull, coarsely punctate with punctures almost contiguous; mesoscutum with punctures coarse, about one puncture width apart; metasomal terga with pubescence dense over entire surface - - - - - 66

66(65). Pile of head and thorax ochreus; wings dusky hyaline with abundant ochreus pubescence

over surface; metapleural prominence with rim variable but usually narrow and testaceous; length 9-10 mm. - - - - ochraceus Swenk

Pile of head and thorax pale ochreus to dusky grey; wings whitish hyaline with sparse, light ochreus pubescence; nervures light yellow-brown; metapleural prominence with rim narrow, black to deep brown; length 8-9 mm. - - - - - - - tectiventris Timberlake

67(64). Metapleural prominence strongly protuberant with a broad rim, abruptly declivous - - - 68

Metapleural prominence weakly protuberant with narrow brown to black rim, shallowly concave beneath - - - - - - - - - - - - - - 70

68(67). Tegulae black; fascial foveae with upper margins curved strongly mesad, extending two-thirds of the way to lateral ocelli from eyes; mesoscutum with pile dusky grey - - - - - saritensis Stephen, new species

Tegulae brownish hyaline; fascial foveae with upper margins rounded not curved mesad, extending less than half way to lateral ocelli from eyes; mesoscutum with pile tinged with ochreus - - - - - - - - - - - 69

69(68). Second metasomal tergum with broad dense basal fascia, at least as broad as non-pubescent area between basal and apical

fasciae; first metasomal tergum finely and densely punctate especially laterally; metasomal terga three to five with short, white, semi-erect pile, giving the surface a whitish sheen; apical fasciae broad and white; lateral fringes of first metasomal tergum dense and continuous to apical fascia; mesoscutum with pile white to ochreus - - - - - - - - - - mandibularis Smith

Second metasomal tergum with basal fascia weak, not more than one-third as wide as non-pubescent area between basal and apical fasciae; first metasomal tergum with disc sparsely folliculated and shiny; metasomal terga three to five bare and shiny, occasionally with a few semi-erect hairs; apical fasciae weak and narrow; first metasomal tergum with lateral fringes weak and usually not continuous to apical fascia; mesoscutum with pile deep ochreus to yellow - - - - - - - - - - americanus Cresson

70(67). Malar space at least as long as wide; clypeus with apical half shiny impunctate - - - - - - - - - - - - - - - productus Robertson

Malar space no more than one-half as long as wide; clypeus entirely covered with deep coarse elongate punctures - - - - - - - - 71

71(70). Mesoscutum and scutellum with strong admixture of black and dark hairs; second metasomal tergum with no basal fascia; mesepisterna rugose -- *thysanellae* Mitchell

Mesoscutum and scutellum with pile entirely light; second metasomal tergum with strong basal fascia; mesepisterna distinctly punctate - - - - - - - - - - - - - - - - - - 71

72(71). Anterior coxae with spines rudimentary; posterior basitarsi about three and one-quarter times as long as broad - - - - - - - - - - - - *laticinctus* Timberlake

Anterior coxae with spines well developed; posterior basitarsi four to five times as long as broad - - - - - - - - - - - - - - - 73

73(72). Posterior basitarsi five and one-quarter times as long as broad; mesepisterna densely and contiguously punctate, with a dense covering of long fine tawny to white pile; length 12 mm. - - - - - - - - - - - - - - *gypsicolens* Cockerell

Posterior basitarsi four times as long as broad; mesepisterna with punctures separated by shiny interspaces below; pile short and not obscuring surface, usually tinged with yellow - - - - - - - - - - - - - - - - - 74

74(73). Second and third metasomal terga with distinct basal fasciae; wings with nervures light yellow brown; antennae tinged with yellow - - - - - - - - - - annae annae Cockerell

Second metasomal tergum with weak basal fascia, fascia absent on third; wings with nervures deep brown; antennae dark brown - 75

75(74). Mesepisterna with upper half finely, densely, contiguously punctate, almost roughened; mesoscutum and scutellum with pile tinged with deep ochreus; America east of continental divide - mitchelli Stephen, new species

Mesepisterna sharply punctate, punctures separated by broad shiny interspaces; mesoscutum and scutellum with pile tawny to tinged with yellow; southern California and extreme southwestern United States - - - - - - - - - - annae disseptus Timberlake

76(2). Inner orbital margins, mesepisterna and upper genal areas with pile black or with admixture of black pile - - - - - - - - - - 77

Inner orbital margins, mesepisterna and upper genal areas with pile white or pale grey - 85

77(76). Pile of mesepisterna black - - - - - - - - - 80

Pile of mesepisterna, especially upper half, white to tawny grey. (Face with abundant

white pile about antennal bases.) - - - - 78

78(77). Metasomal terga with apical fasciae absent; vertex with pile light to dusky; southern California - xerophilus cismontanus Timberlake

Metasomal terga with apical fasciae present; vertex with pile variable - - - - - - - - 79

79(78). Mesoscutum and scutellum with pile all light; pile of face, vertex and genal areas predominantly black - - paniscus paniscus Viereck

Mesoscutum and scutellum with admixture of black or dark pile; pile of face, vertex and genal areas predominantly white - - - - - - - xerophilus xerophilus Timberlake

80(77). Prothoracic spine long and distinct, at least one and one-half times as long as width across the base. (Pile of head, thoracic pleura and legs black; metasomal fasciae absent.) - - - - - - - californicus Provancher

Prothoracic spine absent or vestigial - - - - 81

81(80). Mesoscutum and scutellum with strong covering of pale grey to light ochreus pile - - - - 82

Mesoscutum and scutellum with admixture of black pile - - - - - - - - - - - - - - - - - 83

82(81). Metasomal terga two to five with apical fasciae very weak but discernible at lateral margins; mesoscutum and scutellum with pile white

to pale grey; propodeum with pile white
- - - - - - - - - - - - - consors consors Cresson

Metasomal terga two to five with no apical fasciae; mesoscutum and scutellum with pile light ochreus; propodeum with strong admixture of black pile - - - consors pascoensis Cockerell

83(81). Metasomal terga one to five with dense white apical fasciae at least laterally; malar space one-third as long as wide; metasomal terga one and two finely punctate, punctures one to two puncture widths apart
- - - - - - - - - - - - - - - - - nigrifrons Titus

Metasomal terga one to five with fasciae absent, at times evident laterally on tergum one; malar space one-half as long as wide; metasomal terga one and two sparsely folliculated - - - - - - - - - - 84

84(83). Metanotum and mesoscutum with strong admixture of black pile medially
- - - - - - - - - paniscus mertensiae Timberlake

Metanotum and mesoscutum with few scattered black hairs - - - paniscus sculleni Timberlake

85(76). First metasomal tergum densely punctate or folliculated with punctures one to two puncture widths apart - - - - - - - - - - 86

First metasomal tergum impunctate or finely and sparsely folliculated - - - - - - - - 89

86(85). Metasomal terga one and two with distinct narrow preapical grooves followed by raised flange-like margin. (Metasomal terga very coarsely and densely punctate.)
- - - - - - - - - - - - - - - brevicornis Robertson

Metasomal terga one and two with apical margins smooth - - - - - - - - - - - - - - - 87

87(86). Clypeus long, flattened medially with a very faint longitudinal median sulcus; prothoracic spines long, needle-like, about one and one-half times as long as width across the base - - - texanus texanus Cresson

Clypeus short, uniformly convex, shiny; prothoracic spines short, weak, triangular - 88

88(87). Clypeus sparsely punctate with coarse punctures one to three puncture widths apart, interspaces broad and shiny; metasomal sterna two to four with long dense erect pile forming strong scopa; fascial foveae very broad and deep, dorsal margins extending two-thirds of the way to lateral ocelli; length 9 mm. - - - - scopiventer Swenk

Clypeus densely punctate, punctures no more than one puncture width apart, interspaces dull; metasomal sterna two to four

moderately long and sparse, very weakly scopiform; fascial foveae shallow, reaching but half way to lateral ocelli; length 7.5-8 mm. - - - - - - - - - linsleyi Timberlake

89(85). Last metasomal sternum with the apical one-quarter or less depressed; body with pile short and white with few black hairs intermixed; fascial foveae strongly depressed above - 90

Last metasomal sternum with apical one-half strongly depressed; body with pile long, sparse and dusky; fascial foveae weakly depressed above - - - - - - - - - - - - - - 92

90(89). Mesoscutum and scutellum with discs having strong admixture of black pile, at least one-half of pile black - - - - - - - - - - - 91

Mesoscutum and scutellum with pile light, a few dusky hairs intermixed. (Clypeus short, convex, shiny, very sparsely punctate with coarse punctures; southwestern United States, east of Continental Divide.) - - - - - - - - - - aridus Stephen, new species

91(90). Hind basitarsi four times as long as broad; clypeus and frontal areas sparsely punctate with coarse shallow punctures, punctures one to two puncture widths apart; tegulae

brownish hyaline - - - peninsularis Timberlake

Hind basitarsi three times as long as broad; clypeus and frontal areas coarsely and densely punctate, punctures no more than one-half puncture width apart; tegulae black - - - - - - swenki Stephen, new species

92(89). Metapleura with a few dark hairs on upper faces; head very broad, about one and one-third times as broad as long. (Metasomal terga two and three finely and densely punctate or coarsely folliculated with shiny interspaces; California.) - nitescens Timberlake

Metapleura with pile white; head about one and one-fifth times as broad as long or less - 93

93(92). Clypeus coarsely, contiguously, striately punctate to apex; mesepisterna coarsely and densely punctate above, punctures one-half puncture width apart; fascial foveae obscure, median margins not discernible, dorsal margins extending barely above upper inner orbital margins; tegulae black; California - - - - - - sphaeralceae Timberlake

Clypeus irregularly punctate with shallow, obscure punctures, weakly rugose and shiny; mesepisterna shallowly punctate with shiny interspaces; fascial foveae variable - - - 94

94(93). Fascial foveae very broad and deep, dorsal edge extending at least two-thirds of the way to the lateral ocelli; metasomal terga two and three shiny, impunctate; tegulae brownish hyaline; America east of Continental Divide - - - - - - consors mesocopus Swenk

Fascial foveae obscure, narrow, not extending above upper inner orbital margins; metasomal terga two and three finely follicullated and shiny; tegulae deep brown to black; montane species, Rocky Mountains - - - - - - - - - - - paniscus paniscus Viereck

95(3). Metasomal terga nearly or completely covered with short appressed pubescence, most complete on metasomal terga three to five - - 96

Metasomal terga having discs non-pubescent, except for basal fasciae sometimes present on terga two and three - - - - - - - - - - 98

96(95). Malar space long, at least as long as broad; posterior basitarsi four times as long as broad - - - - - - - - - - - - - - - - - - - 97

Malar space three-quarters as long as broad; posterior basitarsi broad, three and one-quarter times as long as broad. (Pile of vertex, mesoscutum, scutellum and apical metasomal terga strongly tinged with

ochreus.) - - - - - - - - covilleae Timberlake

97(96). Pile of vertex and mesoscutum long and deep ochreus; mesepisterna dull above with punctures shallow and obscure; prothoracic spines absent; nervures deep brown to black; length 10-11 mm. - - - - - clypeonitens Swenk

Pile of vertex and mesoscutum short and pure white; mesepisterna shiny with deep punctures separated by shiny interspaces; prothoracic spines short and sharp; nervures light yellow brown, especially basally; length 8-9 mm. - - - - - - petalostemonis Swenk

98(95). Mesepisterna with punctures shallow and sparsely scattered over shiny black surface, punctures two to four puncture widths apart on disc; malar space one-half as long as broad or less - - - - - - - - - - - - - - 99

Mesepisterna with punctures deep and close, no more than one puncture width apart on disc; malar space three-quarters to seven-eighths as long as broad (shorter in deserticola Timb.) - - - - - - - - - - - - - 100

99(98). Antennae with under surface of flagellum light brownish yellow; mesepisterna with punctures almost obscure, at least four puncture widths apart on disc; metasomal

terga five and six with disc having abundant golden erect pile; length 8 mm.
- - - - - - - - - - - - - - - *prosopidis* Cockerell

Antennae with under surface of flagellum reddish brown; mesepisterna with punctures distinct but at least two puncture widths apart on disc; metasomal terga five and six with disc having abundant deep ferrugineous to black, erect pile; length 9-9.5 mm. - - - - - - - - - - - *algarobiae* Cockerell

100(98). Metasomal terga six (and sometimes five) with disc having abundant deep ferrugineous to black hairs; prothoracic spines at least as long as broad at base - - - - - - - - - 101

Metasomal terga five and six having disc covered with light hairs; prothoracic spines vestigial or absent - - - - *salicicola* Cockerell

101(100). Malar space about seven-eighths as long as broad; metasomal terga two and three with weak basal fasciae; apical fasciae loose and broad; length 8.5-9 mm. - - - - *daleae* Cockerell

Malar space slightly more than one-half as long as broad; metasomal terga two and three with broad dense basal fasciae; apical fasciae dense and broad; length 9.5-10 mm.
- - - - - - - - - - - - - *desertiicola* Timberlake

DESCRIPTION OF THE SPECIES

GROUP I - productus

Colletes productus Robertson

productus ROBERTSON, 1891, Trans. Amer. Ent. Soc., vol. 18, p. 62; ROBERTSON, 1904, Canadian Ent., vol. 36, p. 278; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 38; LEONARD, 1926, Cornell Agric. Exper. Sta. Mem. No. 101, p. 1021; ROBERTSON, 1928, Flowers and Insects, p. 10; GRAENICHER, 1935, Ann. Ent. Soc. Amer., vol. 28, p. 301 (questionable); BRIMLEY, 1938, Insects North Carolina, p. 451.

Although this species keys out with the americanus group, a multitude of characters clearly indicate that it does not belong there, and both sexes are easily distinguished from the rest of that group by their exceptionally long malar spaces which are at least one and one-half times as long as wide in the males and as long as wide in the females. The great morphological difference in other characters indicates that the rimmed metapleural protuberance which is common to the americanus group may have been independently developed in productus.

MALE: length 9-11 mm., wing length 6 mm.

Hair of body very sparse, ochreus to pale grey; pile

of face clumped principally about antennal bases extending below to basal portion of clypeus; malar space and lower half of clypeus relatively free of hair and shiny; hair of vertex pale grey and sparse; lower genal areas with hairs sparse, long, and plumose; mesoscutum with pile sparse, ochreus to tawny yellow; scutellum with weak lateral and posterior fringe of pale grey pile; mesoscutum with ochreus pile extending down to posterior lobe of pronotum having a few darker hairs among pale hairs on upper mesopleura; hair of mesepisterna very sparse, long, and branched, never sufficiently dense to conceal surface; upper lateral edges of propodeum with a dense clump of pale grey hairs, lateral and posterior faces of propodeum free of pile; legs with short, pale grey pubescence even on posterior femora; first metasomal tergum with few sparse hairs not concealing surface to any extent, but with weak lateral fringes of greyish pile; metasomal tergal fasciae narrow and weak, easily removed by rubbing; fasciae present on first to fifth metasomal terga; discs of metasomal terga three to six with abundant, short, erect, ferrugineous to blackish pile; sternal fasciae composed of a few sparse, apical, ochreus hairs.

Antennae long, flagellar segments about one and one-half times as long as wide; malar space at least one and one-half times as long as wide; clypeus long, densely punctate basally, punctures becoming sparser towards the apex, latero-apical half shiny with very few punctures,

clypeus flattened slightly medially with a weak furrow evident at base; elongate malar space and clypeus forming a snout-like extension to head; vertex shiny with few punctures. Prothoracic spines very short and sharp; anterior and posterior edges of pronotum raised with disc shallowly concave, most evident at lateral edge; mesoscutum black and shiny with very sparse, shallow punctures, punctures approximately three puncture widths apart even at anterior extremity of mesoscutum, mesoscutum with small, impunctate area; scutellum with punctures coarse and dense on posterior half; mesepisterna shiny with obscure, shallow punctures on lower half, punctures becoming more distinct and much denser towards upper anterior face; metapleural prominence distinct but not reaching posterior margin of metapleura, rim dark brown, most conspicuous on anterior half; propodeum with lateral faces shiny, traversed by sharp rugae, latero-posterior edge abrupt, not rounded, with a weak ridge separating two surfaces, basal area of propodeum with shallow, quadrate pits; tegulae dark brown hyaline; wings dusky hyaline with scattered, fine, ochreus pubescence most noticeable apically, nervures dark brown; legs black at base, more brownish apically; hind basitarsi three times as long as wide. Disc of first metasomal tergum virtually impunctate, shiny; discs of terga two to four shiny and weakly folliculated.

FEMALE: length 10-11 mm., wing length 6-7 mm.

Body black with a weak covering of hair to head and thorax, abdomen sparsely pubescent; hair of face sparse, concentrated chiefly about antennal bases, vertex with a very few pale grey hairs; pile of upper genal areas dense white to pale grey, becoming sparser and longer towards ventral faces; hair of mesoscutum ochreus and very sparse, not concealing surface; scutellum with a dense rim of pale ochreus pile on lateral and posterior edges; posterior lobes of pronotum with a dense mat of whitish to grey hair; mesepisterna with sparse, elongate, branched pubescence, not concealing surface; upper lateral surfaces of propodeum with dense clumps of ochreus hair; weak pile on surface of metapleura; first metasomal tergum with but a few long, pale grey hairs on anterior face, very weak lateral fringes of hair on first tergum which do not reach to fascia, fascia white and sharply narrowed medially; metasomal terga two to five with fasciae not narrowed as on first tergum, a slight widening of fasciae laterally followed by an abrupt narrowing at extreme lateral margins; pile of legs short, moderately dense except on posterior femora where pile is long, curled, and pale grey; sternal fasciae absent; discs of metasomal terga three to six with short, dark ferrugineous to black pubescence giving surface an ironish tinge.

Antennae short and dark, basal flagellar segment about as long as second; malar space at least as long as wide;

clypeus shiny and sparsely punctate with large punctures over basal three-quarters, becoming shiny impunctate on apical lateral portions, a weak longitudinal median furrow most pronounced half-way between base and apex; vertex shiny impunctate; fascial foveae deep, shiny impunctate. Prothoracic spines short and blunt; pronotum expanded slightly laterally as a convex structure; mesoscutum with shallow, sparse punctures over surface, punctures at least three puncture widths apart, even on extreme anterior surface of mesoscutum, impunctate area of mesoscutum large and shiny; scutellum with deep, dense punctures over posterior half; mesepisterna with punctures shallow and obscure below, becoming deeper and denser towards the upper anterior portions, punctures on upper mesepisterna not more than one puncture width apart while those on posterior edges shallow and obscure; metapleural prominence strongly protuberant with a dark brown rim, only slightly concave beneath; lateral faces of propodeum dull with a few weak rugae near lateral posterior margin, basal area with distinct quadrate pits; tegulae dark brown; wings dusky hyaline with weak, ochreus pubescence on surface; legs dark brown to black at bases, tibiae and tarsi much more reddish brown; posterior basitarsi wide and shallowly concave on upper surface, about two and three-quarters times as long as wide. First metasomal tergum weakly and sparsely punctate, punctures on lateral portion of disc about two puncture widths apart, becoming shallower and sparser on

anterior and mid portion of disc; second and third metasomal terga with very weak, dense, follicle-like punctures giving them a roughened yet shiny appearance.

Distribution:

Georgia: Margaret; Helen; Sarah.

Alabama: Mobile; Kushla.

North Carolina: Bryson City; Grandfather Mountain; Aberdeen; Old Fort Road; Raleigh; Roaring Gap.

Kentucky: southeast Kentucky.

Virginia: Falls Church.

New Jersey: Lakehurst.

Massachusetts: Holliston; Needham.

Flight Records:

May 10 to July 26.

Plant Records:

Rhus glabra; Xolisma ligustrina.

The lectoholotype is located in the collection of the Illinois Natural History Survey.

Colletes arizonensis Stephen, new species

This new species from the mountains of Arizona resembles perilenous rather closely. The males have dark pile on the vertex, mesoscutum, and scutellum, and have the first metasomal tergum closely punctate. The females are rather distinctive in having the latero-apical elevated ridge on the apical ventral segment and abundant black pile on the thorax and head. An unusual character of both sexes is that the apical margin of the first metasomal tergum is bluntly rounded rather than with a broadly flattened fascial depression like that of each of the remaining metasomal terga. The fascia of the basal tergum is composed of short, white pile at the extreme apex.

MALE: length 8.25 mm., wing length 7 mm.

Pile of face long and white, sparse over clypeus, partially concealing surface, a few dark hairs below antennal bases; vertex with pile predominantly black, with a few pale grey to ochreus hairs intermixed; upper genal areas with pile short, pale grey, a few darker hairs intermixed on anterior face, pile becoming much longer, denser, and whiter below; mesoscutum with a sparse covering of pale grey and black pile, becoming more predominant on median discal area; scutellum with a very narrow peripheral fringe of fine, pale grey pile, abundant, long, black pile over median lateral areas; mesepisterna with pile long, white to pale grey, and fine; propodeum with tufts of long

pile at upper latero-posterior margin, pile with a strong admixture of black hairs, lateral and posterior faces with long, fine, pale grey, erect pile; first metasomal tergum with an apical fringe of short, white pubescence, not lying in a depressed fascia, lateral fringes of white pile short, reaching apical fascia, disc with abundant, short, erect, whitish pile, not at all concealing surface; metasomal terga two to five with fasciae narrow, weak, and white; metasomal terga four to six with abundant, erect, short, black pile on discs; metasomal sterna two to five with weak apical fringes of white to pale grey pile.

Antennae deep reddish brown to black, flagellar segments one and one-half times as long as broad; malar space one-half as long as broad; clypeus weakly convex with a shallow, longitudinal median sulcus, surface weakly, striately punctate, punctures most dense along clypeo-frontal regions and down median sulcus, punctures of lateral faces striate and separated by shiny interspaces; vertex shiny, impunctate. Prothoracic spines short and sharp, about as long as width across base; mesoscutum coarsely punctate over anterior one-half and lateral margins, impunctate area large; scutellum with a few coarse punctures about lateral and posterior margins, median discal area very sparsely punctate with broad, shiny interspaces, anterior one-half virtually impunctate; mesepisterna deeply punctate with shiny interspaces, punctures one-half puncture width apart; propodeum with basal area very shallowly, quadrately

punctate, lateral and posterior faces shiny and rather sharply punctate; tegulae black; wings dusky with abundant, very short, fine, deep fulvous pubescence, nervures deep brown; legs deep brown to black; posterior basitarsi four times as long as broad. First metasomal tergum densely punctate on lateral and apical margins, punctures fine and no more than one puncture width apart, punctures becoming very sparse and much finer on median and medio-apical faces where they are four to five puncture widths apart, apical margin not depressed to retain fascia, rather abruptly rounded with a very weak pre-apical groove; second metasomal tergum densely, coarsely folliculated, follicles about one follicle width apart; metasomal sterna shiny; seventh ventral plates much as in productus, however with latero-basal projection blunt and weakly rounded (See Fig. 2).

FEMALE: length 10 mm., wing length 7.75 mm.

Pile of face rather sparse, concentrated chiefly about antennal bases and along lower inner orbital margins, a few darker hairs intermixed below antennal bases; vertex with pile predominantly black, a few pale grey to dusky hairs intermixed; upper genal areas with pile short and pale grey, with a few longer, black hairs intermixed, pile becoming longer, whiter, and finer below; mesoscutum with a sparse covering of pale grey and black pile, black pile predominating on median discal area; scutellum with a narrow lateral and posterior fringe of white pile, having

abundant, erect, black pile medially; mesepisterna with an admixture of pale grey and black pile on pre-episterna and on upper mesepisterna, pile becoming longer and pure white below; propodeum with long tufts of intermixed black and pale grey pile on dorsal surface of latero-posterior margin, lateral and posterior faces with abundant, erect, pale grey pile; femora and tibiae of middle and hind pairs of legs with pile long and tinged with fulvous, abundant, short, black pile, particularly on upper surfaces of tibiae; first metasomal tergum with a dense apical fringe of short, white pubescence, lateral fringes very weak and white, barely reaching fascia, disc with abundant, erect, whitish pile; metasomal terga two to four with fasciae narrow, white, and weak; metasomal terga three to five with abundant, erect, deep fulvous to black pubescence; metasomal sterna with sparse, erect, pale grey pile, particularly on apical one-third of each sternum.

Antennae brown below, black above, long, flagellar segments about as long as wide; malar space three-eighths as long as wide; clypeus flattened with a deep longitudinal median sulcus, clypeus sparsely, coarsely, striately punctate, punctures one to three puncture widths apart, with broad, shiny interspaces; vertex shiny, impunctate; fascial foveae very deep, broadened slightly medially, extending above inner orbital margins, reaching almost half way from inner orbital margins to lateral ocelli. Prothoracic spines short and sharp, about as long as width

across the base; mesoscutum coarsely and densely punctate about anterior one-half and lateral margins, impunctate area small; scutellum finely, almost contiguously punctate, about extreme lateral and posterior faces, punctures becoming sparse in median discal area and absent on anterior one-third; mesepisterna densely and coarsely punctate, punctures no more than one-half puncture width apart with shiny, linear interspaces; propodeum with basal area very shallowly, quadrately pitted, lateral and posterior faces with numerous, sharp punctures, surface moderately shiny; tegulae deep brown to black; wings dusky, very densely covered with deep fulvous pubescence, nervures deep brown; legs deep brown to black; posterior basitarsi three and three-quarter times as long as broad. First metasomal tergum very finely punctate about lateral and apical margins, punctures becoming exceedingly fine and sparse on median and medio-apical surfaces where they appear to be folliculated rather than punctured; second metasomal tergum densely and finely folliculated; metasomal sterna dull, densely folliculated, last metasomal sternum with weak, elevated, lateral ridges, extending about apico-lateral margins to posterior margin, cutting off a narrow, shiny apical rim.

Distribution:

Holotype, male, south slope Tumacacori Mountain, 8 miles west of Nogales, Arizona, 6000 feet, in the chaparral zone, July 20, 1949 (F. Werner and W. Nutting); allotype,

female, top of Huachuca Mountains, Arizona, August 10, 1940 (E. S. Ross); paratypes: 2 males, south slope of Tumacacori Mountain, 8 miles west of Nogales, Arizona, 6000 feet, chaparral zone, July 20, 1949 (F. Werner and W. Nutting); 1 female, top of Huachuca Mountains, Arizona, August 10, 1940 (E. S. Ross).

The holotype is in the collection of the Museum of Comparative Zoology at Harvard University and the allotype is in the collection of the California Academy of Sciences.

Colletes perileucus Cockerell

perileucus COCKERELL, 1924, Proc. California Acad. Sci., ser. 4, vol. 12, p. 535; TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 202.

The species, originally described from a female from Guaymas, Sonora, Mexico, has been recorded from California by Timberlake. The present work extends the range to Arizona and southwestern Texas. It is difficult to separate the females of perileucus and albocinctus; however, perileucus has the prothoracic spines very long and sharp, and the second metasomal tergum not depressed basally. There is some doubt as to the correct association of the sexes of albocinctus and it is not at all impossible that the female designated as albocinctus may prove to be a subspecies of perileucus. The males of the two species are

markedly different, perileucus having the malar space one-half as long as wide and the first metasomal tergum shiny and impunctate, while in albocinctus the malar space is slightly longer than wide and the first metasomal tergum densely, coarsely punctate. The males of perileucus are distinguished from species C by having the black pile only on the scutellum and in having the first tergum shiny and impunctate. The females are readily distinguished from closely related species by having black pile restricted to the vertex, mesoscutum, and scutellum, and also in the impunctate condition of the first metasomal tergum.

MALE: length 10 mm., wing length 7.5 mm.

Pile of face long, dense, and pure white, completely concealing clypeus and lower face; vertex with pile long and pale grey; upper genal areas with the long, dense, and pale grey, becoming much whiter and finer below; mesoscutum with pile long, dense, and dusky; scutellum with a dense covering of long pile, particularly about lateral and posterior margins, pile dusky on extreme peripheral edge, strongly admixed with black medially; mesepisterna with pile long, fine, and white; propodeum with dense fringes of white pile on latero-posterior margins from the dorsal face to pedicle, lateral and posterior face with abundant, very long, white pile; pile of legs sparse, short, and white; first metasomal tergum with a dense, broad, white apical fascia, lateral fringes of long, white pile

extending to apical fascia, disc with abundant, long, erect, white to pale grey pile, partially obscuring the surface medially; metasomal terga two to five with fasciae narrower but pure white; metasomal terga four to six with abundant, erect, deep fulvous to black pubescence, not at all concealing surface; metasomal sterna two to five with dense apical fringes of white pile.

Antennae long and brown, flagellar segments one and one-half times as long as broad; malar space five-eighths as long as broad; clypeus weakly convex, rather densely and finely punctate, particularly on clypeo-frontal margins and down median longitudinal line, punctures coarser on apico-lateral faces and tending to be somewhat striate; vertex dull, densely and deeply punctate. Prothoracic spines long and sharp, at least one and one-half times as long as width across base; mesoscutum densely punctate over anterior and lateral margins, punctures becoming sparse medially, impunctate area large; scutellum coarsely punctate over posterior one-half, punctures becoming finer anteriorly to absent on extreme anterior face, punctures not at all striate; mesepisterna with punctures shallow, coarse, one-half puncture width apart above to one puncture width apart below, interspaces shiny; propodeum with basal area not at all pitted, weakly roughened, lateral and posterior faces dull and weakly roughened; tegulae brownish hyaline; wings very weakly dusky with very sparse, deep fulvous pubescence apically, nervures brown; legs deep

brown to black; posterior basitarsi four times as long as broad. First metasomal tergum shiny, sparsely folliculated, surface with a very deep bluish-black metallic lustre; metasomal sterna sparsely and finely folliculated; seventh ventral plate broad and elongate with median and lateral edges reflexed, much as in *producetus* (See illustration 5).

FEMALE: length 11.5 mm., wing length 8 mm.

Pile of face short, white, and dense, particularly between antennal bases and compound eyes; vertex with abundant, black pile, with a few intermixed pale grey hairs; upper genal area with pile predominantly short, pale grey, with a few intermixed, longer, black hairs, pile becoming much longer, finer, and whiter below, a wide band of appressed, white pubescence immediately posterior to each compound eye; mesoscutum with anterior and lateral margins having pile short, dense, and white, discal area with abundant, black hair intermixed; scutellum with a narrow fringe of pale grey pile about peripheral margins, median discal area predominantly covered with black pile; mesepisterna with pile long, fine, and white; propodeum with dense fringes of long, white pile on latero-posterior margins, extending down latero-posterior margin toward pedicle, lateral and posterior faces with a sparse covering of long, erect, white pile; pile of anterior two pairs of legs short and

white, posterior legs with pile long, plumose, and tinged with light ochreus; first metasomal tergum with apical fascia broad and pure white, interrupted weakly medially, lateral fringes of long, white pile just barely reaching apical fascia, disc with abundant, long, erect, whitish pile; metasomal terga two to four with fasciae broad, rather dense, and white; metasomal tergum five with a very narrow apical white fascia; second metasomal tergum with a distinct broad basal fascia, remnants of a white basal fascia just evident on third metasomal tergum; metasomal terga four and five with abundant, erect, black pile on discal areas; metasomal sterna with weak apical fringes of short, white pile, usually interrupted medially, discs of metasomal terga with a few, erect, pale grey hairs, not at all scopa-like.

Antennae brown, flagellar segments about as long as broad; malar space one-third as long as broad; clypeus very weakly convex with a longitudinal median sulcus, surface coarsely but rather sparsely punctate with punctures one to two puncture widths apart, most densely punctate along median sulcus, interspaces shiny; vertex moderately shiny with numerous, very shallow, fine punctures; fascial foveae deep, slightly broadened medially, extending dorsally above inner margin of the compound eye, dorsal margin extending but one-third of the way to lateral ocelli. Prothoracic spines very long and sharp, approximately three times as long as width across

the base; mesoscutum densely punctate, punctures one-half to one puncture width apart over anterior one-half and lateral margins, impunctate area large; scutellum rather coarsely punctate over posterior one-half, punctures sparser and finer, becoming absent, on anterior face, punctures not at all striate; mesepisterna closely, coarsely, and deeply punctate, punctures no more than one-half puncture width apart with shiny interspaces; propodeum with basal area very finely rugate, not at all quadrately pitted, dull, lateral faces shiny and finely marked, posterior face dull and weakly roughened; tegulae brownish hyaline; wings dusky with a moderate covering of deep fulvous pubescence, especially apically, nervures dark brown; legs deep reddish brown; posterior basitarsi four times as long as broad. First metasomal tergum shiny, impunctate except for a few, very shallow, sparse follicles, surface tinged with a deep bluish-black lustre; second metasomal tergum shiny, rather densely and very finely folliculated; metasomal sterna shiny, coarsely and very sparsely folliculated, follicles one to four follicle widths apart.

Distribution:

1 female, Guaymas, Mexico, April 7, 1921 (E. P. Van Duzee) (ectype); 3 males, El Mayor, Baja California, April, 1939 (C. D. Michener); 1 female, Wild Rose Canyon, Panamint Mountains, Inyo County, California, 7500 ft., May 28, 1937

(C. D. Michener), on Prosopis juliflora glandulosa; 1 female, Tombstone to Bisbee, Arizona, over 4500 ft., June 16, 1942 (H. A. Scullen); 1 male, 2 females, Big Bend Park, Hot Springs, Texas, April 11, 1949 (Michener-Beamer), on Prosopis juliflora.

The species has been taken only on flowers of mesquite, Prosopis juliflora, but Timberlake also records a single specimen taken at the flowers of Melilotus. As far as present records indicate, perileucus appears to be a spring and early summer species.

The holotype is located in the collection of T.D.A. Cockerell.

Colletes cercidii Timberlake

cercidii TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, pp. 198-200.

This and the following species, C. rudis Timberlake, deviate slightly from the typical members of the productus group and are placed here with some hesitancy. The seventh ventral plates and the capsules resemble those of the productus group except for certain specific characteristics. Both sexes of cercidii bear some resemblance to skinneri and gilensis, but do not have the coarse puncturation of either species. The males have the malar space one-half as long as wide; dark pile intermixed

on the vertex, mesoscutum, and scutellum; and the first metasomal tergum finely punctate. The females are similar to skinneri, but have the malar space shorter, the first metasomal tergum more finely punctate, the second metasomal tergum weakly depressed basally, and the second and third terga with faint basal fasciae.

MALE: length 10 mm., wing length 7.75 mm.

Pile of face very long, dense, and white, completely concealing clypeus and antennal basal region; vertex with pile long and sparse, strongly intermixed with black; genal areas with upper surface having sparse, short, pale grey pile with a few dark hairs intermixed on anterior margins, pile becoming much longer, finer, and whiter below; mesoscutum with pile predominantly pale grey to white, particularly about lateral and anterior faces, abundant, black pile intermixed over discal area, being most dense on median portions of disc; scutellum with a narrow fringe of pale grey pile about lateral and posterior faces, disc with pile predominantly long and black; mesepisterna with pile long, fine, and white; propodeum with long fringes of white pile on dorsal latero-posterior margins, lateral and posterior faces with abundant, long, erect, pale grey pile; legs with pile short, sparse, and white; first metasomal tergum with apical fascia broad, dense, and white, lateral fringes of long, white pile extending to apical fascia, disc with abundant,

erect, whitish pile; metasomal terga two to five with fasciae broad, dense, and white; metasomal terga four to six with disc having abundant, short, black, erect pile; metasomal sterna two to five having apical fringes of long, pale grey pile, pile much shorter medially.

Antennae long, reddish brown to brown, flagellar segments one and one-half times as long as broad; malar space one-half as long as broad; clypeus flattened medially with a very shallow, longitudinal median line, surface finely and densely punctate over basal one-half, punctures becoming much more striate apically, striate punctures extending virtually to apex; vertex shiny, sparsely punctate, punctures one to three puncture widths apart. Prothoracic spines absent; mesoscutum densely and coarsely punctate over anterior and lateral margins, punctures one-half puncture width apart, impunctate area small; scutellum rather densely and coarsely punctate over posterior three-quarters, anterior face shiny, impunctate; mesepisterna with punctures coarse and dense, having shiny interspaces, punctures one-half puncture width apart; propodeum with the basal area not at all pitted, having a few, very weak, irregular rugae, lateral and posterior faces dull and roughened; tegulae deep brown; wings dusky with abundant, deep fulvous pubescence, nervures brown; legs deep brown to black; posterior basitarsi four and one-quarter times as long as broad. First metasomal tergum finely and

rather densely punctate, punctures coarser laterally, becoming much finer on median surface, punctures one to two puncture widths apart; metasomal terga two and three coarsely and rather densely folliculated, interspaces shiny, second metasomal tergum very weakly depressed basally; metasomal sterna shiny, coarsely and sparsely folliculated; seventh ventral plates broadly subtriangular, with apical margin extended and rounded, median margins strongly reflexed, with basal hair bands extending across base and down median reflexed margins (See Fig. 3).

FEMALE: length 11.5 mm., wing length 8.5 mm.

Pile of face short and dense, particularly about antennal bases and along lower inner orbital margins; mesoscutum with pile pale grey about anterior and lateral faces with abundant, deep black pubescence on median discal area; scutellum with a very narrow fringe of pale grey pile about lateral and posterior faces, disc with abundant, erect, black pile; mesepisterna with pile long, fine, and pale grey; propodeum with dense fringes of long, pale grey pile on upper latero-posterior margins, extending down toward pedicle, lateral and posterior faces with abundant, erect, pale grey pile; anterior two pairs of legs with pile long and white, posterior pair of legs with abundant, long, plumose pile on femora and tibiae, strongly tinged with ochreus; first metasomal tergum with a very weak, white fascia, broadly interrupted medially, tergum with dense

lateral fringes of white pile extending to fascia, disc with abundant, erect, pale grey pile; metasomal terga two to four with the fasciae weak, broad, and white, occasionally interrupted or partially interrupted medially; metasomal terga four and five with abundant, short, deep fuscous to black, erect pile on discal areas; metasomal sterna two to four with very weak fringes of pale grey pile, discal area with abundant, erect, light ochreus pile, forming a weak scopa on metasomal sterna two and three.

Antennae reddish brown, long, flagellar segments one and one-eighth times as long as broad; malar space one-third as long as broad; clypeus flattened medially, very densely, coarsely, striately punctate to apex, interspaces shiny, a very faint trace of a median longitudinal sulcus; vertex shiny, sparsely punctate, with punctures one to three puncture widths apart with shiny interspaces; facial foveae narrow and deep, curved at dorsal extremity toward lateral ocelli, inner margin of curve reaching just barely over one-third of way from inner orbital margins to lateral ocelli. Prothoracic spines very short, vestigial; mesoscutum very coarsely and densely punctate over anterior and lateral margins, impunctate area very small, with punctures much sparser over median discal area; scutellum densely, finely, contiguously punctate about extreme lateral and posterior margins, punctures becoming much coarser and sparser toward anterior face, where they vary from one-half to one puncture width apart, anterior

one-third shiny, impunctate; mesepisterna deeply and densely punctate, with shiny interspaces, punctures one-half puncture width apart; propodeum with basal area smooth, very shallowly pitted, pits not at all uniformly quadrate, lateral and posterior faces roughened, dull; tegulae deep brown to black; wings dusky with abundant, deep fulvous pubescence, nervures dark brown; legs dark brown to black; posterior basitarsi three and three-quarters times as long as broad. First metasomal tergum finely and densely punctate, with shiny interspaces, punctures approximately one puncture width apart, punctures of apical and median faces much finer than lateral discal areas; second metasomal tergum very finely and densely folliculated, surface dull, second metasomal tergum with a weak basal depression; metasomal sterna shiny, coarsely and densely folliculated.

Distribution:

Timberlake records the holotype male and the allotype female from Box Canyon, Riverside County, California, on March 31, 1934, on Cercidium torreyanum, and the following paratypes on the same flower: 2 males and 2 females, Box Canyon, March 31 and April 13, 1934; 1 female, Oasis, Riverside County, March 27, 1934; 1 female, Gila Bend, Arizona, March 28, 1934 (Timberlake); 1 female, Morristown, Arizona, May 21, 1945; 1 male, Potholes, Imperial County, California, April 10, 1923 (E. P. Van Duzee).

I have seen the male paratype from Box Canyon, April 13, 1934, the female paratype from Gila Bend, Arizona, and the male paratype from Potholes. The types are located in the collection of the Citrus Experiment Station, Riverside, California.

Colletes rudis Timberlake

rudis TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 197.

The species is described from two males taken at Indio, California. It is a rather unique species with roughly quadrate seventh ventral plates. There is a slight resemblance to C. productus but it has only a few black hairs on the posterior portion of the scutellum; the malar space is shorter, approximately three-quarters as long as wide, and does not bear the metapleural prominence which is typical of productus.

MALE: length 10 mm., wing length 7 mm.

Pile of face long, dense, and white, completely concealing clypeus and antennal bases; vertex with pile rather dense and tinged with grey, a few darker hairs intermixed; genal areas with upper surface having abundant, short, pale grey pile, pile becoming much longer, finer, and whiter below; mesoscutum with pile long, dense, and predominantly pale grey, a few darker (not black) hairs intermixed on median discal area; scutellum with a very

dense lateral and posterior rim of pale grey pile, pile having a few black hairs intermixed; mesepisterna with pile long, fine, and white; propodeum with long, pale grey fringes of pile on upper latero-posterior margins, lateral and posterior faces with abundant, erect, pale grey pile; legs with pile short, sparse, and white; first metasomal tergum with apical fascia broad and white, lateral fringes of pale grey pile weak, barely reaching to apical fascia, disc with abundant, erect, pale grey pile; metasomal terga two to four with fasciae broad, weak, and pure white; fascia of fifth metasomal tergum very weak, evident only as an apical fringe of fine, white pile; metasomal terga three to six with abundant, very short, black, erect pubescence, not at all concealing surface; metasomal sterna two to five with long apical fringes of white pile, pile somewhat shortened medially.

Antennae long, deep brown to black, flagellar segments one and one-quarter times as long as broad; malar space three-quarters as long as broad; clypeus weakly convex, flattened medially, very finely and densely punctate over basal three-quarters, punctures becoming somewhat striate and much sparser on latero-apical margins; vertex dull, densely and deeply punctate. Prothoracic spines very short; mesoscutum very coarsely and densely punctate over anterior and lateral faces, impunctate area very small with numerous coarse punctures lying irregularly on median area; scutellum finely, densely, contiguously

punctate about lateral and posterior edges, punctures becoming coarser and sparser anteriorly, never more than one-half puncture width apart to anterior face; mesepisterna coarsely, densely, almost contiguously punctate, with shiny, linear interspaces, interspaces becoming dull below; propodeum with basal area shallowly, irregularly, quadrately pitted, lateral and posterior faces dull and roughened; tegulae deep brown to black; wings with abundant, deep fulvous pubescence, nervures brown; legs black; posterior basitarsi four times as long as broad. First metasomal tergum densely punctate with moderately fine punctures, punctures becoming much sparser and finer medially and on anterior portions, punctures approximately one-half to one puncture width apart laterally; second metasomal tergum very densely and finely punctate or coarsely folliculated, punctures one-half to one puncture width apart; metasomal sterna shiny, finely and sparsely folliculated; seventh ventral plates roughly quadrate with lateral and median margins weakly reflexed (See Fig. 4).

Distribution:
Holotype, male, 5 1/2 miles west of Indio, California, February 18, 1946 (P. H. Timberlake), at the flowers of Encelia farinosa.

I have only seen the holotype. However, Timberlake records male paratype taken at the same place and at the same time as the holotype. The types are in the collection of the Citrus Experiment Station, Riverside, California.

Colletes gilensis Cockerell

gilensis COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 41; COCKERELL, 1897, Bull. Univ. New Mexico, vol. 24, p. 24; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 42; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 42; COCKERELL, 1899, Entom., vol. 32, p. 155; COCKERELL, 1901, Ann. Mag. Nat. Hist., ser. 7, vol. 7, p. 125; COCKERELL, 1901, Ent. News, vol. 12, p. 41; COCKERELL, 1902, Amer. Nat., vol. 36, p. 810; COCKERELL, 1904, Entom., vol. 37, p. 6; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292; COCKERELL, 1907, Bull. New Mexico Agric. Exper. Sta., No. 24, p. 21; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 23; COCKERELL, 1909, Psyche, vol. 12, p. 87; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 398.

The species occurs in the southwestern part of the United States and in northern Mexico, presumably from Colorado south to New Mexico and Arizona and east to the Big Bend Country of Texas. It can readily be distinguished by its very large size and the very coarse puncturation of the metasomal terga, but may be confused with compactus Cresson. The males, however, have a short malar space, about one-half as long as broad, while the female lacks the elevated ridge on the last metasomal sternum.

MALE: length 14 mm., wing length 10 mm.

Face with pile coarse, dense, and pure white, completely concealing the clypeus, a few darker hairs along inner orbital margins; vertex with mixture of black and light pile; genal areas with upper surface having a few black hairs but predominantly white, pile becoming very long, white, and plumose on lower surfaces; mesoscutum with strong mixture of black pile; scutellum with abundant, long, black and pale grey pile on posterior and lateral faces; mesepisterna with long, fine, plumose pile, white below with a few black hairs on pre-episterna; propodeum with dorso-lateral margins with dense clump of long, pure white pile, lateral and posterior faces with abundant, very fine, erect, white pile; legs with pile white, sparse, and long; metasomal terga one to five with broad, dense, white apical fasciae; metasomal tergum one with lateral fringes of pure white pile to apical fascia, disc and anterior face with abundant, fine, erect pile; metasomal tergum two with few very fine hairs over basal portion; metasomal terga three to six with abundant, short, black, erect discal pile; metasomal tergum six lacking apical fascia; metasomal tergum seven with deep brown, appressed pile; metasomal sterna two to five with broad apical fasciae of pure white pubescence, broadest medially on terga two to four; metasomal sterna three to five with abundant, long discal pile tinged with ochreus.

Antennae long and brown, flagellar segments one and one-half times as long as broad; malar space one-half as long as broad; clypeus weakly convex with sharp median longitudinal sulcus, sulcus with close punctures, lateral clypeal areas coarsely and densely punctate over basal half, punctures sparse with broad shiny interspaces apically; vertex densely punctate with shiny interspaces. Prothoracic spines long and sharp, about one and one-half times the width across the base; mesoscutum densely and coarsely punctate, punctures contiguous to one-half puncture width apart over anterior and lateral margins, impunctate area small; scutellum with anterior one-quarter shiny and sparingly punctate, posterior three-quarters coarsely and densely punctate to posterior margin where punctures are contiguous; mesepisterna coarsely and densely punctate with shiny interspaces, tending to striately punctate above; propodeum with basal area broad with weak, quadrate pits, lateral and posterior faces dull, roughened, and weakly rugose; tegulae deep brown; wings dusky with abundant, long, brownish pubescence over apical half, nervures brown; legs dark brown; posterior basitarsi four and one-half times as long as broad. Metasomal tergum one coarsely and densely punctate, punctures no more than one-half puncture width apart, a weak median longitudinal impunctate ridge transversing disc, extreme apical margin raised as a flange-like apex with a shallow pre-apical groove, most evident at medial area; metasomal terga two and three densely and

coarsely punctate, punctures one-half to one puncture width apart; metasomal tergum two sharply depressed basally; metasomal terga three to six with punctures of variable coarseness with shiny interspaces; metasomal sterna shiny and sparsely follioulated or weakly punctate; seventh ventral plates transversely quadrate with latero-basal process long (See Fig. 6).

FEMALE: length 14.5 mm., wing length 11 mm.

Face with pile sparse, white, and erect, a few hairs overhanging clypeus from fronto-clypeal suture; vertex with mixture of long black and shorter tawny pile; genal areas with upper surface having mixture of black and tawny pile, becoming longer and much finer to pure white below; mesoscutum with mixture of black and pale grey pile extending to extreme anterior surface; scutellum with strong covering of long, black pile intermixed with shorter, finer, pale grey hairs particularly about extreme margins; mesepisterna with pile long, fine, and pure white, a few darker hairs on pre-episterna; propodeum with dense latero-posterior clumps of long, white pile, lateral and posterior faces with few, scattered, long, fine, white hairs; anterior pair of legs with long, white femoral pile, tibiae and tarsi with pile tinged with ochreus, second and third pairs of legs with pile tinged with ochreus, a few, short, spine-like hairs on upper surface of posterior tibiae; metasomal terga one to five with dense, white apical fasciae, much

narrowed on tergum five; metasomal tergum one with long lateral fringes of white pile, disc and anterior face with few, short, fine hairs; second metasomal targum with weak basal fascia; metasomal terga three and four with few, short, white hairs forming rudiments of weak basal fascia; metasomal terga two to five with discal areas having short, black, erect pubescence; metasomal tergum six with pile golden to brown and appressed; metasomal sterna with apical margins having few, short, fine, white hairs, discal areas with abundant, fine, erect pile tinged with ochreus.

Antennae reddish brown, flagellar segments as long as broad; malar space three-eighths as long as broad; clypeus weakly convex with median longitudinal sulcus not reaching apex or base, sulcus with few, coarse, contiguous punctures, lateral faces coarsely and striately punctate, closely punctate about base and sparsely punctate with broad shiny interspaces apically; vertex shiny, finely punctate; fascial foveae narrow and long, broadened sharply medially, dorsal portions pointed and curved, reaching two-thirds of the way to lateral ocelli. Prothoracic spines long, about one and one-half times as long as width across base; mesoscutum densely and coarsely punctate, punctures no more than one-half puncture width apart about anterior and lateral margins, impunctate area small; scutellum with anterior one-quarter shiny and sparingly punctate, posterior three-quarters becoming more densely and finely punctate toward posterior margins; mesepisterna coarsely and densely

punctate with punctures becoming much finer on posterior faces, almost rugosely punctate with shiny interspaces; propodeum with basal area broad, shallowly, quadrately pitted, lateral and posterior faces dull and weakly roughened; tegulae brown; wings dusky with abundant, long, brownish pubescence over apical one-third, nervures brown; legs brown; posterior basitarsi three and one-third times as long as broad. Metasomal tergum one coarsely and densely punctate, punctures varying from one-half to one puncture width apart, apical margin reflexed slightly with a shallow pre-apical groove most evident medially, shallow longitudinal median impunctate ridge; metasomal tergum two with punctures deep and sparser than on tergum one, basal area sharply depressed, apical margin slightly reflexed; metasomal tergum three with punctures shallow, finer, and separated by one to three puncture widths; metasomal terga four and five shiny and finely punctate; metasomal sterna shiny, coarsely follioulated, apical margins hyaline, impunctate.

Distribution:

Colorado: Pueblo; Grand Junction; Colorado Springs; Boulder; Greeley; Halls Valley.

New Mexico: Las Vegas; White Mountains; Gila; Jemez Springs; Socorro County.

Arizona: Oak Creek Canyon; Huachuca Mountains; Grand Canyon; Flagstaff.

Texas: Davis Mountains; Chisos Mountains, Big Bend National Park.

Flight Records:

This appears to be an aestival species, occurring from June 15 to August 21.

Plant Records:

Melilotus alba, Petalostemon candidus, P. flavescens, P. oligophyllus, Potentilla thurberi, Solidago canadensis.

The holotype is located in the collection of T.D.A. Cockerell.

Colletes skinneri Viereck

skinneri VIERECK, 1903, Trans. Amer. Ent. Soc., vol. 29, p. 58; COCKERELL, 1905, Psyche, vol. 12, p. 86; COCKERELL, 1906, Bull. Amer. Mus. Nat. Hist., vol. 22, p. 425; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 291; Swenk, 1908, Univ. Nebraska Studies, vol. 1, p. 21; CRESSON, 1928, Mem. Amer. Ent. Soc., vol. 5, p. 64.

This species is most likely to be confused with C. gilensis or vandykei. However, both sexes can be readily distinguished by the malar spaces, which surpass both the aforementioned species in length. The malar space of the male is approximately one and three-eighths times as long as broad, and that of the female three-quarters as long as broad, much longer than its closest relative, gilensis, in which this space is almost linear. I have only seen one

specimen other than the types of skinneri and this a female taken from the Catalina Mountains of Arizona.

MALE: length 10 mm., wing length 7.5 mm.

Pile of face long, most dense about antennal bases, clypeus incompletely concealed with a long, overhanging fringe of pile from clypeo-frontal regions, pile mostly pale grey with a few darker hairs intermixed below and mesad to antennal bases; vertex with a mixture of dark and pale grey pile, sparse; genal areas with a weak covering of short, pale grey to light ochreus pile above, pile becoming much longer, denser and finer below; mesoscutum with a strong admixture of black pile, particularly on median discal area, the pile about anterior and lateral faces predominantly pale grey to tinged with yellowish; scutellum with a narrow fringe of pale grey pile about lateral and posterior faces, pile of disc predominantly black; mesepisterna with a sparse covering of long, fine pile, pile tending to grey to tinged with ochreus above, becoming much whiter to pale grey below; propodeum with long fringes of dusky pile along upper latero-posterior margins, lateral and posterior faces with abundant, long, erect, pale grey pile; legs with pile long, sparse, and pale grey; first metasomal tergum with apical fascia weak and white, broadly interrupted medially, lateral fringes of pale grey pile weak, barely extending to apical fascia, disc with abundant, erect, pale grey pile; metasomal terga two to five with fasciae weak and pure

white, often interrupted medially; metasomal terga three to six with discs having abundant, very short, black pile intermixed with a few, longer, pale grey hairs, not at all concealing surface; metasomal sterna two to four with narrow apical fringes of white to pale grey pile.

Antennae deep reddish brown, flagellar segments one and one-third times as long as broad; malar space one and three-eighths times as long as broad; clypeus convex with a longitudinal median sulcus, rather densely and coarsely, striately punctate about latero-frontal regions and down longitudinal median sulcus, latero-apical regions sparsely punctate with broad, shiny interspaces; vertex deeply and coarsely punctate with shiny interspaces, punctures contiguous to one-half puncture width apart, compound eyes weakly petiolate as viewed from above. Prothoracic spines very short and sharp; mesoscutum densely and coarsely punctate over anterior one-half and lateral margins, punctures no more than one-half puncture width apart, impunctate area small; scutellum densely and coarsely punctate over posterior two-thirds, punctures contiguous except along median longitudinal line, anterior face sparsely punctate to virtually impunctate; mesepisterna densely, weakly striately punctate above, dull, punctures becoming less striate on lower faces and interspaces more shiny; propodeum with basal area being shallowly, quadrately pitted, lateral and posterior faces dull and roughened; tegulae brownish hyaline; wings dusky, very densely covered with a deep

fulvous pubescence, nervures dark brown; legs reddish brown to black; posterior basitarsi four times as long as broad. First metasomal tergum very densely and coarsely, almost contiguously punctate over entire surface, punctures slightly sparser along median anterior face, surface rather dull; second metasomal tergum densely punctate, punctures one-half to one puncture width apart, being much finer and denser medially and basally; metasomal sterna shiny, sparsely and weakly folliculated; seventh ventral plates closely resembling those of gilensis but having median fringe much longer and denser.

FEMALE: length 11 mm., wing length 8 mm.

Pile of face long, white to pale grey with a few, darker hairs intermixed below antennal bases; clypeus with a weak covering of overhanging, pale grey pile; vertex with pile predominantly long and black amongst finer, pale grey hairs; occiput with abundant, erect, pale grey pile, pile becoming much longer, finer, and whiter below, with a very weak rim of short, appressed, white pubescence immediately posterior to each compound eye; mesoscutum with abundant, black pile intermixed with pale grey, black pile becoming most predominant on median discal area; scutellum with a lateral and posterior fringe of long, pale grey pile, discal area covered with erect, black pile; mesepisterna with pile long, fine, pale grey to white; propodeum with long fringes of white to pale grey pile on latero-posterior

margins, extending down toward the pedicle, lateral and posterior faces with pile long, fine, and erect; pile of anterior two pairs of legs has long, white fringes from the femora, posterior legs with pile rather sparse, long, plumose, and tinged with ochreus, particularly on femora and tibiae; first metasomal tergum with apical fascia narrow and white, broadly interrupted medially, lateral fringes of pale grey pile weak and barely reaching apical fascia, disc with sparse, erect, whitish pile, pile short; metasomal terga two to five with fasciae white and broad, sharply narrowed medially; metasomal terga three to five with abundant, erect, black pile on discal area, pile becoming much longer on apical terga; metasomal sterna with very weak fringes of short, pale grey pile on extreme apical margins.

Antennae brown, flagellar segments about as long as broad; malar space three-quarters as long as broad; clypeus weakly convex, flattened medially to having a very weak, longitudinal median groove, clypeus rather coarsely and densely, striately punctate about clypeo-frontal regions and along median depressed sulcus, latero-apical portions shiny and very sparsely punctate; vertex densely punctate with shiny interspaces; fascial foveae sharply delineated, narrow, curving inward from dorsal margins of compound eyes toward lateral ocelli, reaching almost one-half way to lateral ocelli from upper inner orbital margins. Prothoracic spines short and heavy; mesoscutum very densely

and coarsely punctate over entire surface, punctures no more than one-half puncture width apart, impunctate area absent; scutellum with extreme posterior and lateral margins finely, contiguously punctate, dull, punctures much coarser over discal area with shiny, linear interspaces, scutellum punctate to anterior margin, a weak longitudinal median groove extending length of scutellum; mesepisterna densely, weakly striately punctate, punctures no more than one-half to one puncture width apart, surface dull; propodeum with basal area narrow and very shallowly pitted, lateral and posterior faces dull and roughened; tegulae deep brown; wings dusky with abundant, fulvous pubescence, nervures brown; legs brownish black; posterior basitarsi four times as long as broad. First metasomal tergum very densely and coarsely punctate, punctures one-half to one puncture width apart except on a median longitudinal impunctate line where punctures are very sparse to absent, interspaces shiny; second metasomal tergum very finely punctate or coarsely folliculated, interspaces shiny; metasomal sterna coarsely and rather densely folliculated on apical half of each sternum, surface shiny.

Distribution:

Holotype, female, Beulah, New Mexico (Skinner); allotype, Beulah, New Mexico, August 18 (T. D. A. Cockerell); 1 female, Catalina Mountains, Arizona, August 21, 1942 (E. C. Van Dyke).

The holotype is located in the Academy of Natural Sciences of Philadelphia.

Colletes vandykei Timberlake

vandykei TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 200.

This species is based on a single male taken from the Santa Rita Mountains of Arizona and bears close resemblance to species C, differing in its exceptionally large size and in having abundant, black pile extending well down the mesepisterna. The apical margins of the first metasomal terga in both species are very similar in that the fasciae do not lie in abruptly depressed margins but rather fringe a broadly rounded apex; also in both species there is evidence of a very narrow and weak pre-apical groove, particularly laterally. Genitalically the species is very similar to species C, skinneri, and gilensis. The seventh ventral plates of vandykei are much more quadrate than either of the above-mentioned species and have the latero-basal projections much shorter and blunt.

MALE: length 13 mm., wing length 9.25 mm.

Pile of face long about antennal bases and along lower inner orbital margins, with a strong admixture of black pile immediately below antennal bases; clypeus covered partially by an overhanging fringe of pale grey pile; vertex with a mixture of black and pale grey pile, particularly in

ocellar triangle; upper genal areas with pile predominantly pale grey, however having a few darker hairs on anterior face, pile becoming much longer, finer, and pure white below; mesoscutum strongly covered with a mixture of black and pale grey pile, black predominating medially; scutellum with but a very narrow, lateral and posterior fringe of pale grey pile, discal area with abundant, long, black pile; mesepisterna with an admixture of pale grey, dark, and black pile on upper half, pile predominantly light to pale grey below; propodeum with very dense fringes of black and white pile on upper latero-posterior margins, dense fringes extending down toward pedicle and becoming whiter ventrally, lateral and posterior faces with abundant, erect, dusky pile; pile of legs short, sparse, and predominantly white, with a weak admixture of black pile most evident on fringes of pro-femora; first metasomal tergum with a narrow apical fascia of pure white pile, interrupted medially, lateral fringes of pale grey pile weak, barely reaching apical fascia, disc with abundant, very short, whitish pile; metasomal terga two to four with narrow, white apical fasciae, broadly interrupted medially; metasomal terga five and six with abundant, erect, black pile on the discal areas; metasomal sterna two to five with very weak apical fringes of pale grey pile.

Antennae deep brown to black, flagellar segments one and one-quarter times as long as broad; malar space one-half as long as broad; clypeus convex, weakly flattened

medially, surface very coarsely, striately punctate about latero-basal edges and down a median longitudinal line to apex, latero-apical portions shiny, impunctate; vertex densely punctate, punctures contiguous to one puncture width apart, interspaces shiny. Prothoracic spines very short and sharp, about as long as width across base; mesoscutum very densely and coarsely punctate, punctures almost contiguous on anterior two-thirds and lateral margins, impunctate area absent; scutellum densely and coarsely punctate over entire surface, a deep longitudinal median groove running to anterior margin; mesepisterna with punctures coarse and dense, one-half to one puncture width apart with interspaces shiny; propodeum with basal area having a number of weak, longitudinal rugae, not at all forming quadrate pits, lateral and posterior faces dull and roughened; tegulae deep brown to black, rather finely and densely punctate; wings dusky with abundant, deep fulvous pubescence, nervures dark brown; legs black; posterior basitarsi four times as long as broad. First metasomal tergum densely covered with moderately coarse punctures, punctures much finer than those of mesoscutum and approximately one puncture width apart, interspaces shiny, apical margin very weakly reflexed, giving it a blunt, rounded appearance and also giving an impression of a very shallow, pre-apical groove, most evident laterally; metasomal terga two, three, and four very coarsely and sparsely folliculated, follicles varying from one to three

follicle widths apart, interspaces shiny, black; metasomal sterna shiny, coarsely and sparsely folliculated; seventh ventral plates much more quadrate than either skinneri or gilensis and having latero-basal projections short and blunt (See Fig. 8).

Distribution:
Holotype, male, Madera Canyon, Santa Rita Mountains, Arizona, August 15, 1940 (E. C. Van Dyke).

The type is in the collection of the California Academy of Sciences.

GROUP II - compactus

Colletes compactus compactus Cresson

compactus CRESSON, 1868, Proc. Boston Soc. Nat. Hist., vol. 12, p. 166; PATTON, 1879, Proc. Boston Soc. Nat. Hist., vol. 20, p. 142; ROBERTSON, 1895, Trans. Amer. Ent. Soc., vol. 22, p. 115; VIERECK, 1903, Ent. News, vol. 14, p. 120; ROBERTSON, 1904, Canadian Ent., vol. 36, p. 275; COCKERELL, 1905, Psyche, vol. 12, p. 86; ROBERTSON, 1906, Science, vol. 23, p. 309; LOVELL, 1907, Can. Ent., vol. 39, p. 363; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 25; SMITH, 1910, Ann. Rept. New Jersey State Mus. for 1909, p. 694; ROBERTSON, 1914, Ent. News, vol. 25, p. 70; VIERECK, 1916, Conn. Geol. Nat. Hist. Bull., vol. 22, p. 740;

CRESSON, 1916 Mem. Amer. Ent. Soc., vol. 1, p. 107; RAU and RAU, 1916, J. Animal Behaviour, vol. 6, p. 367; RAU, 1922, Trans. Acad. Sci. St. Louis, vol. 24, p. 37; CRIDDLE et al, 1924, Rept. Ent. Soc. Ontario, vol. 33, p. 99; ROBERTSON, 1926, Psyche, vol. 33, p. 116; ROBERTSON, 1926, Ecology, vol. 7, p. 378; LEONARD, 1926, Cornell Agric. Exper. Sta. Mem., No. 101, p. 1021; ROBERTSON, 1928, Flowers and Insects, p. 10; PEARSON, 1933, Ecolog. Monogr., vol. 3, p. 384; BRIMLEY, 1938, Insects of North Carolina, p. 451; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 400.

This is one of the more robust forms of the genus which is distributed throughout North America south of the Boreal Zone. The male is readily distinguished by the long malar space and deep median longitudinal sulcus of the clypeus, while the female is the only species having strong elevated lateral ridges on the last metasomal sternum. There is a progressive decrease in the ratio of black to white pile from the type locality in the east to the western Great Plains, but through this range the black pile of the thoracic dorsum is quite evident.

MALE: length 11 mm., wing length 8 mm.

Face with pile long and dense about antennal bases, much shorter and appressed along lower inner orbital margins, abundant, long, white pile overhanging clypeus from fronto-clypeal suture and concealing upper and lateral

surfaces; inner orbital margins with mixture of long, black hairs below antennal bases; vertex with mixture of black and light ochreus hairs; genal areas with upper surface with mixture of black and dusky pile, becoming longer, denser, and pure white on lower surfaces; mesoscutum with mixture of long, weakly plumose, dusky and black pile, black pile predominating over posterior portions of disc; scutellum with pile very long, plumose, and mostly black; mesepisterna with pile pale grey, weak admixture of black hairs above and on pre-episterna; propodeum with strong latero-posterior fringes of pale grey pile, lateral and posterior face with abundant, long, erect, pale grey pile, not concealing surface; legs with pile sparse, fine, and white; metasomal terga one to five with broad apical fasciae weakly covered with pure white, short pubescence; metasomal tergum one with fascia narrow, almost absent medially, lateral fringes of long, white pile, discal area and anterior face with abundant, fine, erect pile; metasomal terga four to six with scattered, long, erect, ferrugineous hairs; metasomal tergum seven with pile brown, appressed; metasomal sterna two to five with broad apical fasciae of pure white pile.

Antennae long and brown, flagellar segments one and three-quarters times as long as broad; malar space as long as broad; clypeus long with a deep longitudinal median sulcus bordered by two, lateral, shiny, sparsely punctate rims, a few shallow punctures along medial sulcus; vertex

dull, sparsely and weakly punctured with narrow, shiny interspaces. Prothoracic spines short and sharp, about as long as the width across the base; mesoscutum densely and coarsely punctate with punctures one-half to one puncture width apart on anterior and lateral faces; scutellum with anterior one-half impunctate except for a few, shallow, puncture-like depressions, surface shiny, posterior one-third closely and densely punctate with punctures contiguous on posterior margin; mesepisterna coarsely and closely punctate, punctures about one puncture width apart with shiny interspaces; propodeum with basal area broad, not pitted but with irregular striae, lateral and posterior faces finely roughened, not striate or rugose; tegulae light brown; wings whitish hyaline with scattered, fine, light pubescence apically, nervures brown; legs reddish brown; posterior basitarsi five and one-half times as long as broad. Metasomal tergum one densely and coarsely punctate over entire surface, punctures almost contiguous with linear, shiny interspaces; metasomal tergum two with punctures deep and coarse as first tergum but separated by one to two puncture widths, basal area sharply depressed, apical fascia in smooth hyaline depression most evident laterally; metasomal terga three to six shiny, weakly punctate or folliculated; metasomal sterna shiny, finely and densely folliculated apically; seventh ventral plates roughly quadrate, with median, lateral, and basal margins

reflexed, discs densely covered with pile (See Fig. 9).

FEMALE: length 13 mm., wing length 9 mm.

Face with strong mixture of black and pale grey pile about antennal bases and lower frontal region; clypeus bare, except for a few overhanging hairs from fronto-clypeal margin; vertex with pile long, predominantly black with finer, intermixed, pale grey hairs; genal areas with upper surfaces having black pile predominating, pile becoming longer, denser, and pure white on lower surfaces; mesoscutum with dense covering of black and white pile; scutellum with pile long and black about anterior and lateral margins; mesepisterna with pile long, white, and plumose, a few dark hairs on extreme upper surfaces; propodeum with latero-posterior margins with strong fringe of pale grey to light ochreus pile, occasionally with a few, scattered, dark hairs, lateral and posterior faces with few, fine, light hairs; legs with pile white, except on posterior femora and tibiae where it is tinged with ochreus and having some short, spine-like, dark hairs on upper faces; metasomal tergum one with weak apical fascia only evident laterally; metasomal terga two to four with fasciae broad, pure white, and weak; metasomal terga three to five with a few, erect, long, brown hairs on disc; metasomal tergum six with pile deep brown to black and appressed; metasomal sterna with a few, light ochreus hairs along apical margin.

Antennae brown, flagellar segments as long as broad; malar space three-eighths as long as broad; clypeus with median portion flattened to weakly concave, surface roughened and dull with scattered, coarse, shallow punctures separated by one to two puncture widths; vertex finely and densely punctate with shiny interspaces. Prothoracic spines absent; mesoscutum coarsely and densely punctate over anterior half and lateral margins, punctures almost contiguous, median impunctate discal area large; scutellum with anterior two-thirds shiny, impunctate, posterior one-third with punctures obscure and dense; mesepisterna coarsely and densely punctate with shiny interspaces; propodeum with basal area broad, not pitted but with numerous longitudinal striae, lateral and posterior faces dull and weakly roughened; legs deep reddish brown; posterior basitarsi three and three-quarters times as long as broad; metasomal tergum one with disc finely and densely punctate, punctures varying from one-half to one puncture width apart; metasomal tergum two with disc very finely punctate, punctures approximately one puncture width apart and slightly smaller than those on tergum one, apical fascia in sharply declivous hyaline depression; metasomal terga three to five with discs shiny, weakly punctate or folliculated; metasomal sterna two to four coarsely and sparsely folliculated, one to three follicle widths apart, apical margins light hyaline; last metasomal sternum with two, strongly elevated,

lateral ridges extending from base to apex, converging slightly and most pronounced apically.

Distribution:

The subspecies is found throughout America south of the Boreal Zone and east of the Great Divide, occurring in greatest abundance in the eastern, particularly seaboard, portions of the United States and Canada. On the basis of present collections, c. compactus is not known to occur in the deep south, but a male from Flagstaff, Arizona, as well as material from Meadow Valley, Mexico, suggests that the species may extend along the foothill regions into the Arizona and Mexican Plateaus.

Marginal localities include: Roundhill, Nova Scotia; St. John, New Brunswick; Bryson City, North Carolina; Atlanta, Georgia; Ozark Lake, Missouri; Manhattan, Kansas; southern Arizona; Milwaukee, Wisconsin; and Midland County, Michigan.

Flight Records:

The species has been recorded as flying between July 10 (New Jersey) and November 11 (North Carolina), reaching its maximum abundance during September and early October.

Plant Records:

Aster multiflora and Solidago are the only two plants this bee has been recorded as visiting. Robertson

suggests it is oligotropic on Compositae.

The holotype is located in the Academy of Natural Science of Philadelphia.

Colletes compactus hesperius Swenk

hesperius SWENK, 1906, Ent. News, vol. 17, p. 257; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 28.

compactus TIMBERLAKE (not Cresson), 1951, Wasmann J. Biol., vol. 9, p. 196.

Colletes compactus hesperius Swenk

The form, originally described by Swenk in 1906, was reduced to subspecific rank in 1908. C. c. hesperius has the black pile of the body reduced and even absent in some cases, and although there is considerable variation in size, both sexes are larger than their eastern counterparts. There is some question in my mind as to the exact location of the area of intergradation of these two subspecies, for specimens from Flagstaff, Arizona, Meadow Valley, Chihuahua, Mexico, and Golden, Colorado, all exhibit characteristics intermediate between the Washington type and typical c. compactus. I have a single male taken at Flagstaff, Arizona, which resembles c. compactus closely except for a slight reduction in the amount of black pile present on the head and thoracic dorsum. Another male from Murray,

Utah, has the black pile absent from the head and present only on the mesoscutum and scutellum; this cline appears to terminate in the more northerly specimens from Washington and British Columbia, which have the pile of the body all white except for a few dark hairs on the scutellum. The length and density of the pile of the body varies inversely with the presence of black.

In the females this feature is even more evident. Although I have no Arizona material, two females from Escalante and Bryce Canyon, Utah, have a strong admixture of black pile on the mesoscutum and vertex. This ratio of black to white decreases in material from northern Utah and southern Oregon where the pile of the inner orbital margins is tawny grey to dusky and that of the vertex dusky with a few black hairs intermixed.

The single female from Chimney Gulch, Golden, Colorado, deviates strongly from c. compactus of the western plains and bears a close resemblance to material from Washington and British Columbia, for there is no black pile on the vertex or along the inner orbital margins and the pile of the mesoscutum is predominantly dusky to tawny grey.

MALE:

Similar to c. compactus except in having inner orbital margins with a few dark hairs, not black; mesoscutum and scutellum with few black hairs; apical

metasomal fasciae broader and denser; malar space one and one-quarter times as long as broad.

FEMALE:

As in c. compactus except in having face with no dark pile and much larger (14-15 mm.); vertex with few to no black hairs; mesoscutum and scutellum with black pile restricted to median discal area; malar space slightly longer, about one-half as long as broad; second metasomal tergum sharply depressed basally, containing a broad basal fascia at least as wide as apical fascia.

Distribution:

Arizona: Flagstaff.

Utah: Bryce Canyon; Escalante; Murray; Springville; Granger; Taylorsville; Mills.

Idaho: Parma.

California: Old Station, Shasta County; Gazelle, Siskiyou County; Mohave Desert.

Oregon: Echo; Rufus, Sherman County.

Washington: Hunt's Junction; Almota, Whitman County; Yakima.

British Columbia: Oliver; Walhachin; Vernon; Pentieton; Lillooet; Okanagan.

Colorado: Chimney Gulch, Golden.

Flight Records:

The species has been taken between August 30 and October 15.

The types are located in the collections of the University of Nebraska.

GROUP III - latitarsis

Colletes latitarsis Robertson

latitarsis ROBERTSON, 1891, Trans. Amer. Ent. Soc., vol. 18, p. 60; ROBERTSON, 1892, Trans. Acad. Sci. St. Louis, vol. 5, p. 571; ROBERTSON, 1904, Canadian Ent., vol. 36, p. 275; ROBERTSON, 1906, Science, vol. 23, p. 309; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 17; GRAENICHER, 1910, Bull. Publ. Mus. Milwaukee, vol. 1, p. 228; BANKS, 1912, Ent. News, vol. 23, p. 107; ROBERTSON, 1926, Ecology, vol. 7, p. 387; ROBERTSON, 1926, Psyche, vol. 33, p. 116; LEONARD, 1926, Cornell Agric. Exper. Sta. Mem., No. 101, p. 1021; ROBERTSON, 1928, Flowers and Insects, p. 10; GRAENICHER, 1930, Ann. Ent. Soc. Amer., vol. 23, p. 154; PEARSON, 1933, Ecolog. Monog., vol. 3, p. 384; GRAENICHER, 1935, Ann. Ent. Soc. Amer., vol. 28, p. 301; BRIMLEY, 1938, Insects of North Carolina, p. 451.

This species is distinctive but may be confused with willistoni Robertson. The males can readily be distinguished by having the posterior basitarsi two and one-quarter times as long as broad and by having the fifth sternal segment with its posterior margin strongly curved

anteriorly from two posterior lateral angles. The female has the second tarsal segment of each hind leg short, approximately as long as broad, while the same segment in willistoni is one and one-half times as long as broad. In the female of latitarsis the posterior basitarsi are very broad, about two and one-quarter times as long as broad and the posterior tibiae are clothed with a mixture of tawny and black pile.

MALE: length 9.5 mm., wing length 6.25 mm.

Face with pile pure white, long, and dense about antennal bases and along inner orbital margins; clypeus bare except for a few long hairs overhanging from lateral margins; vertex with a few, dark, long hairs, but predominantly short, white pile; genal areas with pile pure white, becoming much longer and whiter on lower regions; mesoscutum with strong admixture of black and white pile; scutellum with the disc predominantly covered with black pile, lateral and posterior margins with fringe of longer, pure white pile; mesepisterna with the pile long, fine, and white; propodeum with strong clump of black and white pile on latero-posterior margins, lateral and posterior faces of propodeum with short, white pile not concealing surface; anterior femora and tibiae with very long, white pile, second and third pairs of legs with the pile short, sparse, and tawny; metasomal terga one to five with broad, white apical fasciae; first metasomal tergum with dense

lateral fringes of white pile extending to fascia, anterior face and discal area with abundant, erect, fine, white pile not concealing surface; metasomal terga two to five with abundant, short, deep fuscous to black pile on disc; metasomal tergum six with pile semi-appressed and deep golden; metasomal sterna one to five with apical fringes of ochreus pile, almost comb-like; tergo-sternal margin with abundant black pile; metasomal sternum five with apical fringe of deep fuscous to black pile.

Antennae short, reddish brown, middle flagellar segments short, as long as broad; malar space seven-eighths as long as broad; clypeus flattened with shallow longitudinal median sulcus, surface shiny with a number of obscure longitudinal punctures; vertex shiny with scattered fine punctures. Prothoracic spines long and sharp, longer than width across base; mesoscutum closely and coarsely punctate, punctures almost contiguous over entire surface with shiny, almost linear, interspaces, impunctate area absent; scutellum with anterior surface sparsely punctate with fine punctures, punctures becoming coarser and more dense toward posterior margin, interspaces shiny; mesepisterna deeply and coarsely punctate, punctures almost contiguous above, tending to one-half puncture width apart below; propodeum with basal area deeply, quadrately pitted, lateral and posterior faces shiny and weakly striate, posterior face separated from lateral by a weak longitudinal stria; tegulae deep brown; wings

dusky with abundant, short, fine, brown pubescence, nervures brown; legs brown; posterior basitarsi two and one-quarter times as long as broad. Metasomal terga one and two deeply punctate with punctures verying from one to two puncture widths apart, becoming finer and denser toward extreme apical margins; metasomal terga three to five shiny and weakly folliculated; metasomal sterna shiny with apical margins of metasomal terga three and four weakly emarginate medially; metasomal sternum five strongly excavated from two lateral margins; seventh ventral plates as illustrated (Fig. 10).

FEMALE: length 10 mm., wing length 6 mm.

Face with pile white, short, and concentrated principally along lower inner orbital margins; clypeus bare; vertex with mixture of black and white pile; genal areas with pile short and pure white; mesoscutum with mixture of black and white pile over entire disc; scutellum with the disc completely covered with short, black pile, lateral and posterior margins with a fringe of short, white pile; mesepisterna with pile fine and white; pro-episterna with mixture of black and white pile; propodeum with lateral and posterior faces having abundant, short, white pile not concealing surface, latero-posterior margins with strong clump of pure white pile; legs with pile pale grey to deep fuscous, posterior femora and tibiae with pile mainly black; metasomal terga one to four

with apical fasciae pure white; first metasomal tergum with weak lateral fringes of white pile, disc with few, fine, white, erect hairs; metasomal terga three to five with discs covered with short, fine, erect, black pile; metasomal tergum six with pile semi-appressed, black to deep golden; metasomal sterna with mixture of erect, black and ochreus pile, not fasciated.

Antennae brown, short; flagellar segments three-quarters as long as broad; malar space one-third as long as broad; clypeus flattened with a deep median longitudinal sulcus, shiny with elongate obscure punctures; vertex shiny and sparsely punctate. Prothoracic spines long and sharp, longer than width across base; mesoscutum very coarsely, densely punctate with punctures one-half puncture width apart, almost contiguous on extreme anterior and lateral faces, impunctate area absent; scutellum with punctures smaller on anterior one-third, becoming larger and much more dense toward posterior face; mesepisterna shiny, deeply punctate with punctures approximately one-half puncture width apart; propodeum with the basal area deeply, quadrately pitted, lateral and posterior faces dull and finely striate; tegulae deep brown; wings dusky with abundant, fine, brown pubescence, nervures brownish black; legs reddish brown; posterior basitarsi two and one-half times as long as broad; second tarsal segment of hind leg as long as broad at widest points. Metasomal tergum one closely and deeply punctate over

entire surface, becoming finer and denser on extreme apical margins; metasomal tergum two with punctures much finer and denser than those of first; metasomal terga three to five densely folliculated; metasomal sterna dull and finely and densely folliculated; metasomal sterna four and five with apical margins emarginate medially.

Distribution:

The species is sparingly distributed over eastern America to the tablelands of Arizona. Marginal areas include: Forsythe, Montana; Pierre, South Dakota; Faribault, Minnesota; St. Croix County, Wisconsin; Douglas Lake, Michigan; South Miami, Florida; West Point, Mississippi; Quemada, Texas; Huachuca, Arizona; and Wray, Colorado.

Flight Records:

Records from Florida and Texas indicate the species begins flying in March and continues until August. With the increase in latitude to the north and altitude to the southwest the emergences are retarded with the latest seasonal record as September 29 from a Carlinville, Illinois, specimen. The main flights occur during the months of July, August, and early September.

Plant Records:

The bee principally visits members of the genus Physalis but is not oligotropic on that group. Records

include: Asclepias incarnata, Ceanothus americana, Medicago sativa, Melilotus alba, Physalis lanceolata, P. virginiana, Polygonum Hydropiper, Solidago, and Symphoricarpos occidentalis.

The lectotypes are in the collection of the Illinois State Natural History Survey.

Colletes punctipennis maurus Stephen, new subspecies

punctipennis COCKERELL, 1914, Ann. Mag. Nat. Hist., ser. 8, vol. 14, p. 11; COCKERELL, 1917, Ann. Mag. Nat. Hist., ser. 8, vol. 19, p. 481.

This species was originally described by Cresson from specimens taken in Mexico south of Mexico City. An examination of the original description and of a male from Yucatan convinces me that Texas specimens exhibit sufficient differences to merit subspecific recognition. The pile of the face, mesothorax, and tibiae is strongly intermixed with black pile while p. punctipennis has no black hair in these areas. The prothoracic spines of p. maurus are shorter and more triangular and the puncturation of the vertex is more distinct. Generally the pile of the body has a much greater intermixture of black in the Texas specimens, and the isolation of this sub-tropical area in the Brownsville region may restrict the dark population to a very small locale.

MALE: length 11.5 mm., wing length 8.5 mm.

Pile of face predominantly long and white about antennal bases and along inner orbital margin; clypeus with a few, overhanging, long, pale grey to white hairs, a strong admixture of erect, black pile laterad and ventrad to antennal bases; vertex with pile black mixed among finer, pale grey pile; upper genal areas with pile short, pale grey, with a few dark intermixed hairs, pile becoming much longer, denser, and whiter below; mesoscutum with a very strong admixture of black and pale grey pile over entire surface; scutellum with pile predominantly black except for a weak peripheral fringe of white pile; mesepisterna with an admixture of black and pale grey pile above, pile becoming longer, finer, and whiter below; propodeum with a dense fringe of long, pale grey and black pile at upper latero-posterior surface, lateral and posterior faces with pile shorter and whiter; pile of legs long and rather sparse with almost equal quantity of black and white pile intermixed; first metasomal tergum with apical fascia very weak and narrow, often interrupted medially, pile forming a weak white fringe, lateral fringes of pile weak, short, and white, barely reaching apical fascia, disc with sparse, erect, pale grey pile; metasomal terga two to four with fasciae very weak, narrow, and white, often interrupted medially; metasomal terga two to six with abundant, erect, black pile on discal areas; metasomal sterna with a weak covering of fine, dark pile, particularly

on apical portions of each sternum.

Antennae long, yellowish brown below to deep brown-black above; malar space five-eighths as long as broad; clypeus with a deep longitudinal median sulcus, most evident at central portion, surface very coarsely, striately punctate to apex, interspaces shiny; vertex dull, finely and densely punctate; fascial foveae distinctly depressed above, barely reaching to top of inner margin of compound eyes. Prothoracic spines roughly triangular, barely as long as width across base; mesoscutum very coarsely and densely punctate, almost contiguous anteriorly to one-half puncture width apart posteriorly, impunctate area absent; scutellum very densely and coarsely punctate to anterior margin, punctures contiguous and not at all striate; mesepisterna deeply, coarsely punctate, punctures one-half puncture width apart with shiny interspaces; propodeum with basal area deeply, longitudinally quadrate, lateral and posterior faces dull and roughened; tegulae deep brownish black; wings dusky with abundant, long, deep fulvous pubescence over entire surface, wings pictured, pictures extending posterior to the stigma and apically from radial sector to anterio-apical margin, weakly pictured about apical ends of veins, median one and cubitus one; legs extremely robust, deep black; posterior basitarsi twice as long as broad. First metasomal tergum very densely and coarsely punctate, punctures one-half to one puncture width apart, interspaces shiny, a weak elevated median

impunctate longitudinal ridge; second metasomal tergum with punctures slightly finer and denser than those of first tergum, not more than one-half puncture width apart, tergum abruptly depressed basally; apical fasciae of metasomal terga two to four lying in smooth, black, impunctate margins; metasomal sterna with apical portion finely folliculated, discal areas shiny; seventh ventral plates and capsule complex, much as in latitarsis (See Fig. 11).

Distribution:

Holotype, male, Brownsville, Texas, July 3, 1938 (R. H. Beamer); paratypes, 3 males; Brownsville, Texas, October 16, 1908 (Mitchell and Bishopp); Palm Forest, Brownsville, Texas, March 27, 1951 (R. H. Beamer); Brownsville, Texas, January 2 to 13, 1928.

The holotype is in the Snow Entomological Collection of the University of Kansas.

GROUP IV - simulans

Colletes simulans Cresson

This species most closely resembles fulgidus Swenk, particularly in the western part of its range where the females are at times barely distinguishable. The mountain representatives of the simulans group differ slightly from fulgidus in having the puncturation of the first metasomal

tergum much closer and coarser; however, there are exceptions to this, and the only accurate method of determination is by genitalic examination of the males. The penis valves of simulans are broad, truncate apically, and the gonostyli are slightly more than four times as long as their apical width. In fulgidus the penis valves are weakly rounded and the gonostyli are three times as long as broad measured at the same position. The seventh ventral plate of simulans undergoes a great deal of variation in the regions between the western great plains and California. Generally it is much broader and has a long lateral basal projection near the basal hair tufts in the west and north. As Timberlake suggests, the trapezoidal shape of the seventh ventral plate is exaggerated in the Swenk illustration from California; however, the more northerly material from Wyoming, Montana, and British Columbia comes closer to that illustrated, suggesting there may be a north-south cline in this character rather than the east-west variability suggested by others. In addition to the puncturation of the first metasomal tergum, the females differ from fulgidus in having the procoxal spines approximately four times as long as broad, and the scutellum with many longitudinal striae over the posterior three-quarters of the surface.

MALE: length 10 mm., wing length 7 mm.

Pile of face is rather long and pale, concealing clypeus; pile of vertex and upper genal areas variable,

becoming much longer, finer, and pure white below; mesoscutum and scutellum with abundant, long, erect pubescence, weakly tinged with ochreus and occasionally mixed with black pile on mesoscutol and scutellar discs; pile of mesepisterna is long, fine, and light grey; propodeum with long, dense fringes of pale grey pile at latero-posterior margins, extending half way down to pedicle, lateral and posterior faces sparsely covered with erect, pale grey pile; legs with pile sparse, long, and white to pale grey; first metasomal tergum with apical fascia weak, rather narrow, and pale grey, lateral fringes of pile extending to the apical fascia, sometimes interrupted towards apex, discal area with abundant, long, erect, pale grey pile, not at all concealing surface; metasomal terga two to five with fasciae broad and white; metasomal sterna with very narrow apical fasciae of short, white pubescence.

Antennae long, deep reddish brown, flagellar segments approximately one and one-half times as long as broad; malar space five-eighths as long as broad; clypeus weakly convex, finely and densely punctate over the basal one-half and down a median longitudinal line, punctures not at all striate, the apico-lateral margins shiny, sparsely punctate with weak striate punctures; vertex dull, densely punctate. Prothoracic spines short and roughly triangular; mesoscutum densely, coarsely punctate over anterior one-half and lateral margins; scutellum with discal area sparsely punctate with shiny interspaces, punctures approximately

one to two puncture widths apart, becoming much sparser towards anterior margin; wings dusky, nervures brown; legs deep brown to black; posterior basitarsi four times as long as broad. Second metasomal tergum with a distinct basal depression; seventh ventral plates roughly quadrate, expanded or lobate towards the apical end, a long, lateral projection from the basal area of each plate; penis valves broadly truncate apically; gonostyli slightly more than four times as long as apical width.

FEMALE: length 11.5 mm., wing length 8.25 mm.

Pile of face erect, sparse, and pale grey, concentrated principally about antennal bases; vertex with some dark pile intermixed; mesoscutum with dense fringes of light ochreus pile about anterior one-quarter and lateral margins, discal area with abundant, black, erect pile; scutellum with a peripheral fringe of light ochreus pile, discal area with abundant, erect, black pile; mesepisterna with pile tinged with ochreus above, becoming much longer and whiter below; pile of legs long and tinged with ochreus; first metasomal tergum with a very narrow, weak apical fascia, evident only laterally, lateral fringes rather weak, evident only on interior lateral face, not usually reaching apical fascia, discal area sparsely covered with a few pale grey hairs; metasomal terga two to five with fasciae broad and white, second metasomal tergum with distinct basal fascia of white pubescence; metasomal

sterna two to four with very weak fringes of light ochreus pile, not at all fasciate.

Antennae reddish brown, flagellar segments approximately as long as broad; malar space one-quarter as long as broad; clypeus weakly convex, very coarsely and striately punctate to apex, interspaces shiny; vertex finely punctate with shiny interspaces. Prothoracic spines long; mesoscutum very coarsely, densely, almost rugosely punctate over anterior one-half and lateral margins, surface dull, impunctate area very small; scutellum rather densely and striately punctate, striae extending towards anterior margin, dull, striate punctures almost reaching anterior margin; mesepisterna very coarsely and densely punctate, punctures contiguous above, becoming slightly sparser below, dull; propodeum with basal area quadrately pitted, lateral face shiny and weakly sculptured, posterior face dull and roughened; wings dusky, with abundant, light ochreus pubescence apically, nervures brown; legs deep reddish brown; posterior basitarsi three times as long as broad. Metasomal sterna shiny, finely and sparsely folliculated.

It is difficult to separate the subspecies of simulans on the basis of the named forms. The division into the four subspecies which follows is not entirely satisfactory since simulans was originally described from specimens labeled merely Colorado and exhibiting features intermediate between two of the subspecies. I believe the typical

material to be most characteristic of the Rocky Mountain subspecies and therefore have recognized simulans simulans as the form occurring in the mountainous regions from Arizona and New Mexico north into Montana. A rather good representation of this subspecies from the mountains of Arizona and western New Mexico has the mesoscutum devoid of any dark hairs and the seventh ventral plate more strongly lobate than in those specimens occurring in the northern portion of the Great Divide. Specimens from Zion National Park in southern Utah are basically similar to the Arizona material but in northern Utah, Nevada, and western Colorado the dark hair of the mesoscutum becomes more prominent and the seventh ventral plate much more trapezoidal. This increase in the amount of black pile and the more trapezoidal shape of the seventh ventral plate progresses to the north, with the plate becoming widest in specimens taken from the valleys of Washington and British Columbia. The females taken in Arizona exhibit a marked difference from other populations of this species in having the prothoracic spines roughly triangular and strongly tending towards obliqueness. The first metasomal tergum of s. simulans is much more coarsely punctate than the others and the pile of the scutellum and the mesoscutum is predominantly ochreus to ochreus grey. The oblique nature of the prothoracic spine is found in much of the material taken i n Colorado, particularly in specimens from the higher altitudes between 4000 and 9000 feet, and this tendency is

also evident in some of the southern Utah specimens.

The obliqueness to the prothoracic spine is lost in s. nevadensis occurring in California, Oregon, Washington, and British Columbia, where the spine is quite long and sharp.

The material taken from the foothill regions east of the Continental Divide to the Atlantic seaboard I have considered as mostly armatus Patton, with s. miamiensis or intergrades toward it occurring in the extreme south. Two males from El Paso, Texas, are intermediate between s. simulans and s. miamiensis genitalically but differ in having much less dark hair on the mesoscutum and scutellum; in fact there are only a few darker hairs intermixed on the scutellar disc. Several specimens representing both sexes have been taken at Hattiesburg, Mississippi, and prove to be an intermediate form between those from El Paso and those from Florida, s. miamiensis Mitchell.

Were it not for the abundance of black pile on the thoracic dorsum of the eastern armatus, this subspecies would be very difficult to distinguish from the populations of s. simulans occupying the Arizona-New Mexico plateaus. In the material taken from the foothill regions of Texas, Nebraska, and the Dakotas, the prothoracic spines lose the oblique nature of s. simulans completely and become much longer and sharper. Accompanying this elongation in the spine there is a progressive increase in the amount of black pile on the mesoscutum, scutellum, and the vertex of

the head, reaching a stage of almost completely black along the Atlantic seaboard. Here, too, the prothoracic spine reaches its greatest length, extending laterally well out beyond the edges of the head.

Thus examination of the two sexes would seem to indicate that the entire group may have spread from the southwestern area and moved north, west, and east to occupy North America, subspeciating as it moved. The absence of any closely related species in the Palearctic region (see Noskiewicz, 1936) would tend to substantiate the southerly origin of this complex. Assuming this hypothesis plausible it would put the intermediate form of the simulans group, simulans, in the southwestern and Rocky Mountain region of the United States and perhaps northwestern Mexico, with simulans nevadensis occurring west of the Rocky Mountain region and armatus and simulans miamiensis east of this region.

Colletes simulans simulans Cresson

simulans CRESSON, 1868, Proc. Boston Soc. Nat. Hist., vol. 12, p. 168; COCKERELL, 1898, Zool., ser. 4, vol. 2, p. 313; VIERECK, 1903, Trans. Amer. Ent. Soc., vol. 29, p. 57; SWENK, 1904, Canadian Ent., vol. 36, p. 94; COCKERELL, 1905, Psyche, vol. 12, p. 86; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 30, p. 291; CRESSON, 1916, Mem. Amer. Ent. Soc., vol. 1, p. 109; TIMBERLAKE, 1943,

Bull. Amer. Mus. Nat. Hist., vol. 81, p. 397.

armatus, COCKERELL (not Patton), 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 41; COCKERELL, 1897, Bull. New Mexico Agric. Exper. Sta., no. 24, p. 21; COCKERELL, 1898, Zool., ser. 4, vol. 2, p. 311; COCKERELL, 1898, Bull. Dennison Univ., vol. 11, p. 42; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 42; COCKERELL, 1899, Ent. News, vol. 10, p. 4; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292.

bigeloviae COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 40; COCKERELL, 1897, Bull. Univ. New Mexico, vol. 24, p. 21; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 42; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 42; COCKERELL, 1899, Entom., vol. 32, p. 155; COCKERELL, 1901, Ann. Mag. Nat. Hist., ser. 7, vol. 7, p. 125; VIERECK, 1903, Trans. Amer. Ent. Soc., vol. 29, p. 62; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 291; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 53; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 397.

brevispinosus VIERECK, 1903, Trans. Amer. Ent. Soc., vol. 29, p. 62; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 291; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 54; CRESSON, 1928, Mem. Amer. Ent. Soc., vol. 5, p. 58; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 397.

coloradensis COCKERELL, 1933, Ann. Ent. Soc. Amer., vol. 26, p. 41; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 397.

tegularis SWENK, 1905, Canadian Ent., vol. 37, p. 304; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 58; CRIDDLE et al., 1924, Rept. Ent. Soc. Ontario, vol. 33, p. 99; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 397.

The males of this subspecies have the pile of the mesoscutum and scutellum pale grey or tinged with light ochreus and a few dark hairs intermixed, these dark hairs not black. The tegulae and the nervures are a light hyaline brown. The first metasomal tergum is very densely and coarsely punctate with the punctures no more than one puncture width apart. The seventh ventral plates are roughly quadrate tending to weakly trapezoidal in the mountains of the central United States. The females have the prothoracic spines rather long and tending towards obliqueness apically, becoming much shorter and tending to be much more oblique in the mountains of New Mexico and Arizona, which at present is the southern known extremity of its range. The first metasomal tergum is very densely punctate, punctures no more than one puncture width apart.

Distribution:

This subspecies ranges from Montana southward into the mountains of New Mexico and Arizona. It has been recorded from:

Montana: Bozeman; Weeksville.

Wyoming: Rock Springs; the mountains near Sheridan.

Colorado: Creede; Glenwood Springs; Greeley; San Luis Valley; Wray.

New Mexico: Albuquerque; Las Cruces; Sacramento Mountains; Mescalero; San Ignacio; Willow Creek.

Arizona: Flagstaff; Grand Canyon; Houserock Valley; Humphrey's Peak; Oak Creek Canyon; Sabino Basin; Santa Catalina Mountains; San Pedro River, Fairbanks.

Flight Records:

Specimens have been caught during the period August 2 to September 23.

Flower Records:

Aster, Bigelovia Wrightii, Grindelia, Senecio.

The holotype is located in the Academy of Natural Sciences of Philadelphia.

Colletes simulans miamiensis Mitchell

simulans miamiensis MITCHELL, 1951, J. Elisha Mitchell Sci. Soc., vol. 67, pp. 236-7.

The subspecies, although far removed from the Continental Divide, agrees more closely with s. simulans than s. armatus, but ranks as subspecifically distinct on the basis of few dark hairs on the thoracic dorsum, weakly truncate and short prothoracic spines, and denser pubescent covering of the wings. The seventh ventral plates resemble those of s. simulans in their shorter latero-basal projections and broad basal areas.

The suggested relationship to s. simulans is enhanced by the presence of intermediate forms from Hattiesburg, Mississippi, and El Paso, Texas, and the apparent absence of the species in the east-central states.

On the basis of these data it appears that the Florida specimen represents the eastern terminus of an east-west cline extending through Texas and the southern states.

This monotype was examined only once and unfortunately returned before an adequate description was compiled. To supplement the notes made at the time of examination, the original description follows.

"Male--Length 9 mm.; length and breadth of face subequal; eyes convergent below; length of malar space about one-third its breadth; length of antennal segments about 1 1/2 times their breadth, basal segment of

flagellum much shorter than the second, flagellum brownish, but the basal segment much darker; clypeus closely and deeply punctate, upper portion hidden by the dense pubescence; face above antennae dull, rugoso-punctate, vertex shining, finely and irregularly punctured; cheeks closely and finely punctate beneath the copious pubescence; pubescence whitish on head and thorax, slightly yellowish above, mesonotum and scutellum with a few inconspicuous, fuscous hairs; lateral angles of prothorax not spined; metapleural protuberance not carinate; legs dark, metatarsi slender; spurs yellowish; tegulae yellowish-ferruginous; wings lightly infuscated, nervures and stigma piceous; third submarginal cell slightly exceeding the second, the latter receiving first recurrent slightly basad of middle, third receiving second recurrent about one-third from tip; punctures of mesonotum deep and coarse, close over most of disc, but sparse in center of posterior half; scutellum shining, coarsely and deeply punctate, anterior margin impunctate, but punctures quite close along hind margin; pleura dull, rugoso-punctate anteriorly and above, with more distinct but close and coarse punctures below; lateral and posterior faces of propodeum coarsely reticulate, dorsal face short, with closely parallel striae; base of abdomen deeply and distinctly but finely punctate, punctures well separated but not sparse; second and following terga becoming successively more minutely and closely punctate; apical margins of terga slightly depressed, reddish-hyaline

beneath the thin, white faseiae, discal pubescence on second and following terga fuscous, very short, suberect and inconspicuous; seventh sternum and genital armature essentially the same as in the other forms of simulans.

"Holotype: Male, Miami, Fla., Jan. 21, 1924 (J. Pearson) Am. Mus. "

Colletes simulans armatus Patton

inaequalis CRESSON (not Say), 1868, Proc. Boston Soc. Nat. Hist., vol. 12, p. 166; CRESSON, 1872, Trans. Amer. Ent. Soc., vol. 4, p. 248.

armata PATTON, 1879, Proc. Boston Soc. Nat. Hist., vol. 20, p. 143; PATTON, 1879, Bull. U. S. Geol. Geog. Survey, ser. 5, no. 3, p. 365; ROBERTSON, 1895, Trans. Amer. Ent. Soc., vol. 22, p. 116; BRIDWELL, 1899, Trans. Kansas Acad. Sci., vol. 16, p. 209; PIERCE, 1904, Univ. Nebraska Studies, vol. 4, p. 24; MORICE, 1904, Trans. Ent. Soc. London, p. 27, pl. 9, fig. 57, 58, Colletes sp.?; ROBERTSON, 1904, Canadian Ent., vol. 36, p. 275; ROBERTSON, 1906, Science, vol. 23, p. 309; LOVELL, 1907, Canadian Ent., vol. 29, p. 364; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 53; GRAENICHER, 1910, Bull. Pub. Mus. Milwaukee, vol. 1, p. 228; SMITH, 1910, Ann. Rept. New Jersey State Mus. for 1919, p. 694; ROBERTSON, 1914, Ent. News, vol. 25, p. 69; GIBSON and CRIDDLE, 1919, Rept. Ontario Ent. Soc., p. 20; ROBERTSON, 1926 Ecology, vol. 7, p. 387; ROBERTSON,

1926, Psyche, vol. 33, p. 116; LEONARD, 1926, Cornell Agric. Exper. Sta. Mem., no. 101, p. 1021; ROBERTSON, 1928, Flowers and Insects, p. 10; GRAENICHER, 1935, Ann. Ent. Soc. Amer., vol. 28, p. 301; BRIMLEY, 1938, Insects of North Carolina, p. 451; PROCTOR, 1938, Biol. Surv. Mount Desert Region, pt. 6, p. 440 & pt. 8, p. 503; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 397 (simulans sbsp.).

scitula PATTON, 1879, Proc. Boston Soc. Nat. Hist., vol. 20, p. 144; ROBERTSON, 1895, Trans. Amer. Ent. Soc., vol. 22, p. 116 (armatus).

spinosa ROBERTSON, 1891, Trans. Amer. Ent. Soc., vol. 18, p. 60; ROBERTSON, 1895, Trans. Amer. Ent. Soc., vol. 22, p. 116 (armatus).

The Swenk (1908) synonymy in which he lists bigeloviae and brevispinosus as armatus is in error and as Timberlake (1943) suggests they are synonyms for the better known simulans simulans.

The males have black hair intermixed on the vertex, mesoscutum, and scutellum. The prothoracic spine is long and sharp, approximately one and one-half times as long as the width across the base. The mesepisterna are obscurely punctate and roughened, and the first metasomal tergum is very finely punctate, with punctures two to three puncture widths apart. In many specimens there is an admixture of

black pile along the lower inner orbital margins. The seventh ventral plate is particularly quadrate and lobate apically. (See Fig. 14).

In the females the pile of the vertex, the mesoscutum, and the scutellum is predominantly black. The prothoracic spines are very long and sharp, protruding well beyond the sides of the head; the fascial foviae are deep and shiny; the tegulae are deep brown, almost black; the scutellum is more striate than punctate to the anterior margin; and the mesepisterna are more coarsely punctate.

Distribution:

This species is found in abundance throughout the northern Great Plains to the Atlantic seaboard, recorded southward to North Carolina. Marginal localities include King's County, Nova Scotia; Fort Coulonge, Quebec; Aweme, Manitoba; Bilby, Alberta; Malcolm, Nebraska; and Raleigh, North Carolina.

Flight Records:

The subspecies flies from August 2 until October 1.

Plant Records:

Aster, Solidago, Solidago nemoralis.

The neotypes are located in the Snow Entomological Collections of the University of Kansas.

Colletes simulans nevadensis Swenk

nevadensis SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 52.

simulans nevadensis TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 402; TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 207.

The male has the pile of the face, the thorax, and the abdomen weakly tinged with light yellow, the pubescence, particularly the fascia, is denser and the fascia somewhat broader. The prothoracic spines are slightly longer than the width across the base. The seventh ventral plates are trapezoidal in shape, much more so than the quadrate form from the southwestern mountains. The malar space is slightly reduced, being scarcely half as long as wide.

The female has the pile of the body weakly tinged with yellow. The malar space is slightly reduced. The prothoracic spines are long and sharp, protruding to the edge of the head. The first metasomal tergum has the punctures finer and slightly sparser, ranging from two to three puncture widths apart.

Distribution:

The subspecies is found in the lowland areas throughout Utah, Nevada, California, Washington, Oregon, and British Columbia. It undoubtedly occurs in the valleys of Idaho and possibly western Colorado but has not yet been taken

there. Peripheral localities include: Penticton and Oliver in British Columbia southward to Riverside and Los Angeles Counties in California.

Flight Records:
The species flies from August 7 until the 26th of November. A great number of specimens determined as nevadensis taken particularly from the mountains of California have proved to be fulgidus Swenk. I believe simulans nevadensis to occur only in the lowland areas, being replaced by fulgidus in the mountains.

Plant Records:
Baccharis emoryi, Chrysothamnus, Ericameria ericoides, Eriogonum, Gutierrezia californica, Isocoma veneta var. vernonioides, Lepidospartum, Melilotus alba.

The holotype is located in the collections of the University of Nebraska.

Colletes angelicus Cockerell

angelicus COCKERELL, 1905, Bull. So. California Acad. Sci., vol. 4, p. 32; CRIDDLE et al, 1924, Rept. Ent. Soc. Ontario, vol. 33, p. 99; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 402.

Both sexes of this species can readily be distinguished by having the prothoracic spine obliquely truncate and by having its posterior margin protruding to or beyond the anterior. It most closely resembles fulgidus Swenk. Criddle et al reported angelicus from British Columbia in 1924. I doubt the validity of this determination although to my knowledge I do not have their specimen before me. The species seems to be restricted to southern California where it appears to replace fulgidus. The male genitalia closely resemble that of fulgidus except for minor differences in the hair pattern. Some variation exists in the presence of black pile on the mesoscutum and scutellum. In all specimens having a deep ochreus pile on the thoracic dorsum dark hairs are evident; however in those having the pile tawny, dark hairs are not discernible. This would seem to indicate that the dark pile is deep ochreus rather than black. In the majority of the males the sternal fasciae are continuous, however in a few the fasciae are interrupted medially. The female can be readily separated from other members of the simulans group on the basis of the prothoracic spine peculiarity and the very long procoxal spines.

MALE: length 11 mm., wing length 7.5 mm.

Pile of face dense and long, tinged with yellow, completely concealing clypeus and extending just slightly above antennal bases; pile of vertex and upper genal areas pale grey, pile becoming much longer and whiter below;

mesoscutum with abundant, long, erect pile slightly tinged with ochreus, a few darker hairs on discal area of the mesoscutum; scutellum with pile principally pale grey to light to tinged with yellow, having a few dark, almost black, hairs intermixed; mesepisterna with pile long, fine and pale grey, propodeum with dense latero-posterior fringes of pale grey pile, lateral and posterior faces with abundant, erect, pale grey pile; legs with pile sparse, short and light; first metasomal tergum with fascia weakly tinged with yellow and complete with rather long hairs, lateral fringes pale grey, extending to the fascia, disc with abundant, erect, pale grey pile; metasomal terga two to five with fasciae much broader than first and much more white, fasciae very dense; terga three to six with discs having abundant, erect, light pile, not black; metasomal sterna with fasciae uniform and complete with a dense apical fringe.

Antennae deep brown to black, flagellar segments approximately one and one-half times as long as broad; malar space three-quarters as long as broad; clypeus weakly convex, rather finely and densely punctate over apical one-half and down median portion, lateral apical aspects sparsely, striately punctate with shiny interspaces; vertex is finely and densely punctate, dull. Prothoracic spines obliquely truncate with posterior margin descending beyond anterior; mesoscutum is densely punctate, impunctate area very small; scutellum densely,

coarsely, almost rugosely punctate over posterior one-third, punctures becoming sparser with shiny interspaces over median portion, anterior face is shiny, impunctate; mesepisterna densely punctate, punctures no more than one-half puncture width apart; propodeum with basal area deeply, quadrately pitted, lateral and posterior faces dull and roughened; tegulae brown; wings with very sparse, light ochreus pubescence tending to be almost whitish hyaline basally, nervures brown; legs reddish brown to black; posterior basitarsi four and one-half times as long as broad. First metasomal tergum densely punctate with punctures one to two puncture widths apart; second metasomal tergum with punctures finer and denser, no more than one puncture width apart, tergum having an abrupt basal depression; metasomal terga one to four with fasciae lying in broad, depressed apical margins, these depressed margins light brownish hyaline; sterna shiny, rather weakly and sparsely folliculated; the seventh ventral plates resemble fulgidus but much narrower and more elongate. (See Fig. 15).

FEMALE: length 11 mm., wing length 8 mm.

Pile of face erect and pale grey, clumped principally about antennal bases; vertex with pile tinged with ochreus, pile becoming longer and pale grey below; mesoscutum with pile pale grey to light ochreus intermixed with abundant black pile on discal area; scutellum with an admixture of

light ochreus and black pile about peripheral margins; mesepisterna with pile long, fine, and pale grey; propodeum with a dense fringe of pile along latero-posterior margin extending down towards pedicle, lateral and posterior faces with abundant, erect, pale grey pile; pile of legs light ochreus, long, and dense; first metasomal tergum with apical fasciae weak and narrow, easily removed, lateral fringes of light ochreus pile extending to fascia, discal area with scattered, pale grey pile, particularly on anterior face; metasomal terga two to five with fasciae broad and rather dense, second metasomal tergum with a broad basal fascia; terga three to six with the discs having scattered, ochreus to deep testaceous, erect pile, not at all concealing surface; metasomal sterna two to five with weak lateral clumps of pile, not continuous through middle.

Antennae reddish brown, flagellar segments seven-eighths as long as broad; malar space three-eighths as long as broad; clypeus weakly convex, densely, striately punctate to the apex; fascial foviae greatly broadened above and deep, extending over half way to lateral ocelli; vertex is shiny with many fine punctures. Prothoracic spines obliquely truncate with posterior margin descending beyond anterior; mesoscutum very coarsely almost contiguously punctate on median area, impunctate area very small; scutellum very coarsely and densely punctate over posterior one-half, anterior half with punctures sparse and almost

absent, a deep median longitudinal sulcus extending almost to anterior margin; mesepisterna are dull and very coarsely and contiguously punctate; tegulae deep brown; wings dusky with sparse, ochreus pubescence, nervures brown; legs deep reddish brown to black; posterior basitarsi four times as long as broad. First metasomal tergum rather densely punctate with fine punctures, punctures approximately one to two puncture widths apart; second tergum with punctures very fine, follicle-like, and dense, apical fasciae in weakly depressed margins, fascial depressions hyaline; metasomal sterna sparsely folliculated with rather coarse follicles.

Locality Records:

California: Antioch; Contra Costa County; Riverside; Annaheim, Orange County; Morro Bay; Los Angeles; Berkeley.

Flight Records:

The species has been caught in abundance between August 21 and October 25 in southern California. However, I have two specimens from Berkeley, California, which were collected on April 20.37. This would indicate that the species has two generations or probably one and a partial spring generation.

Plant Records:

Eriogonum, Hermizonia paniculata, Isocoma vernoniodes.

The holotype is located in the collections of the Citrus Experiment Station, Riverside, California.

Colletes fulgidus fulgidus Swenk

fulgidus SWENK, 1904, Canadian Ent., vol. 36, p. 95; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 50; GIBSON and CRIDDLE, 1919, Rept. Ent. Soc. Ontario for 1919, p. 20; GIBSON and CRIDDLE, 1920, Rept. Ent. Soc. Ontario, vol. 36, p. 131; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 396.

This species ranges from California and Nevada across the southern Great Basin to the Rocky Mountains. Swenk recorded the species from Nebraska and Texas as well as other northern and far western states. I have not seen any specimens from either Nebraska or Texas other than a few females determined as fulgidus by him. These two specimens are louisae and simulans simulans. No males have as yet been taken from Nebraska, New Mexico, or Texas, where it is probably replaced by the more southerly louisae. The males of the species are difficult to distinguish without genitalic examination and even then a series of characters is necessary for accurate determination. This sex often shows considerable deviation from the typical series, having the colour of the thoracic pile varying from pale grey to light ochreus. The thoracic

spine is rather blunt in some but rather long and sharp in others. A very few specimens lack the presence of any dark pile on the mesoscutum and the scutellum, and in some there is a weak rudiment of a basal fascia on the second metasomal tergum. The females are difficult to segregate with certainty from the typical louisae and some specimens show the first metasomal tergum rather coarsely punctate, bearing a close superficial resemblance to the simulans complex. While the typical material from the Big Horn Mountains of Wyoming has an almost impunctate or weakly folliculated first tergum, other specimens from the western part of America show rather coarse but sparse puncturation. The second metasomal tergum, unlike that of louisae, is finely and densely folliculated. Similarly, the apical sterna of fulgidus are uniformly, finely folliculated, while the sterna of louisae have sparse, fine punctures restricted to the lateral and the extreme posterior faces.

MALE: length 9 mm., wing length 6.5 mm.

Pile of face is long, white, concealing clypeus and antennal basal area; vertex with pile light tinged with pale grey; upper genal areas with pile long and pale grey, becoming longer and more white below; mesoscutum with pile tinged with grey, long, erect, and fine; scutellum with pile pale grey to tinged with ochreus, a few darker hairs intermixed; mesepisterna with pile long, fine, and white;

propodeum with weak fringes of long, pale grey pile on latero-posterior margins, lateral and posterior faces with a sparse covering of long, erect, pale grey pile; pile of legs very sparse, fine, and whitish; first metasomal tergum with apical fasciae narrow, composed of long, ragged, pale grey pubescence, lateral fringes of pale grey pile weak extending to apical fascia, discal area with abundant, erect, long, pale grey pile; metasomal terga two to five with fasciae composed of weak, ragged, white pubescence, discal areas of terga three to six with abundant, short, ochreus to grey pile, not at all concealing surface; metasomal sterna with apical fringes of short, white pile, slightly longer at extreme lateral margins.

Antennae reddish brown, flagellar segments one and one-quarter times as long as broad; malar space three-quarters as long as broad; clypeus convex, finely and densely punctate over basal one-half and down a flattened, median longitudinal line, not rugosely punctate, apico-lateral faces shiny, impunctate; vertex distinctly punctate with shiny interspaces. Prothoracic spines long and sharp, about one and one-half times as long as width across base; mesoscutum rather finely punctate, punctures approximately one puncture width apart on anterior and lateral faces, becoming sparser to median discal area; scutellum coarsely punctate, punctures approximately one puncture width apart medially, becoming much sparser toward anterior face;

mesepisterna rather finely punctate, punctures approximately one puncture width apart above to one and a half puncture widths below, interspaces shiny; propodeum with basal area deeply pitted, lateral and posterior faces dull and roughened; tegulae dark brown hyaline; wings dusky, nervures brown; legs deep reddish brown; posterior basitarsi four and a half times as long as broad. First metasomal tergum deeply punctate with punctures one to two puncture widths apart, interspaces shiny; second metasomal tergum with punctures finer and closer, especially on anterior margin, tergum distinctly depressed basally; metasomal sterna shiny and sparsely folliculated on latero-posterior one-half of each sternum; seventh ventral plates as illustrated (See Fig. 16).

FEMALE: length 10.5 mm., wing length 7 mm.

Pile of face long, white, and dense about antennal bases and middle inner orbital margins, a few long hairs overhanging clypeus; vertex with a few light ochreus hairs, particularly in and about the ocellar triangle; upper genal areas with pile tinged with grey, becoming very fine and much longer below; mesoscutum with pile light ochreus about anterior and lateral margins, discal area with pile black; scutellum with a peripheral rim of pile tinged with ochreus, disc with abundant black pile; mesepisterna with pile long, fine, and pale grey; legs with pile short, rather dense on posterior legs, and tinged with

ochreus; first metasomal tergum with apical fasciae weak, interrupted medially and evident only as a fascia at lateral one-third, lateral fringes of pile dense, extending to apical fascia, discal area sparsely covered with erect, fine, pale grey pile; metasomal terga two to five with fasciae very broad, dense, and pure white, second metasomal tergum with a basal fascia interrupted medially; metasomal sterna with a few erect, pale grey hairs, not forming a fascia.

Antennae reddish brown, flagellar segments about as long as wide; malar space one-third as long as broad; clypeus flattened medially, coarsely, striately punctate to the apex, ridges and interspaces shiny; vertex shiny with a few scattered punctures. Prothoracic spines long, about twice as long as width across base, extending laterally to sides of the head; mesoscutum very densely and coarsely punctate over anterior one-half and lateral margins, impunctate area large; scutellum densely punctate about lateral and posterior faces, discal area sparsely and finely punctate with punctures anywhere from one to three puncture widths apart, anterior one-third shiny, impunctate; mesepisterna very densely, almost contiguously punctate; propodeum with deep, broad, quadrate pits, propodeum with lateral and posterior faces weakly rugose and shiny; tegulae deep brownish hyaline; wings dusky, nervures brown; legs deep brown; posterior basitarsi three and one-half times as long as broad. First metasomal tergum shiny, very

weakly and sparsely punctate, punctures most dense laterally where they are three to four puncture widths apart; second tergum shiny and sparsely folliculated; metasomal sterna densely folliculated over posterior one-half of each sternum.

Locality Records:
The species is found in abundance in the mountainous regions of California, Oregon, Washington, Idaho, Montana, Wyoming, Northern Utah, and Colorado, circumscribing the Great Basin region.

Flight Records:
The species flies from May 7 until October 16, occurring in abundance during all the summer months.

Plant Records:
Chaenactis stenioides, Clarkia, Encelia, Eriogonum, Grindelia, Isocoma vernonoides, Medicago sativa, Melilotus alba, Salix, Solidago.

The holotype is located in the collections of the University of Nebraska.

Colletes fulgidus longiplumosus Stephen, new subspecies

This subspecies has been formerly included with fulgidus fulgidus; however it is readily distinguished in both sexes by the extremely long and dense pile of the head, thorax, and abdomen. The subspecies appears to be a

coastal race of the generally montane f. fulgidus and has been collected from various localities along the Californian coast. The male differs from f. fulgidus in having the malar space as long as wide, the prothoracic spines vestigial, almost absent, the puncturation of the first metasomal tergum finer and sparser and the pile of the body very long, dense, and plumose. The black pile is evident on the scutellum and the mesoscutel disc. In the females of this subspecies the malar space is approximately one-half as long as broad; the prothoracic spines are roughly triangular and obtuse; and the pile, principally of the head and thorax, is exceedingly long and plumose.

Distribution:

The extreme western coastal region of California from Humbolt County to San Luis Obispo County.

Holotype male, allotype female and 9 paratypes: Montara, San Mateo County, California, June 10, 1939 (C. D. Michener); paratypes: 27 males, Dillon Beach, Marin County, California, May 22, 1949 (W. W. Middlecauff); 1 male, San Francisco, California, May 21, 1911 (J. A. Kusche); 2 females, Sacramento, California, June 26, 1938, June 28, 1938; 1 female, San Luis Obispo, California, June, 1938 (I. McCracken), on Clarkia; 1 female, San Luis Obispo County, California, June 3, 1938 (I. McCracken) on Lagia; 7 males, mouth of Redwood Creek, Humbolt County, July 11, 1937 (E. C. Van Dyke); 6 males, 1 female, Orick,

Humbolt County, California, July 9, 1938 (E. C. Van Dyke).

The holotype is in the Snow Entomological Collections of the University of Kansas.

Colletes rufocinctus Cockerell

rufocinctus COCKERELL, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 298; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 394; TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 207.

truncatus TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 394.

On the basis of collected material the species appears to be most common in the northern great plains, centering in North Dakota. A few specimens have been recorded from Minnesota, Manitoba, and South Dakota, while single specimens from Alberta; Colorado; Flagstaff, Arizona; and a male from the Huachucha Mountains, indicate the species is scattered more sparingly along the western edge of the Great Plains as well as to the mountains of the southwest. The late fall flight period may have some effect on the incomplete collections. Both sexes have a rather characteristic feature in the shape of the prothoracic spines, which have a modified truncate appearance; the posterior edge is rounded while the

anterior margin is weakly pointed, terminating in a sharp, short spine protruding laterally beyond the posterior margin. The males closely resemble fulgidus except in having a somewhat shorter malar space, the peculiarity of the prothoracic spines, plus an absence of the lateral basal projection of the seventh ventral plates. The females similarly differ in the prothoracic spines and in the more distinct punoturation of the first metasomal tergum.

MALE: length 9.5 mm., wing length 6 mm.

Pile of face is white and concentrated principally over clypeus and lower antennal bases; vertex with very sparse, pale grey pile; upper genal areas with pile pale grey to white, becoming much longer, finer, and whiter below; mesoscutum with pile pale grey, long, fine and erect; scutellum with a dense peripheral margin of long, fine, pale grey pile; mesepisterna with pile long, fine, and erect, not concealing surface; propodeum with a weak fringe of pale grey pile along latero-posterior margin, not extending directly to pedicle, lateral and posterior faces with scattered, shorter, pale grey pile; pile of legs is short, sparse, and pale grey; first metasomal tergum with a broad fascia of whitish to greyish pubescence, fascia sometimes interrupted medially due to wearing, lateral fringes of white pile extending to apical fascia, discal area with abundant, erect, pale grey pile, not at all concealing the surface; metasomal terga two to five with broad, rather dense fasciae of white pile, broadened

slightly at extreme lateral margins; metasomal terga three to six having discs with sparse, short, erect, pale grey to fulvous pile, not at all concealing surface; metasomal sterna with apical fringes of short, white pile, complete but slightly shorter medially.

Antennae long, deep brown to black, flagellar segments one and one-quarter times as long as broad; malar space three-quarters as long as broad; clypeus convex with a very shallow, longitudinal median sulcus, sulcal area very closely and finely punctate to apex; punctures over basal third close and dense as in sulcal area, latero-apical portions shiny, sparsely punctate to impunctate; vertex dull, closely and densely punctate. Prothoracic spines obliquely truncate with the anterior margin pointed sharply and protruding beyond posterior; mesoscutum coarsely and densely punctate over anterior one-third, punctures becoming much sparser on disc, impunctate area large; scutellum coarsely and rather sparsely punctate over disc, punctures becoming sparser anteriorly, anterior one-third shiny, impunctate, a weak median longitudinal sulcus extending to anterior margin; mesepisterna densely punctate, punctures no more than one-half puncture width apart, closer on dorsal face; propodeum shallowly, almost obscurely, pitted with quadrate pits, lateral and posterior faces dull and roughened; tegulae brownish hyaline; wings dusky with abundant, light ochreus pubescence, nervures brown; legs reddish brown to deep brown; posterior basitarsi four and

three-quarter times as long as broad. First metasomal tergum densely punctate with coarse punctures, punctures no more than one puncture width apart; second metasomal tergum punctured much as first, only having punctures slightly smaller, tergum distinctly depressed basally; metasomal tergum three finely punctate or coarsely folliculated; metasomal sterna shiny, very finely folliculated on apical margins; seventh ventral plates resembling those of fulgidus, however lacking lateral projection to basal portion of each plate.

FEMALE: length 10.5 mm., wing length 7.5 mm.

Pile of face sparse, erect, and clumped principally laterad of antennal bases along inner orbital margins, pile pale grey; vertex with light ochreus pile principally in ocellar region; upper genal areas with abundant, short, light ochreus pile, pile becoming longer and whiter below with a very narrow margin of short, appressed pile immediately posterior to each compound eye; mesoscutum with pile tinged with light ochreus about anterior one-quarter and lateral margins, discal area having abundant, black pile; scutellum with a peripheral rim of light ochreus pile, discal area with abundant, black pile; mesepisterna with pile long, fine, and weakly tinged with yellow; propodeum with long fringes of pale grey to light ochreus pile along latero-posterior margins extending down to pedicle, lateral and posterior faces with scattered, short, erect, pale grey

pile; pile of legs pale grey except on posterior femora where it is tinged with light ochreus; first metasomal tergum with apical fascia very narrow and weak, interrupted medially, lateral fringes of pale pile extending half way to apical fascia, usually not complete, discal area with very few, erect, light grey hairs; metasomal terga two to five with fasciae broad and weak, composed of very fine, short, white pile; second metasomal tergum with a basal fascia equal in width and density to apical fascia; metasomal sterna two and three with weak lateral fringes of pale grey pile.

Antennae brown, flagellar segments as long as wide; malar space one-third as long as broad; clypeus convex, weakly depressed medially at medio-longitudinal line, surface shiny, coarsely, striately punctate; vertex shiny and sparsely punctate, fascial foviae narrow, extending just above inner orbital margins of compound eyes, and extending barely more than one-quarter of way to lateral ocelli. Prothoracic spines obliquely truncate with anterior margin pointed and extending beyond posterior margin; mesoscutum densely punctate with punctures of variable size, almost contiguous in spots and separated by one to two puncture widths in others, impunctate area small; scutellum with punctures of variable size, punctures one to two puncture widths apart, anterior face shiny, impunctate; mesepisterna dull, very densely, contiguously punctate, almost roughened; propodeum quadrately pitted with shiny

pits, lateral and posterior faces transversed by very weak rugae; tegulae brownish hyaline; wings dusky, nervures brown; legs reddish brown to deep brown; posterior basitarsi four times as long as broad. First metasomal tergum finely, obscurely punctate, punctures approximately one to two puncture widths apart on lateral faces, becoming shallow and more obscure medially, surface shiny; second metasomal tergum shiny, impunctate; metasomal sterna shiny, very finely folliculated over posterior one-half of each sternum. Procoxal spines twice as long as broad.

Distribution:

Manitoba: Magnus.

Alberta: Lethbridge; Medicine Hat.

Minnesota: Barrett; Barry; Detroit; Polk County.

North Dakota: Beach; Burgan; Crary; Devil's Lake; Dickinson; Edgeley; Fargo; Jamestown; Lakota; Mandan; Martin; Minot; McKenzie; Monango; Mott; Schafer; Sentinel Butte; Steele; Williston.

South Dakota: Platte; White River, Stanley County.

Wyoming: Sheridan.

Colorado: Chimney Gulch.

Arizona: Flagstaff; Huachuca Mountains.

Flight Records:

The species flies from August 3 to September 15 throughout its range.

Host Plants:

Aster paniculatus, Grindelia squarrosa, Helianthus petiolaris, Melilotus alba, Solidago canadensis, Solidago rigida, Taraxacum.

The type is located in the collections of the Citrus Experiment Station, Riverside, California.

Colletes louisae Cockerell

louisae COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 46; COCKERELL, 1897, Bull. Univ. New Mexico, vol. 24, p. 24; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 43; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 43; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292.

tucsonensis COCKERELL, 1906, Canadian Ent., vol. 38, p. 163; COCKERELL, 1935, Pan-Pac. Ent., vol. 11, p. 54; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 402 (new synonymy).

texanus COCKERELL (not Cresson), 1897, Bull. New Mexico Agric. Exper. Sta., no. 24, p. 24; COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 45; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 42; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 42; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292 (these references placed under tucsonensis by Timberlake, 1943).

An examination of the type of this species proves it to be the same as the better known tucsonensis. The species is rather distinctive on the basis of the seventh ventral plate in the male, and by the strong scutel admixture of black pile accompanied by the shiny, impunctate first tergum in the female. The males have the pile of the mesoscutum and the scutellum entirely pale grey except for a few specimens from California where there appears to be a weak admixture of dark hairs, particularly about the posterior face of the scutellum. Slight variation exists in the punctuation of the first metasomal tergum, with punctures very fine, becoming denser on the extreme lateral margins. The females closely resemble those of birkmanni, differing in having a very strong admixture of black pile on the mesoscutum and scutellum. The species is restricted to southern California, Arizona, New Mexico, and southwestern Texas in the United States, but undoubtedly occurs throughout northern Mexico.

MALE: length 9.5 mm., wing length 7 mm.

Hair of face long, dense, and pure white, extending well above antennal bases; pile of vertex and upper genal areas pale grey, dense, and erect, becoming longer and whiter on lower surfaces of occiput; mesoscutum and scutellum with pile pale grey, long, erect, and plumose; mesepisterna with pile long, fine, and white; dense fringes of white pile along latero-posterior margins of propodeum,

extending half-way down to pedicle, lateral and posterior faces with sparse, erect, white pile; pile of legs short, sparse, and white; first metasomal tergum with fascia broad, dense, and pure white, lateral fringes of pile very long and dense, extending to apical fascia, discal area with abundant, long, fine, white pile, not at all concealing surface; fasciae of metasomal terga two to five dense, broadened at extreme lateral margins, and pure white; metasomal terga three to six with short, pale grey, erect pubescence, not at all concealing surface; metasomal sterna two to five with long, dense fringes of white pile from apical margin.

Antennae brownish black, flagellar segments one and one-half times as long as broad; malar space as long as broad; clypeus finely and densely punctate over basal two-thirds, punctures very weakly rugose, extending down a median longitudinal line almost to apex, extreme apex and lateral apical margins of clypeus shiny, impunctate; vertex dull, closely and densely punctate; mesoscutum densely punctate over anterior one-half, impunctate area large; scutellum densely punctate over posterior one-half, punctures becoming much sparser and almost absent on anterior half, a weak longitudinal median sulcus extending to anterior margin; mesepisterna densely punctate, punctures slightly larger than those of mesoscutum, interspaces shiny below; propodeum with basal area shallowly, quadrately pitted, lateral and posterior faces dull, transversed by

many weak rugae; tegulae light hyaline brown; wings whitish hyaline with very sparse, short, whitish pubescence apically, nervures brown; legs deep reddish brown basally, lighter brown apically; posterior basitarsi four times as long as broad. First metasomal tergum very finely and shallowly punctate, punctures two to three puncture widths apart laterally, becoming sparser, almost folliculated, medially; second metasomal tergum coarsely folliculated or finely punctate, punctures dense, no more than one puncture width apart, interspaces shiny; metasomal sterna shiny, coarsely and sparsely folliculated over posterio-lateral margins of each segment; seventh ventral plates much as in eulophi, however with a dense clump of long pile arising from lateral aspects of the neck of each plate (See Fig. 18).

FEMALE: length 11 mm., wing length 7.5 mm.

Pile of face long, white, and erect, concentrated principally about upper antennal bases with a few long, white hairs overhanging clypeus, not concealing surface; pile of vertex dusky tawny grey with a few dark hairs intermixed; pile of genal areas short, pale grey, becoming much longer and finer below; mesoscutum with pile white to pale grey about extreme anterior and lateral margins, abundant black pile intermixed on discal area; scutellum with a peripheral rim of pale grey pile, having much black hair mesad to peripheral pale grey; mesepisterna with abundant, long, white pile, partially concealing surface;

propodeum with dense, long fringe of whitish pile on upper latero-posterior margins, lateral and posterior faces with scattered, erect, white to pale grey pile; legs with pile long, plumose, and white to weakly tinged with ochreus, particularly on posterior femora and tibiae; first metasomal tergum with a dense fascia of pale grey pile, lateral fringes long and white, extending to apical fascia, a few erect, scattered hairs over discal surface; second metasomal tergum with a distinct basal fascia of white pile, fascia weak but complete; metasomal terga two to five with broad apical fasciae of white pubescence; metasomal terga three to six with discal area having abundant, erect, pale grey to black pile, not concealing surface; metasomal sterna two to five with weak fringes of long, pale grey pile interrupted medially.

Antennae deep brownish black, flagellar segments about as long as wide; malar space one-third as long as broad; clypeus weakly convex with a very faint, median longitudinal sulcus, surface coarsely, striately punctate with shiny ridges; vertex shiny with a few shallow, scattered punctures. Prothoracic spines long, protruding to edge of head; mesoscutum rather densely and coarsely punctate on lateral and anterior faces, punctures varying from contiguous to two puncture widths apart; scutellum coarsely and sparsely punctate over discal area, punctures from contiguous to two puncture widths apart, anterior one-quarter shiny, impunctate, a weak longitudinal median sulcus extending to

anterior margin; mesepisterna very densely, contiguously punctate, dull; propodeum with basal area shallowly, quadrately pitted, lateral and posterior faces dull, weakly rugose; tegulae brownish hyaline; wings tending to whitish hyaline with a little short, scattered, light ochreus pubescence apically; legs brown; posterior basitarsi four times as long as broad. First metasomal tergum shiny with a few very shallow follicles over surface; second metasomal tergum shiny, impunctate; metasomal sterna shiny, finely folliculated on latero-apical extremities.

Distribution:

The species occurs in abundance throughout southern California and has also been recorded from the following southwestern states:

Nevada: Austin; Kyle Canyon, Charleston Mountains; Lee Canyon.

Arizona: Ago; San Pedro River, Fairbanks; Santa Rita Mountains; Tucson.

New Mexico: Tucumcari.

Texas: El Paso; Hot Springs, Big Bend Park.

Flight Records:

The species seems to have two generations per year, the first flying from March 17 until June 7. The earliest record of the fall generation I have is for August 10 through November 26. Both of these records are Californian.

Plant Records:

Baccharis, Chrysothamnus nauseosus, Isocoma veneta var. acradenia, Larrea tridentata var. glutinosa, Melilotus, Prosopis joliflora, Solidago.

The type is located in the United States National Museum.

Colletes bryanti Timberlake

bryanti TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, pp. 208-10.

This species, recently described by Timberlake, is most closely related to the sleveni-kincaidii-eulophi portion of the simulans group. The male closely resembles that of sleveni, differing in having the punctures of the mesopleura coarse and almost contiguous over the upper surface. While most specimens of this sex have a weak admixture of dark pile on the mesoscutum, a few do not. In these seemingly aberrant forms the scutum and scutellum is tawny to almost white rather than the typical light ochreus. The seventh ventral plate closely resembles that of sleveni in general form but has the dorsal fringe of the pile extending almost to the basal articulatory condyle along its entire width. The female resembles the females of kincaidi, eulophi, and sleveni. Where the three occur together, as in the Oak Creek area of Arizona, they

are difficult to separate. The female of bryanti, however, has the mesopleura coarsely and densely, almost contiguously punctate over the upper surfaces while the others have the punctures well separated by shiny impunctate areas. The females of bryanti also have the fascial foviae deeply depressed and impunctate, extending beyond the compound eyes to the lateral ocelli; the vertex is deeply and closely punctate; the pile of the mesoscutum and scutellum is deep ochreus. However, specimens of the three closest relatives often tend to display similar variations and distributional data is based on males alone. This extends the records to Alpine, Salt River, and Greer in Arizona, as well as to Cloudcroft and Tajique, New Mexico. The species has two generations per year, appearing first in April, May, and June, and then again in August, September, and October.

MALE: length 9.5 mm., wing length 6.5 mm.

Pile of face is long, dense, and lightly tinged with yellow; pile of vertex erect, light ochreus, clumped principally in ocellar triangle and about upper surfaces of genal areas, pile becoming much longer, finer, and almost pure white on lower surfaces of occiput; mesoscutum and scutellum with abundant, dense, ochreus pile, not concealing surface, a moderately strong admixture of very deep testaceous or deep ochreus pile intermixed with this ochreus pubescence, tending to give it appearance of being intermixed with black hairs; pile of mesepisterna long, fine, plumose and pale grey; propodeum with a dense fringe

of long, pale grey pile on upper latero-posterior faces, posterior face with a weak covering of fine, erect pile; legs with pile sparse and pure white to pale grey; metasomal terga with weak fasciae on terga one to five, fasciae becoming progressively broader and whiter towards apical metasomal terga; first metasomal tergum with fascia very narrow and almost removed medially, pile very lightly tinged with yellow, a lateral fringe of pale grey pile extending to apical fascia, discal area with abundant, erect, fine, pale grey pile, not at all concealing surface; metasomal terga four to seven with abundant, short, erect, black pile, not at all concealing the surface; sternal fasciae weak, continuous only on sterna two and three, on metasomal sterna four and five fasciae represented by lateral tufts of long pile.

Antennae long, deep brown, flagellar segments approximately one and one-half times as long as broad; malar space as long as broad; clypeus convex with evidence of a weak longitudinal median sulcus, that extending down to apical portions of clypeus, surface densely, striately punctate along medio-apical portions of surface, apical one-third shiny and rather sparsely punctate; vertex very coarsely and densely punctate, dull. Prothoracic spines absent; mesoscutum coarsely and densely punctate over entire surface, punctate area very small; scutellum closely punctate over posterior three-quarters of surface, punctures not at all striate; mesepisterna densely punctate with

rather coarse punctures tending to be somewhat striated on upper half of surface; propodeum with basal area very shallowly or obscurely pitted, pits not at all quadrate, basal area traversed by irregular, weak rugae extending to posterior margin, posterior and lateral faces dull, weakly rugose; tegulae brown; wings dusky with abundant, short, fulvous pubescence principally on apical one-third; legs black; posterior basitarsi three and one-half times as long as broad. Metasomal terga depressed apically to contain apical fasciae, apical depressions most evident on lateral portions of each segment; first metasomal tergum densely and rather coarsely punctate, punctures approximately one to two puncture widths apart; second metasomal tergum punctured much as first, only with punctures denser, no more than one puncture width apart, basal portion of second metasomal tergum is abruptly depressed; metasomal sterna shiny, coarsely and sparsely folliculated; seventh ventral plates elongate, much as in sleveni, but with the basal hair band of bryanti extending well up under the basal articulatory condyle, medio-apical margin of plates narrowed slightly not broadly rounded as in sleveni or kincaidii (See Fig. 19).

FEMALE: length 9 mm., wing length 7 mm.

Pile of face long, dense and pale grey, particularly about antennal bases; vertex with a few scattered, light ochreus hairs; pile of upper genal areas light ochreus,

tending to become longer and whiter below; mesoscutum and scutellum with pile ochreus intermixed with a few deep ochreus or testaceous hairs; mesepisterna with pile long, fine, and pale grey; pile of legs is rather short and light ochreus to pale grey except on posterior pair, where tibiae have abundant, short black hairs over entire upper surface; metasomal terga with fasciae white, rather weak and narrow; first metasomal tergum with a very weak lateral fringe of pale grey pile extending to apical fascia, surface with a very sparse covering of long, pale grey pile; metasomal terga four to six with discal area having abundant, erect, long, testaceous to black pile, a very faint basal fascia to second metasomal tergum, most evident towards lateral margins; metasomal sterna unfasciate except for a few longer, grey hairs on apical half of each segment.

Antennae long, deep brown, flagellar segments approximately three-quarters as long as broad; malar space one-half as long as broad; clypeus weakly convex, rather coarsely, striately punctate to the apex, median longitudinal area of clypeus with punctures finer and denser reminiscent of a weak sulcus; vertex very coarsely and densely punctate, dull; fascial foviae depressed deeply and of uniform width extending up towards top of compound eye, not reaching more than one-third of way to lateral ocelli. Prothoracic spines absent; mesoscutum rather coarsely and densely punctate, impunctate area small; scutellum coarsely, non-striately punctate over posterior two-thirds, anterior

one-third shiny and relatively free of punctures; mesepisterna closely and coarsely punctate, punctures almost contiguous over surface, tending slightly towards rugosity at extreme upper posterior portion of face; propodeum with basal area shallowly pitted with quadrate pits, lateral and posterior faces are dull and traversed by many weak rugae; tegulae deep brown; wings dusky with abundant, deep fulvous pubescence, nervures are deep brown; legs brownish black to black; posterior basitarsi three times as long as broad. First metasomal tergum closely and densely punctate, with punctures varying from one to two puncture widths apart; second metasomal tergum much more closely and finely punctate, with punctures usually not exceeding one puncture width apart, particularly on anterior median portions of disc, punctures becoming much sparser laterally; metasomal terga one to four with apical fascial areas depressed, particularly evident on lateral faces; metasomal sterna coarsely but sparsely punctate, much as in eulophi, interspaces shiny.

Distribution:

Arizona: Santa Rita Mountains, September 15, 1933, October 5, 1936 (Bryant) (paratypes); Graham Mountain, September 5, 1937, September 25, 1937, September 8, 1937 (Bryant) (paratypes); Onion Flat, Chiricahua Mountains, August 12, 1940 (E. S. Ross) (paratype); Tucson, April 15, 1933

(Bryant) (paratype); Santa Rita Mountains, May 9, 1937 (W. Benedict); Alpine, June 4, 1937 (Grace and John L. Sperry); Dawson Camp, Salt River, September 7 (C. H. T. Townsend); Greer, June 2, 1946 (R. M. Bohart); Oak Creek Canyon, August, 1947 (R. M. Bohart); Sabino Basin, Santa Catalina Mountains, October 3 (C. H. T. Townsend).

New Mexico: Cloudcroft, June 27, 1940 (L. J. Lipovsky); Tajique, June 25, 1940 (E. E. Kenaga).

The holotype is in the collections of the California Academy of Science.

Colletes birkmanni Swenk

birkmanni SWENK, 1906, Ent. News, vol. 17, p. 259.

The species is restricted to the southern portion of the Great Plains with males taken from Texas and one also from Meade County State Park in western Kansas. This would indicate that the species probably occurs in the panhandles of Texas and Oklahoma as well as in the more arid regions of western Kansas but that it is extremely scarce in these areas. It is quite possible that it may be replaced by the closely related sleveni in the foothills of the mountains and in the more northerly latitudes. There appear to be two generations per year, at least in the southern extremities of the range. A Swenk metatype from Nebraska

City, Nebraska, must be the female of sleveni although the determination of a single female is difficult if not impossible. The males closely resemble those of sleveni externally except for having the punctures of the first metasomal tergum finer and sparser and in having the pile of the mesoscutum all light ochreus to tawny grey. There are minor differences in the seventh ventral plate, as illustrated. In the capsule the gonostyli of birkmanni are not nearly the length of the terminal portions of the gonocoxites while the gonostyli of sleveni are at least as long as the terminal gonocoxite portions. The males exhibit slight variation in the colour of the pile of the mesoscutum, varying from pale grey in some to light ochreus in others; punctures of the first metasomal tergum are also rather variable in density and coarseness, but are still at least two puncture widths apart on the lateral surfaces. The females closely resemble those of sleveni but can be distinguished in having the pile of the terga five and six light golden to ochreus rather than the deep fuscous to black of sleveni; the fifth and sixth metasomal sterna of birkmanni are much more coarsely and densely punctate than are those of sleveni. There are some variations in the pile colour of the mesoscutum and the scutellum of this species, varying from a light golden to ochreus regardless of locality. Similar variation is found in the shape of the prothoracic spine which varies from roughly triangular

to sharply pointed in form; however, the length is just barely longer than the width across the base.

MALE: length 9 mm., wing length 7.5 mm.

Pile of face is dense and pure white, reaching well above antennal bases; vertex and upper genal areas covered with light ochreus, erect pile, pile of lower genal areas becoming much longer, denser, and pure white with a weak rim of appressed shorter pubescence immediately posterior to compound eyes; mesoscutum with pile dense, long, and tinged with light ochreus; scutellum covered similarly to mesoscutum; mesepisterna covered with dense, long, fine, white pile, weakly plumose; propodeum with a dense fringe along the upper margin of latero-posterior faces, posterior and lateral faces with a sparse covering of erect, fine, pale grey pile; pile of legs fine, white, and sparse; first metasomal tergum with a fascia of long, white pile, lateral fringes of white pile reaching to apical fascia, discal area with abundant, erect, pale grey pile, not at all concealing the surface; fasciae of metasomal terga two to five broad, dense, and almost pure white; discal areas of metasomal terga two to six having erect pile pale grey to a very light ochreus, not at all black; metasomal sterna with apical fasciae of dense, short, white to pale grey pile, very weakly broadened medially, fasciae of sterna three to five having lateral tufts of longer, more plumose hairs.

Antennae long, deep brown, flagellar segments one and one-half times as long as broad; malar space seven-eighths as long as broad; clypeus weakly convex, densely and finely punctate over basal one-half, punctures on apical half larger and tending to be striate except for the extreme apex which is shiny impunctate; vertex shiny and finely punctate with shiny interspaces. Prothoracic spines short and sharp, roughly triangular; mesoscutum finely and densely punctate, impunctate area large; scutellum rather densely punctate over posterior one-half, punctures a similar size to those of the mesoscutum; mesepisterna with punctures similar in size to those of mesoscutum and approximately one-half to one puncture width apart, with interspaces shiny, not at all rugose; propodeum with basal area shallowly pitted with elongate, quadrate pits, lateral and posterior faces dull and roughened; tegulae brownish hyaline; wings dusky with a sparse covering of light ochreus pubescence, particularly on apical one-third, nervures brown; legs black; posterior basitarsi four and one-quarter times as long as broad. First metasomal tergum shiny and sparsely punctate, punctures approximately two to four puncture widths apart and fine; second metasomal tergum with punctures much closer, varying in density from one to three puncture widths apart, interspaces shiny; apical margins of terga one to four depressed apically, depression very distinct laterally and evident across breadth of each segment; metasomal sterna shiny with a few coarse follicles,

particularly on extreme apical portions of each sternum; seventh ventral plates much as in _sleveni_, but slightly longer and with a broad, dense hair band circumventing periphery of basal half of each plate; gonostyli of capsule not nearly length of terminal portion of gonocoxites.

FEMALE: length 11 mm., wing length 8 mm.

Pile of face is white, erect, and concentrated principally about antennal bases; pile of genal areas tinged with yellow above becoming longer and whiter below; mesoscutum and scutellum with pile dense, erect and weakly tinged with light yellow; mesepisterna with pile long, fine, and white; propodeum with a fringe of long, pale grey pile along latero-posterior margins, posterior face sparsely covered with erect, pale grey pile; pile of legs long, rather dense, tinged with light ochreus; first metasomal tergum with a weak apical fascia easily removed by rubbing, fascia white, tergum with lateral fringes of white pile extending to apical fascia, discal area, particularly anterior face, with sparse, erect, pale grey hairs; metasomal terga two to six with broad apical fasciae of pure white pile, fasciae often removed medially due to some abrasion; second metasomal tergum with a weak basal fascia of pure white pile; discal area of metasomal terga four to six with pile pale grey to a very light ochreus, never black; metasomal sterna with a few scattered, erect hairs.

Antennae brown, flagellar segments three-quarters as long as broad; malar space three-eighths as long as broad; clypeus weakly convex rather coarsely and sparsely striately punctate, punctures becoming sparser towards apex, median longitudinal line very weakly depressed to form a weak sulcus; vertex shiny with a few sparse, fine punctures; fascial foviae narrow, indistinct, barely reaching to the upper edge of the compound eye. Prothoracic spines strong and roughly triangular, just slightly longer than width across base; mesoscutum densely punctate about anterior one-half and lateral margins, impunctate area large; scutellum densely almost rugosely punctate on posterior one-quarter, punctures becoming sparser with shiny interspaces over discal area and virtually impunctate on anterior one-quarter; mesepisterna coarsely punctate, punctures almost contiguous; propodeum with basal area shallowly pitted with elongate, quadrate pits, lateral faces shiny transversed by a few, very weak rugae, posterior face dull and roughened; tegulae very light hyaline brown; wings dusky to whitish hyaline with abundant, very pale pubescence on the apical one-third, nervures light brown; legs reddish brown; posterior basitarsi three and three-quarter times as long as broad. First metasomal tergum shiny, very sparsely and weakly punctate, punctures three to five puncture widths apart, apical fascial margins of terga one to five depressed slightly and brownish hyaline rather than black of discal areas; metasomal sterna very

coarsely and densely folliculated, interspaces shiny.

Distribution:

Texas: Fedor; Dallas; Lee County; Victoria; College Station; Davis Mountains; Terrell; Colorado County; Brownwood; Albany; Del Rio; Austin; Langtry; Southmost; Eldorado; Roundrock.

Oklahoma: Rush Springs.

Kansas: Meade County; Hamilton County.

New Mexico: Desmoines.

Flight Records:

In Texas the species appears to have two generations, the first generation flying from March 27 to June 12 and the second flying in November. A number of specimens labelled merely November are from Lee County, Texas, and a single specimen taken at Austin is labelled November 11. In Kansas and Oklahoma the species appears from April 9 to June 7, and the single New Mexico male is dated June 18.

Plant Records:

Rhus microphylia.

The holotype is located in the collections of the University of Nebraska.

Colletes sleveni Cockerell

sleveni COCKERELL, 1925, Proc. California Acad. Sci., ser. 4, vol. 14, p. 185; TIMBERLAKE, 1951, Wassman J. Biol., vol. 9, p. 208.

eriogoni COCKERELL, 1939, Pan-Pacific Ent., vol. 15, p. 188; COCKERELL, 1939 Proc. California Acad. Sci., ser. 4, vol. 23, p. 429; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 392.

The females can be distinguished with slight difficulty from birkmanni as described above but are at times difficult to tell from bryanti except by locality data and sex association. C. sleveni is found principally in California but does extend northward to Oregon, thence east and north to Utah and Nevada and to Colorado, whereas bryanti has only been recorded with certainty from the southern lower Sonoran region. The males can be accurately distinguished from birkmanni and bryanti on the basis of genitalic examination, for in bryanti the anterior lateral fringe of hair on the seventh ventral plate reaches to the basal articulatory condyle along the basal area from median to lateral margins. In sleveni this fringe extends medio-basally from a point one-third of the way down the median margin but never reaches the basal condyle at its greatest basal penetration. The males exhibit a great deal of variation in the color of the pile of the mesoscutum and

scutellum, grading from the more typical deep ochreus to a light grey. Similar variation occurs in the coarseness and density of the puncturation of the first metasomal tergum. In most specimens the punctures are very fine and at least one to two puncture widths apart, while in others the punctures become coarser and denser, particularly laterally where they are not usually more than one puncture width apart. The malar space fluctuates from seven-eighths to as long as wide. The prothoracic spines are short and sharp, tending to be somewhat needle-like rather than triangular. In the females the pile of the mesoscutum and scutellum is more uniformly deep ochreus, although in a few there is some degree of greyness evident. There is a similar variation in the puncturation of the first metasomal tergum; the typical and most abundant specimens are very finely and shallowly punctate with punctures one to two puncture widths apart, however isolated specimens have the first tergum closely punctate laterally with rather coarse punctures approximately one puncture width apart, these punctures become much sparser medially to resemble the more typical form.

MALE: length 9 mm., wing length 6.75 mm.

Pile of face long, dense, and light ochreus, completely concealing clypeus and basal areas of antennae; vertex with pile long, rather dense, and deep ochreus; pile of upper genal areas ochreus, becoming much longer and more pale grey

below; mesoscutum and scutellum with pile tinged with ochreus, long, erect, and dense; mesepisterna with pile very light ochreus above, tending to pale grey below, pile long, fine, and rather sparse; propodeum with dense latero-posterior fringes of light ochreus pile extending down towards pedicle, lateral and posterior faces with abundant, erect, shorter, pale grey to light ochreus pile; legs with pile fine, moderately dense, and just tinged with ochreus; first metasomal tergum with fascia dense, broad, and weakly tinged with yellow, lateral fringes of long, ochreus pile extending to fascia, disc with abundant, erect, light ochreus pile not concealing surface; metasomal terga two to five with fasciae broad, dense, and tinged with light yellow, particularly evident about basal portion of each fascia; metasomal terga three to six having discs with abundant, short, deep testaceous to black, erect pile, not concealing surface; metasomal sterna with fasciae evident as long lateral fringes of pile, absent medially.

Antennae deep brown and long, flagellar segments approximately one and one-half times as long as broad; malar space as long as broad; clypeus weakly convex, finely and densely punctate over basal one-half and down a median longitudinal line towards apex, apex and latero-apical portions sparsely punctate and shiny; vertex dull, densely and deeply punctate. Prothoracic spines sharp, scarcely longer than width across base; mesoscutum densely and closely punctate, impunctate area small, almost absent;

scutellum very densely and closely punctate over posterior two-thirds of surface, anterior one-third shiny, impunctate; mesepisterna deeply and densely punctate with narrow, shiny interspaces, punctures equal in coarseness to those of mesoscutum; propodeum with basal area shallowly, irregularly pitted, pits not uniformly quadrate, propodeum with lateral and posterior faces dull and roughened; tegulae brownish hyaline; wings dusky with a sparse covering of light ochreus pubescence, nervures brown; legs deep reddish brown; posterior basitarsi four times as long as broad. First metasomal tergum shiny, irregularly punctate, punctures not uniformly round, some triangular, some roughly hexagonal, and some close to being round, punctures on lateral faces approximately one puncture width apart, becoming sparser and much finer medially, fascial depression of first tergum distinct across entire breadth, discal area elevated and appearing to be flattened in four or five different planes; second metasomal tergum with punctures closer than first, not more than one puncture width apart; fasciae to metasomal terga two to four in distinctly depressed apical margins, depressions most evident along median part of each segment; metasomal sterna shiny, very sparsely and finely folliculated; seventh ventral plates much as in birkmanni except in having densely fasciate rims extending from half way down median areas diagonally to basal lateral margins (See Fig. 21).

FEMALE: length 10 mm., wing length 6.25 mm.

Pile of face dense and semi-appressed along inner orbital margins, pile tinged with yellow and overhanging clypeus from lateral and dorsal margins; vertex with pile light ochreus; upper genal areas with pile strongly tinged with yellow, pile becoming much longer and lighter yellow below, a narrow rim of appressed yellowish pubescence immediately posterior to compound eyes; mesoscutum and scutellum with pile light ochreus, short and dense; pile of upper mesepisterna tinged with ochreus, tending to pale grey below; propodeum with a strong fringe of light ochreus pile on latero-posterior margins extending to pedicle, lateral and posterior faces with abundant, erect, yellowish pile; pile of legs long, plumose, and weakly tinged with yellow; metasomal fasciae broad, dense, and tinged with yellow; first metasomal tergum with lateral fringes of yellowish pile extending to fascia, tergum with discal area having abundant, erect, ochreus pile, not concealing surface; ;metasomal terga three to six with discal area with abundant, black to deep testaceous erect pile, not obscuring surface; metasomal sterna with weak fringes of long, plumose pile at apex of each sternum.

Antennae deep reddish brown, flagellar segments approximately as long as broad; malar space one-half as long as wide; clypeus sparsely and coarsely, striately punctate, with evidence of a weak median longitudinal sulcus, punctures extending tc extreme apex and having ridges shiny;

vertex shiny, sparsely punctate with fine punctures; fascial foviae shallow, not extending beyond top of inner margin of compound eye, broadened dorsally. Mesoscutum densely punctate over anterior one-half, impunctate area large; scutellum with posterior half closely and densely punctate, not rugose, anterior half shiny, impunctate; mesepisterna with punctures close and dense, approximately one-half puncture width apart above, about one puncture width apart below, punctures about same size as those on mesoscutum; propodeum with basal area shallowly pitted with quadrate pits, lateral and posterior faces roughened and dull; tegulae brownish hyaline; wings slightly tending to duskiness with very fine, scattered, ochreus pubescence; legs reddish brown; posterior basitarsi approximately four times as long as broad. First metasomal tergum shiny, sparsely punctate, with punctures of irregular shape, not uniformly round, and approximately two to three puncture widths apart; second metasomal tergum with punctures finer and sparser; fasciae of metasomal terga one and two lying in abruptly declivous depressions, most evident laterally; metasomal sterna shiny and sparsely folliculated.

Distribution:

The species occurs in abundance throughout California from San Diego northward, being found in particular abundance in the mountainous regions from 2500 to 8000 feet. Other records for the species are as follows:

Oregon: Baker; Crater Lake Park; Hood River; Jackson County; Maupin; McKenzie; Parkdale; Pineville; Sisters; Suttle Lake; Yachats.

Washington: Yakima.

Idaho: Hansen; Hollister.

Wyoming: Grand Teton National Park.

Colorado: Grand Junction.

Utah: Bryce Canyon; Lakepoint; Showell; Snowville; Watson.

Nevada: Kyle Canyon, Charleston Mountains.

Arizona: Carrizo Creek; Oak Creek Canyon; Prescott; White Mountains.

Flight Records:

The species appears to fly throughout the summer, being recorded from May 24 to September 30. It is possible that there is at least a partial second generation in California where from specimens collected there appears to be a bimodal curve in population abundance, the first appearing in May and June, and the second in late August and September.

Plant Records:

Amorpha fruticosa, Aster, Biglovia, Chrysanthemum, Cirsium, Eriogonum elatum, Eriogonum fasciculatum, Eriogonum nudum, Euphorbia albimarginata, Melilotus, Nolina, Rhamnus californica.

The type is located in the collection of T.D.A. Cockerell.

Colletes eulophi Robertson

eulophi ROBERTSON, 1891, Trans. Amer. Ent. Soc., vol. 18, p. 61; ROBERTSON, 1895, Trans. Amer. Ent. Soc., vol. 22, p. 116; ROBERTSON, 1904, Canadian Ent., vol. 36, p. 276; ROBERTSON, 1905, Science, vol. 23, p. 309; ROBERTSON, 1926, Psyche, vol. 33, p. 116; GRAENICHER, 1927, Ent. News, vol. 38, p. 233; ROBERTSON, 1928, Flowers and Insects, p. 10; PEARSON, 1933, Ecolog. Monog., vol. 3, p. 384; BRIMLEY, 1938, Insects of North Carolina, p. 451; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 392.

illinoiensis ROBERTSON, 1891, Trans. Amer. Ent. Soc., vol. 18, p. 62; ROBERTSON, 1895, Trans. Amer. Ent. Soc., vol. 22, p. 116.

The species is very close to kincaidii Cockerell and can be distinguished accurately only by an examination of the male genitalia. It has been reported from Wisconsin (Graenicher), Ontario and Quebec (Gibson and Criddle), but these records were based on specimens of kincaidii. This species appears to be the southern sibling species of kincaidii occurring over the southern portion of the United States from the Carolinas and Virginia through

Illinois, Iowa and Nebraska to Colorado; additional records show the species to be present in Arizona and New Mexico, and one specimen has been examined from Texas. It is presumed that the lack of records from the south central United States is due to insufficient collecting.

In eulophi the seventh ventral plates have distinct necks between the condyles and the plates while in kincaidii the plates have abrupt lateral shoulders, sharply emarginate beneath and becoming broader towards the apex as illustrated in the figures 22 and 23. The females are difficult, and at times impossible, to distinguish from kincaidii but some can be told apart upon examination of the metasomal sterna: in eulophi the apical half of sterna three to five is usually coarsely though sparsely punctate while in kincaidii the punctures are very fine and more follicle-like. This character fails in the westerly specimens. There is considerable variation in both sexes in the puncturation of the mesepisterna, mesoscutum, and first two metasomal terga; the puncturation varies in coarseness and density from one-half to one puncture width apart.

MALE: length 9 mm., wing length 6 mm.

Face with pile long, dense, and pale grey about antennal bases, along lower inner orbital margins, and over clypeus; vertex with pile light ochreus; genal areas with upper surface having abundant light ochreus pile,

becoming longer, finer, and pure white below; mesoscutum with pile long, dense, and ochreus; scutellum with pile light ochreus; mesepisterna with pile long and fine, ochreus above tending to pale grey below; propodeum with dorso-lateral margins having weak clump of light ochreus to grey pile, lateral and posterior faces with scattered fine hairs, not concealing surface; legs with pile short, sparse, pale grey to light ochreus; metasomal terga one to five with apical fasciae of pale grey pubescence, fasciae rather sparse; first metasomal tergum with lateral fringes of pale pile extending to apical fascia, disc and anterior face with abundant erect, light ochreus pile; metasomal tergum two with pile short, pale grey to ochreus; metasomal terga three to six having disc with abundant short, deep brown to black pubescence and with a few longer, erect, light ochreus hairs on discs of five and six; metasomal tergum seven with pile light brown and appressed; metasomal sterna two and three with broad white apical fasciae, widest at mid line; metasomal sterna four and five with fasciae weak, almost absent medially.

Antennae deep reddish brown, flagellar segments one and one-half times as long as broad; malar space seven-eighths as long as broad; clypeus weakly convex, very finely and densely punctate over basal half, punctures becoming much sparser apically with apical one-fourth almost completely impunctate and shiny; vertex dull, finely and densely punctate. Prothoracic spines about as long as

width across base, roughly triangular; mesoscutum with disc very finely and densely punctate, punctures one-half puncture width apart about anterior half and lateral margins, impunctate area large; scutellum finely, densely contiguously punctate over posterior two-thirds, anterior third with punctures sparser, almost impunctate on extreme anterior medial area; mesepisterna with punctures coarse and dense, no more than one puncture width apart; propodeum with lateral and posterior faces roughened, shiny, and rather coarsely striate; tegulae light brown, nervures light brown; wings with weak apical covering of light brown pubescence; legs brown; posterior basitarsi three and three-quarters times as long as broad. Metasomal terga one and two coarsely densely punctate with punctures no more than one-half puncture width apart; metasomal tergum two with punctures slightly finer than those of first; metasomal terga three and four very finely and densely punctate with shiny interspaces; metasomal sterna shiny and weakly, sparsely folliculated or roughened.

FEMALE: length 9.5 mm., wing length 7 mm.

Face with pile sparse, fine, and clumped about antennal bases, pale grey to weakly ochreus; vertex with pile light ochreus; genal areas with upper surfaces having light ochreus pile, becoming finer, longer, and much whiter below. Mesoscutum with pile tinged with ochreus, very dense, and weakly plumose; scutellum with pile

longer, plumose, and tinged with ochreus; mesepisterna with pile long, fine, and weakly plumose, light ochreus above to pale grey below; propodeum with dorso-lateral fringe of long pale pile extending part way down to pedicle, lateral and posterior faces with a few long, fine, white hairs; legs with pile short, sparse, and tinged with ochreus on anterior two pair, posterior legs with abundant long, plumose, light ochreus pile on femora and tibiae; metasomal terga one to four with fasciae of sparse, pure white pubescence, narrowest on first tergum; first metasomal tergum with lateral fringes of white pile extending to apical fascia, anterior face and disc with scattered, long, fine, white pile; metasomal tergum two with distinct white basal fascia almost as broad as apical fascia; metasomal terga four and five with abundant erect, deep ferrugineus to black pile; metasomal tergum six with appressed, deep brown to black pile; metasomal sterna not fasciate but with scattered ochreus hairs.

Antennae brown, flagellar segments seven-eighths as long as broad; malar space one-half as long as broad; clypeus weakly convex, closely and densely striately punctate over basal half, punctures becoming sparser and more striate toward apex with broad shiny interspaces; vertex dull, closely and finely punctate. Prothoracic spines as long as width across base; mesoscutum densely and coarsely punctate, punctures almost contiguous over anterior half and lateral margins, large median impunctate

discal area; scutellum densely, deeply, contiguously punctate over posterior seven-eighths, anterior margin shiny and sparsely punctate; mesepisterna deeply and densely punctate with punctures no more than one-half puncture width apart; propodeum with lateral and posterior faces weakly roughened, not evidently striate; tegulae brown, nervures brown; wings with sparse, weak, brownish pubescence, concentrated apically; legs brown; posterior basitarsi three and one-half times as long as broad, with weak longitudinal median excavation. Metasomal terga one and two with discs closely and densely punctate; first metasomal tergum with punctures one-half to one puncture width apart, punctures finer at extreme apical margin; second metasomal tergum with punctures finer than first; metasomal terga three and four finely punctate with shiny interspaces; metasomal sterna three to five coarsely punctate with shiny interspaces, punctures two puncture widths apart; sterna with broad impunctate hyaline band.

Distribution:

The species is found across the southern half of the United States and extends into the mountainous region to the west. Due to the rather disjunct collections, the entire list of localities is recorded.

Arizona: Oak Creek Canyon; Grand Canyon; Flagstaff; San Francisco Mountains; Chiricahua Mountains.

New Mexico: Jemez Springs; Magdelena; Bernalillo County; Springer; Tajique; Quemado; Lordsburg; Las Vegas.

Utah: Bryce Canyon.

Texas: Greenville.

Colorado: Boulder.

Kansas: Douglas County; Baldwin; Miami County; Decatur County.

Missouri: Columbia; Branson; Ozark Lake.

Iowa: Ames; Boone.

Illinois: Carlinville.

Ohio: Columbus.

Kentucky: Mammoth Cave National Park.

District of Columbia: Anacosta.

Virginia: Richmond; Great Falls; Falls Church.

West Virginia: Terra Alta.

North Carolina: Linville; Bryson City; Raleigh; Cruso; Swannanoa; Black Mountain.

Flight Records:

The species flies from May 10 (Texas) to November 8 (North Carolina).

Plant Records:

Aster, Ceanothus fenderli, C. americanus, Chrysanthemum leucanthemum, Clematis, Eupatorium perfoliatum, Melilotus, Solidago nemoralis, Sophia obtusa.

The lectotypes are located in the Illinois State Natural History Survey Collection.

Colletes kincaidii Cockerell

kincaidii COCKERELL, 1898, Proc. Acad. Nat. Sci. Philadelphia, vol. 50, p. 52; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 43; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 43; SWENK, 1904, Canadian Ent., vol. 36, p. 94; COCKERELL, 1905, Psyche, vol. 12, p. 86; COCKERELL, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 314; COCKERELL, 1906, Bull. Amer. Mus. Nat. Hist., vol. 22, p. 424; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 291; COCKERELL, 1907, Univ. Colorado Studies, vol. 4, p. 240; KENOYER, 1916, Proc. Iowa Acad. Sci., vol. 23, p. 488; COCKERELL, 1919, Ent. News, vol. 30, p. 287; COCKERELL, 1919, Canadian Ent., vol. 51, p. 271; CLEMENTS and LONG, 1923, Carnegie Inst. Washington Publ., no. 336, p. 251; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 393; TIMBERLAKE, 1951, Wasaman J. Biol., vol. 9, p. 210.

aestivalis COCKERELL (not Cresson), 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 49.

eulophi GIBSON and CRIDDLE (not Robertson), 1920, Rept. Ent. Soc. Ontario, p. 21; GIBSON and CRIDDLE, Rept. Ent. Soc. Ontario, vol. 36, p. 132.

eulophi GRAENICHER (not Robertson), 1906, Bull. Wisconsin Nat. Hist. Soc., vol. 4, p. 139; GRAENICHER, 1910, Bull. Pub. Mus. Milwaukee, vol. 1, p. 228; GRAENICHER, 1935, Ann. Ent. Soc. Amer., vol. 28, p. 301.

eulophi albertensis COCKERELL, 1938, Canadian Ent., vol. 70, p. 70 (new synonymy).

This species has often been confused with eulophi Robertson and records of the species are often erroneous. Timberlake 1943, discusses the similarity of kincaidii eulophi rather thoroughly and gives complete records for the distribution of kincaidii in the far west. The only constant difference between the two species is found in the seventh ventral plates of the male genitalia, which are shouldered laterally above, emarginate, then weakly shouldered beneath, whereas in eulophi the plate is uniformly constricted at the neck, expanding into a fan-like apical plate. The females of the two species are virtually indistinguishable. Occasionally the two can be separated on the puncturation of the metasomal sterna which are coarsely and closely punctate in eulophi and shallowly punctate, almost folliculated, in most specimens of kincaidii; however even this character fails in some specimens. The characters mentioned by Timberlake in his key fail when the entire range of kincaidii and eulophi is considered. It becomes essential to separate the females of the two species on their respective ranges and

sex associations. There is considerable variation in the puncturation of the mesepisterna and mesoscutum and in the length of the two species. C. kincaidii is found from the far west to the east coast of North America. It is abundant along the westerly slopes of the Great Divide, apparently coming through the mountains in the vicinity of the Columbia River Valley, occurring in a number of mountain valleys of British Columbia and recurring in Alberta, whence the range is continuous to the south and east. The species occurs principally across the northern portion of the continent, being replaced by its sibling species eulophi in the south. All of the material examined from Canada and the northern states has proved to be kincaidii. There appears to be little overlapping of the ranges along the eastern coast where kincaidii predominates as far south as New York. In the western plains kincaidii is abundant in Colorado but a few specimens of eulophi have been examined from that state. Timberlake reports kincaidii from Beulah, New Mexico, and the author has examined a single male specimen taken in the San Francisco Mountains of Arizona on June 25, 1950. This would indicate that the species extends far to the south in the higher western mountains. There is very little difference between series from California and Washington and those taken along the eastern seaboard and the eastern provinces of Canada. There seems to be a progressive lengthening in the malar space in both sexes from east to west (7/8 as

long as broad to as long as broad) and in the length of the posterior basitarsi of the males (3 1/2 to 4 1/2 times as long as broad); also in the males the pile of the body is pale grey to light ochreus in eastern material, becoming slightly longer and much whiter on western specimens. These characters appear to be the only consistent variables in the species range. Subspecific designation would be difficult and is not deemed advisable at present. The type of eulophi albertensis Cockerell, a female, has not been recently examined but from the locality it appears to be a member of the normal kincaidii taken from Alberta. Cockerell's contention that e. albertensis can be distinguished from kincaidii on the basis of excessively fine punctures of the first two tergites fails when a larger series is considered. The puncturation of the terga shows considerable variation in those specimens examined from Alberta.

MALE: length 10 mm., wing length 7 mm.

Face with pile long, pure white, and very dense about antennal bases, along inner orbital margins, and over clypeus; vertex with pile pale grey to light ochreus, and sparse; genal areas with pile short, erect, light ochreus above to long, fine, and pure white below; mesoscutum with pile long, pale grey, and weakly plumose, partially concealing surface; scutellum with pile very long, dense, and weakly plumose, grey to white; mesepisterna with pile

long, fine, and pure white; propodeum with dorso-lateral fringes of pure white pile, lateral and posterior faces with much erect white pile, not concealing surface; legs with pile white, sparse, and short; metasomal terga one to five with broad, sparse, pure white apical fasciae; first metasomal tergum with weak lateral fringes of long white pile, anterior face and disc with abundant long, weakly plumose, white pile; second metasomal tergum with disc having few white basal hairs, discal area with numerous long, erect, white hairs; metasomal terga three to six with discal area covered with abundant short, erect, fine, deep brown to black pubescence, not concealing surface; metasomal sterna two to five with distinct apical fasciae broadened medially and narrowed laterally.

Antennae long and reddish brown, flagellar segments at least one and one-half times as long as broad; malar space seven-eighths as long as broad; clypeus weakly convex, closely punctate over basal half, punctures becoming coarser and more striate toward apex with broad shiny interspaces; vertex dull, densely and coarsely punctate with punctures no more than one-half puncture width apart. Prothoracic spines about as long as broad, roughly forming an equilateral triangle; mesoscutum densely and coarsely punctate, especially over anterior and lateral margins, punctures no more than one-half puncture width apart, usually closer; scutellum closely and coarsely punctate, punctures becoming coarser and sparser towards extreme

anterior margin; mesepisterna densely, distinctly punctate, punctures no more than one-half puncture width apart, with shiny interspaces; propodeum with lateral and posterior faces dull and finely striate; tegulae brown, nervures dark brown; wings dusky with abundant fine brownish pubescence over surface; legs deep brown to black; posterior basitarsi three and three-quarters times as long as broad. Metasomal terga one and two coarsely and densely punctate, punctures no more than one-half puncture width apart and usually much closer medially, interspaces shiny; metasomal terga three to six with punctures very fine, follicle-like, with shiny interspaces, apical fascial bands partially punctate basally and with a hyaline impunctate apical margin; metasomal sterna with discal areas dull, finely roughened, and folliculated with sparse follicles.

FEMALE: length 11 mm., wing length 7.5 mm.

Face with pile pale grey about antennal bases, becoming shorter, sparser, and whiter along lower inner orbital margins; clypeus with very few, scattered, white, semi-erect hairs; vertex with pile pale grey to light ochreus; genal areas with pile light ochreus to pale grey, becoming longer, finer, and pure white below; mesoscutum with pile light ochreus, concentrated principally about lateral and anterior faces; scutellum with pile light ochreus; mesepisterna with pile long and fine, pale grey to light ochreus above to white below; propodeum with dorso-lateral

margins having clump of pale grey pile, lateral and posterior faces with abundant erect, long, pale grey pile not concealing surface; anterior two pairs of legs with pile white, posterior legs with pile tinged with ochreus; metasomal terga one to five with broad apical fasciae, narrowest on first tergum; fasciae one to three often tinged with light ochreus or pale grey; first metasomal tergum with distinct lateral fringes of pale grey to light ochreus pile, disc and anterior face with scattered, long, erect, white pile; metasomal terga three to five having discs with a few scattered, long, erect, ochreus hairs; metasomal tergum six with appressed, deep brown pile; metasomal sterna with weak apical fringes of white pile.

Antennae deep brown, flagellar segments seven-eighths as long as broad; malar space two-thirds as long as broad; clypeus weakly convex with striate longitudinal punctures approximately one puncture width apart toward apex; vertex dull, finely and densely punctate. Prothoracic spines longer than broad, roughly forming an equilateral triangle; mesoscutum with punctures dense and coarse about anterior and lateral faces, punctures no more than one-half puncture width apart, large impunctate median area; scutellum with punctures dense and coarse, becoming sparser and slightly coarser toward anterior median area; mesepisterna with punctures fine and dense, about one-half puncture width apart, becoming sparser below where they tend to one puncture width apart; propodeum with lateral and posterior

faces dull, finely striate; tegulae light brown, nervures deep brown; wings with sparse brown apical pubescence, becoming sparser basally; legs deep brown to black; posterior basitarsi about four times as long as broad, slightly broader apically. Metasomal tergum one deeply and densely punctate, punctures varying from one-half to one puncture width apart, finest and most dense along apical margin; metasomal tergum two with punctures finer and much denser than one; metasomal terga three to six with discal areas finely punctate or folliculated, shiny; metasomal sterna shiny, sparsely folliculated.

Distribution:

The species is broadly distributed over western and northern America, being most abundant in the region west of the continental divide. Marginal localities include: San Francisco Mountains, Arizona; Yosemite and San Bernardino County, California; Nanaimo and Salmon Arm, British Columbia; Park City and Monticello, Utah; Pinecliffe, Colorado; Lethbridge, Alberta; Estevan, Saskatchewan; Russell, Manitoba; Lanorie, Quebec; Crown Point, Nova Scotia; Ithaca, New York; Delphi, Indiana; Galena, Illinois; Sioux City, Iowa, and Crete, Nebraska.

Flight Records:

The species has been recorded as flying between June 10 and September 5, with the flight peak occurring during July and August.

Plant Records:

Heracleum, Medicago sativa, Melilotus, Pentstemon, Potentilla, Symphoricarpos.

The holotype is located in the United States National Museum.

Colletes wootoni Cockerell

wootoni COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 42; COCKERELL, 1897, Bull. New Mexico Agric. Exper. Sta., no. 24, p. 24; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 42; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 42; COCKERELL, 1901, Ent. News, vol. 12, p. 42; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 401; TIMBERLAKE, 1951, Wassman J. Biol., vol. 9, p. 210.

apacheorum TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 401.

This is one of the most distinctive species of the simulans group and is restricted to southern Arizona, New Mexico, and Texas. The male is peculiar in having a very long malar space, approximately one and two-thirds times as long as broad, and the genitalia are unique as illustrated. The females similarly have a very long malar

space, about three-quarters as long as broad at the posterior mandibular articulation and one-half as long as broad at the anterior articulation, its apex stepped rather than uniformly sloping from posterior to anterior. The female is most likely to be confused with sleveni, differing, however, in having a longer malar space, short prothoracic spines, vertex finely and sparsely punctate, and fascial foveae shallow, not depressed at the dorsal ends. In the female there is a great deal of variation in the color of the pile of the mesoscutum, from light grey to deep ochreus; this color difference occurs throughout the entire range of the species. The present work extends the range of the species into southern and western Texas.

MALE: length 9 mm., wing length 6.5 mm.

Face with pile long, dense, and pure white, partially concealing clypeus; vertex with pile long, abundant, and tawny; genal areas with upper pile white and short, becoming longer and denser below; mesoscutum with pile pale grey and dense; scutellum with pile long, pale grey, partially concealing surface; mesepisterna with pile long, fine, and white; propodeum with dorso-lateral clumps of long white pile extending down latero-posterior margin to pedicel, lateral and posterior faces with abundant long white hairs; legs with pile sparse, short, and white; metasomal terga one to five with weak apical fasciae of pure white pubescence; metasomal tergum one with strong

lateral fringes of white pile, disc and anterior face with abundant erect white pile; metasomal terga two to six with discs having few short, fine, white hairs; metasomal tergum seven with pile white to pale grey and appressed; metasomal sterna with weak apical fringe of short white pile.

Antennae deep brown to black, flagellar segments one and one-half times as long as broad; malar space one and two-thirds times as long as broad; clypeus long, weakly convex with a shallow median longitudinal sulcus, punctures very fine and dense about lateral and basal areas and along sulcus, rims of sulcus shiny and sparsely punctate with few striate punctures, punctures separated by two to four puncture widths; vertex sparsely punctate with coarse punctures, interspaces shiny. Prothoracic spines very short and sharp; mesoscutum finely and densely punctate, punctures one-half to one puncture width apart, becoming much sparser posteriorly, impunctate area large; scutellum with anterior one-half sparsely punctate to impunctate shiny, punctures abundant, fine, and denser toward posterior margin where they are almost contiguous; mesepisterna with punctures fine and dense, about one-half puncture width apart; propodeum with lateral and posterior faces shiny and very finely roughened, basal area with shallow quadrate pits; tegulae brown, nervures light brown; wings whitish hyaline with scattered apical pubescence; legs black; posterior basitarsi long and slender, approximately five times as long as broad. Metasomal tergum one

finely and densely punctate, punctures one to two puncture widths apart, most dense and coarse along lateral margins; metasomal terga one to six with apical fascial margins depressed, light brown hyaline and impunctate; metasomal tergum two finely and densely punctate as tergum one but having a deep basal depression, almost as broad as apical fascial depression; metasomal tergum three finely punctate or folliculated, shiny; metasomal terga four to six shiny and weakly roughened; metasomal sterna shiny, finely roughened, apical margins hyaline.

FEMALE: length 11 mm., wing length 7.5 mm.

Pile of face very long and dense about antennal margins and frontal area, clypeus overhung with a few long white hairs from fronto-clypeal suture; vertex with pile long and dense, tinged with grey; genal areas with short white pile above, becoming longer and whiter below; mesoscutum with dense covering of light ochreus, plumose pile concealing anterior one-half and lateral margins, medial area sparsely pilose; scutellum densely and plumosely pilose about lateral and posterior margins, concealing surface; mesepisterna with pile long, fine, and pure white; propodeum with dense dorso-lateral clump of long white pile extending down postero-lateral margin to pedicel, lateral and posterior faces with scattered, long, fine, erect hairs; legs with pile white to pale grey on anterior two pairs, long, dense, and plumose on posterior

femora and tibiae, tinged with ochreus; metasomal terga one to four with broad dense apical fasciae of pure white pubescence; metasomal tergum one with fascia narrowest, lateral fringes dense and white, disc and anterior face with sparse covering of long white pile; metasomal tergum two with weak basal fascia of pure white pile; terga three to five having disc covered with short, white, erect pubescence; metasomal tergum six with pile appressed, pale grey to golden; metasomal sterna with weak apical bands of short, white, plumose hairs.

Antennae deep brown to black, flagellar segments as long as broad; malar space three-quarters as long as broad at posterior mandibular articulation, one-half as long as wide at anterior mandibular articulation, apical margin stepped rather than clined from posterior to anterior face; clypeus weakly convex, deeply coarsely striately punctate with punctures one to two puncture widths apart, having broad shiny interspaces; vertex finely but sparsely punctate with shiny interspaces. Prothoracic spines short and sharp; mesoscutum with anterior half finely and densely punctate with punctures no more than one-half puncture width apart, punctures becoming sparser and coarser posteriorly, impunctate discal area large; scutellum with anterior one-third shiny impunctate, punctures coarse and dense medially, becoming much finer and contiguous at posterior margin; mesepisterna densely and coarsely punctate with punctures one-half puncture width apart, punctures more

obscure, shallower, and finer at posterior face; propodeum with lateral and posterior faces weakly roughened, tending to shiny, basal area with shallow quadrate pits; tegulae light hyaline brown, nervures deep brown; wings whitish hyaline, with sparse short apical pubescence; legs black; posterior basitarsi four times as long as broad. Metasomal terga one and two coarsely and densely punctate, punctures no more than one puncture width apart, finer toward apical margin; metasomal tergum two with punctures slightly finer than those of first, tergum with deep broad basal depression; metasomal terga one to five with apical margins brownish hyaline and almost impunctate; metasomal terga three to five with discs sparsely and finely folliculated; metasomal sterna two to five shiny, coarsely punctate on apical one-half to three-quarters, extreme apical margins light brownish hyaline.

Distribution:

The species is restricted to the southern portions of Texas, New Mexico, and Arizona. Marginal localities include: San Angelo and Big Bend National Park, Texas; Las Vegas and Las Cruces, New Mexico; Flagstaff, Chino Valley, and Nogales, Arizona.

Flight Records:

The species has been recorded as flying between March 3 and October 30. While it is possible that two generations may occur, the great preponderance of specimens

flying during late June and July would suggest these two dates as aberrant extremes of the normal period of activity.

Plant Records:
Amorpha fruiticosa, Dasylirion wheeleri, H. autumnals, Helenium laciniatum, Isocoma, Melilotus alba, Nolium microcarpa, Phacelia, Petalostemon flavescens, Sapindus drummondi, Sphaeralcea laxa, Solidago occidentalis, Wislizenia refracta.

The holotype is located in the collection of T.D.A. Cockerell.

GROUP V - aestivalis

Colletes aestivalis Patton

aestivalis PATTON, 1879, Proc. Boston Soc. Nat. Hist., vol. 20, p. 142; ROBERTSON, 1895, Trans. Amer. Ent. Soc., vol. 22, p. 116; COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 49 (this record is kincaidii); COCKERELL, 1897, Bull. Univ. New Mexico, vol. 24, p. 21 (this record is kincaidii); ROBERTSON, 1904, Canadian Ent., vol. 36, p. 276; ROBERTSON, 1906, Science, vol. 23, p. 309; VIERECK, 1916, Connecticut Geol. Nat. Hist. Surv. Bull., vol. 22, p. 741; ROBERTSON, 1926, Ecology, vol. 7, p. 378; ROBERTSON, 1926, Psyche, vol. 33, p. 116; ROBERTSON, 1928,

Flowers and Insects 10; GRAENICHER, 1935, Ann. Ent. Soc. Amer., vol. 28, p. 301; BRIMLEY, 1938, Insects of North Carolina 451.

heucherae ROBERTSON, 1891, Trans. Ent. Soc. Amer., vol. 18, p. 61; ROBERTSON, 1895, Trans. Ent. Soc. Amer., vol. 22, p. 116.

This and the following species, andrewsi Swenk, are very closely related and at times are difficult to distinguish. These are the only Nearctic members of the genus which have the inner orbital margins parallel. The males have the hind basitarsi 3.8 to four times as long as broad, and very rarely is their upper surface concealed by pile; the females similarly have the hind basitarsi varying from four to four and one-quarter times as long as wide. Although the species was recorded from Wisconsin by Graenicher in 1935 and by Criddle et al from Manitoba in 1924, an examination of the Graenicher material from Milwaukee proves the specimens to be andrewsi rather than aestivalis, and all Manitoba material examined thus far has also been andrewsi.

MALE: length 12 mm., wing length 7.5 mm.

Pile of face longest and most dense about antennal bases, becoming much shorter and extremely sparse over clypeus, pile tinged with ochreus; pile of vertex and genal areas sparse and tawny; mesoscutum with pile erect, pale

grey, and moderately dense, partially concealing surface; mesoscutum and mesonotum with pile becoming longer and more dense laterally and posteriorly, forming a light ochreus to pale grey fringe about thoracic terga; mesepisterna with pile sparse, long, and weakly plumose, ochreus above tending to light pale grey below; propodeum with dense latero-posterior fringe of pale grey pile, becoming weaker and shorter towards pedicle; legs with pile short and sparse, pale grey to ochreus, not completely concealing surface of tibiae or tarsi; first metasomal tergum with weak apical fascia of pure white pubescence, disc with very fine, erect, pale grey pile; metasomal terga two to six with weak, pure white apical fasciae, occasionally interrupted medially due to wear; discs of metasomal terga two to six with abundant, short, erect, black pile; metasomal sterna two to five with very dense latero-apical clumps of long, white pile, intermixed with long, pale grey and black hairs towards lateral margins of apical sterna, no apical sternal fasciae; last metasomal sternum with abundant, short, deep brown to black pile directed posteriorly.

Antennae long and deep black, flagellar segments one and one-half times as long as broad; malar space one-eighth to one-quarter as long as broad; clypeus weakly convex, roughened and dull; inner orbital margins parallel; vertex dull and roughened. Prothoracic spines vestigial; mesoscutum with surface dull, shallowly folliculated;

scutellum dull and roughened, more coarsely roughened to rugose posteriorly; metanotum dull and roughened; mesepisterna dull and roughened; propodeum with basal area sloping ventrally, irregularly pitted, lateral and posterior faces dull; tegulae deep brown; wings dusky, nervures brown; legs deep reddish brown becoming brown apically; posterior basitarsi very long, 3.8 times as long as broad. Metasomal terga dull and sparsely follicolated; metasoma very strongly convex beneath.

FEMALE: length 12 mm., wing length 7.5 mm.

Pile of face white to pale grey, very sparse, concentrated principally about antennal bases, but never concealing surface; vertex and genal areas with hair sparse, fine, and pale grey; mesoscutum with pile pale grey, most dense on anterior half; scutellum with pile dusky, longest about lateral and posterior faces; propodeum with strong latero-posterior fringes of light ochreus pile, extending down latero-posterior margins towards pedicel, posterior face with abundant, erect, pale grey pile; mesepisterna with pile very long and weakly plumose, partially concealing surface; legs with pile light grey to ochreus on posterior femora and basitarsi, pile on ventral surface of tibiae and tarsi most dense and strongly tinged with ochreus, upper surfaces not concealed; first metasomal tergum with a weak apical fascia and lateral fringe of pure white pile, discal area and anterior face

weakly covered with fine, pale grey, erect pile, not concealing surface; metasomal terga two to four with broader, pure white apical fasciae; discs of metasomal terga two to six with abundant, short, erect, black pile; metasomal sterna two to five with weak, ochreus scopa, most dense on metasomal sterna two to four, few apical white hairs on latero-apical margins.

Antennae black, flagellar segments one and one-quarter times as long as broad, first flagellar segment subequal to second; malar space one-third as long as broad, broadest at posterior mandibular articulation; clypeus convex, roughened and not distinctly punctate; vertex dull and weakly punctate. Prothoracic spines short or vestigial; mesoscutum weakly punctate about anterior and lateral surfaces, with large impunctate discal area; scutellum distinctly punctate and roughened on posterior two-thirds; mesepisterna dull and roughened, not distinctly punctate; propodeum with basal area broad, irregularly and weakly pitted, lateral and posterior faces dull, roughened; tegulae deep brownish black; wings dusky, covered with very fine, brown pubescence, nervures deep brown; legs black; posterior basitarsi four times as long as broad. Metasomal terga one and two dull but distinctly punctate with shallow punctures, punctures separated by one and one-half to three puncture widths; metasomal terga three to six roughened and dull; metasomal sterna dull, densely and coarsely folliculated.

Distribution:

Cockerell records the species as occurring in New Mexico, which is an obvious error. It is doubtful that this species ranges west of the southern portions of Illinois, predominating in the Atlantic states.

North Carolina: Raleigh, Bryson City, Cruso.
Virginia: Great Falls, Skyland.
New York: West Nyack.
Maryland: Cabin John.
Massachusetts: Pingahry Swamp.
Pennsylvania: Pottstown, Cloverdale.
Ohio: Summit County, Columbus.
Tennessee: The Chimneys, Great Smokies National Monument.
Illinois: Carlinville.

Flight Records:
May 15 to July 12.

Plant Records:
Heuchera, H. americana, H. hispida.

The neotypes are located in the United States National Museum.

Colletes andrewsi Cockerell

andrewsi COCKERELL, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 311; COCKERELL, 1907, Univ. Colorado Studies, vol. 4, p. 239; CRIDDLE et al, 1924, Rept. Ent. Soc. Ontario, vol. 33, p. 99; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 385.

This species is close to aestivalis Patton, differing in both sexes in the length of the posterior basitarsi. The hind basitarsi of the male of andrewsi are about three to three and one-quarter times as long as broad and are densely plumose with the pile almost completely concealing the upper surface. In aestivalis the posterior basitarsi are much longer, usually 3.8 to four times as long as broad, and are bare above. In the female the posterior basitarsi are three to 3.3 times as long as broad, while in aestivalis the basitarsi are four to 4.2 times as long as broad. Both sexes are much larger than in aestivalis, ranging between 14 and 16 mm., and the species replaces aestivalis in the great plains area. The males of andrewsi are genitalically distinct, as can be seen in figure

MALE: length 14 mm., wing length 9 mm.

Face with pile short and dense, clumped principally about antennal bases, along lower inner orbital margins, and over basal half of clypeus, pale grey to ochreus; vertex with pile light ochreus to grey, becoming much

longer and lighter along lower genal areas; mesoscutum with pile long, fine, and dense, tinged with deep ochreus; scutellum with pile very long and dense, strongly tinged with ochreus, being most dense on extreme lateral and posterior margins; mesepisterna with long, fine pile, dusky above, becoming light grey to whitish below; propodeum with dense clump of long pile on latero-posterior margins, becoming sparser and finer towards pedicle, posterior face with abundant, erect, pale grey pile; legs with pile long and ochreus, most dense on posterior tibiae and basitarsi; metasomal terga one to four with narrow, pure white apical fasciae; metasomal tergum one having disc covered with fine, pale grey pile, not obscuring surface, and with strong lateral fringes of dusky pile; metasomal terga two to six with abundant, erect, black pile on discs; metasomal sterna with latero-apical margins having dense clump of long, ochreus pile forming a lateral tergo-sternal fringe.

Antennae long, black, flagellar segments one and one-half times as long as broad; malar space one-half to three-quarters as long as broad, broadest at posterior mandibular articulation; clypeus closely and shallowly punctate, almost roughened; vertex shiny with a few, scattered, fine punctures, dull medially. Prothoracic spines vestigial; mesoscutum shiny with close, shallow punctures about anterior, lateral, and posterior margins, punctures approximately one puncture width apart; scutellum shiny anteriorly, becoming progressively deeper and more

densely punctate to posterior margin where the surface is weakly rugose; mesepisterna dull, finely and shallowly punctate; propodeum with basal area broad, shallowly and broadly pitted, lateral and posterior faces dull and weakly roughened; tegulae deep brown; wings dusky with fine, brownish pubescence, nervures brown to black; legs deep reddish brown to black; posterior basitarsi broad, approximately three to 3.3 times as long as broad, with surface partially obscured with long pile. Metasomal terga one to six dull, closely folliculated; metasoma with sterna strongly concave beneath, shiny, traversed by many fine lines; seventh ventral plates roughly quadrate, densely pilose along apical and latero-apical portions of disc (See illustration 26).

FEMALE: length 14 mm., wing length 8 mm.

Face with pile pale grey, concentrated principally about antennal bases; vertex with sparse, pale grey pile, becoming longer, finer, and lighter on lower regions of genal areas; mesoscutum with pile long, pale grey, and dense; scutellum with pile long and dense, particularly about lateral and posterior margins, completely obscuring surface; mesepisterna with pile very long and pale grey, weakly plumose; propodeum with strong clump of light ochreus pile on latero-posterior margins, becoming much shorter and sparser towards pedicle; legs with pile pale grey, tending to ochreus on hind legs; metasomal terga one

to five with broad apical band of pure white pubescence; metasomal tergum one with lateral fringe of white pile, disc covered with fine, pale grey, erect pile, not concealing surface; metasomal terga two to five with abundant, short, black and ferrugineous pile on discs; metasomal tergum six with pile long, semi-appressed, and golden; metasomal sterna two to five with apical traces of a weak scopa; last metasomal sternum with apical clump of golden pile.

Antennae reddish brown, flagellar segments one and one-quarter times as long as broad, basal flagellar segment subequal to second; malar space three-eighths as long as wide, being broader at posterior mandibular articulation; clypeus weakly convex, closely punctate with very narrow, shiny interspaces; vertex dull and roughened. Prothoracic spines absent; mesoscutum dull with close, shallow punctures, particularly on lateral and posterior margins, impunctate area small to absent; scutellum closely punctate over posterior one-half where it tends to rugose, anterior one-quarter shiny, impunctate; mesepisterna dull, weakly roughened, shallowly and densely punctate; propodeum with basal area broad, shallowly, obscurely, irregularly pitted, lateral and posterior faces dull; tegulae light brown; wings dusky, covered with very fine, brownish pubescence, nervures light brown; legs black tending to brown at apices; posterior basitarsi 3.2 times as long as broad. Metasomal terga one to five dull and

very weakly punctured or folliculated; metasomal sterna dull with narrow, hyaline apical band to each sternum; last metasomal sternum weakly depressed apically, tending to hyaline and containing clump of golden pile.

Distribution:

Colorado: Estes Park; Glen Haven.

Nebraska: Ashland; South Bend.

South Dakota: Mobridge.

Manitoba: Winnipeg; Cormorant Lake; Aweme.

Wisconsin: Milwaukee.

Flight Records:

The species has been recorded as flying between May 18 and July 15.

Plant Records:

Heuchera, H. hispida.

The holotype is located in the collection of the Citrus Experiment Station, Riverside, California.

GROUP VI - robertsonii

Colletes robertsonii Dalla Torre

punctata ROBERTSON, 1891, Trans. Amer. Ent. Soc., vol. 18, p. 62 (Preocc.).

robertsonii Dalla Torre, 1896, Cat. Hymen., vol. 10, p. 44; ROBERTSON, 1897, Trans. Acad. Sci. St. Louis, vol. 7, p. 315; ROBERTSON, 1904, Canadian Ent., vol. 36, p. 276; ROBERTSON, 1914, Ent. News, vol. 25, p. 73; ROBERTSON, 1926, Ecology, vol. 7, p. 378; ROBERTSON, 1928, Flowers and Insects, p. 10; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 395; TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 193.

robertsonii robertsonii, MICHENER, 1951, in Muesebeck, et al, Hymen. Amer. North of Mexico, U.S.D.A. Monog. no. 2, p. 1047.

robustus SWENK, 1904, Ent. News, vol. 15, p. 251; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292; COCKERELL, 1928, Univ. Colorado Studies, vol. 16, p. 99; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 395.

robertsonii robustus, MICHENER, 1951, in Muesebeck, et al, Hymenoptera America North of Mexico, U.S.D.A. Monog. no. 2, p. 1048.

The synonymy of robustus Swenk and robertsonii D.T. is apparently correct, although I have not had opportunity to check the Robertson types in Illinois. There is a great deal of variability in both sexes throughout the range, even within small intrabreeding units. The body color may range from light reddish brown to deep black; the

prothoracic spine may be short or long; the puncturation of the mesoscutum and scutellum varies in density and size of punctures, usually the impunctate area of the mesoscutum of the female is large, but in many individuals it is sparsely covered with fine punctures. Considering this variation I am not able, as Timberlake suggests, to elevate the Colorado-New Mexico portions of the range to subspecific status. The species is readily distinguished by the coarse, close puncturation over the entire body, the female having a nude depressed area on the apex of the last ventral segment which is basally rimmed by long, overlapping hairs. The males have the tegulae coarsely punctate and distinctive genitalia.

C. robertsonii closely resembles C. metzi Timberlake and C. Timberlakei Stephen and can only be distinguished by examination of the seventh ventral plates and the capsule.

MALE: length 11.5 mm., wing length 8.5 mm.

Pile of face long, white, and dense about antennal bases, inner orbital margins, and over clypeus; vertex with pile sparse and white; upper genal areas with pile long, rather dense, and white, becoming longer below; mesoscutum with pile rather sparse and tinged with pale grey; scutellum with a sparse covering of erect, pale grey to white pile, being most dense along anterio-lateral margins; mesepisterna with pile long, fine, and white,

tinged with grey above; propodeum with dense lateral fringes of long, white pile, extending from upper latero-posterior margin towards pedicle, lateral and posterior faces with abundant, erect, pale grey pile; pile of legs very short, sparse, and white; first metasomal tergum with a distinct apical fascia of pure white pubescence, lateral fringes of pile weak, white, and reach apical fascia, disc with abundant, erect, whitish pile; metasomal terga two to five with fasciae broader, white, and dense, tapering off sharply at lateral faces; metasomal sterna with a very narrow fringe of short, white pile on the apex of segments two to five.

Antennae long, reddish brown, flagellar segments one and one-half times as long as broad; malar space one-quarter as long as broad; clypeus weakly convex, rather densely and finely punctate over apical one-half and down median longitudinal line, latero-apical margins with punctures coarser, weakly striate, with shiny, linear interspaces; vertex dull, coarsely and rather densely punctate. Prothoracic spines about one and one-half times as long as width across base, sharp; mesoscutum very coarsely and densely punctate, punctures contiguous medially, impunctate area absent; scutellum very coarsely punctate over posterior three-quarters, with shiny interspaces, punctures one-half puncture width apart, anterior one-quarter shiny, impunctate; mesepisterna very densely punctate, punctures smaller in size than those of

mesoscutum and scutellum, dull; propodeum with basal area very shallowly, quadrately pitted, pits obscure, lateral and posterior faces dull and roughened; tegulae deep brown to black, very coarsely punctate; wings dusky with abundant, deep fulvous pubescence, nervures brown; legs light brown to fulvous; posterior basitarsi four and one-half times as long as broad. Metasomal terga with fasciae lying in abrupt apical depressions, fascial depressions hyaline brown, shiny, impunctate; metasomal terga one to four very densely, coarsely punctate, punctures no more than one-half puncture width apart; metasomal sterna shiny, finely folliculated; seventh ventral plates greatly expanded laterally, almost linear, with median and lateral margins reflexed, apical margins with a long fringe of light fulvous pile (See illustration 27).

FEMALE: length 12.5 mm., wing length 8.5 mm.

Pile of face rather sparse and white, most dense laterad to antennal bases; vertex with the pile short, sparse, and pale grey; upper genal areas with pile white to pale grey becoming longer, finer, and whiter below; mesoscutum with pile very sparse, fine, short, and white; scutellum with a weak covering of short, white pile, particularly about lateral and posterior margins; mesepisterna with a sparse covering of long, fine, white pile; propodeum with rather dense fringes of long, white

pile along latero-posterior margins, posterior face with sparse, erect, short, white pile; pile of legs tinged with light ochreus, rather long, particularly on posterior femora and tibiae; first metasomal tergum with apical fascia dense and white, lateral fringes of very short, white pile, weak, barely reaching the apical fascia, disc with sparse, very short, whitish pile; metasomal terga two to five with fasciae broad, white, and dense, fasciae abruptly tapering laterally; metasomal sterna with discs having abundant, erect, pale grey to light ochreus pile, forming a weak scopa.

Antennae reddish brown, flagellar segments as long as broad; malar space linear; clypeus weakly convex with a very weak to almost obscure longitudinal median sulcus; clypeus densely punctate, punctures not tending to be striate except on extreme apical portions, interspaces linear and shiny; vertex coarsely punctate, punctures no more than one-half puncture width apart; fascial foveae deep, extending well above inner margins of compound eyes and one-third of way toward lateral ocelli, upper median margins weakly pointed toward lateral ocelli. Prothoracic spines long and coarse, as long as width across base; mesoscutum very densely and coarsely punctate, punctures giving surface a roughened appearance, impunctate area absent; scutellum very coarsely punctate over posterior three-quarters, punctures one-half to one puncture width apart, anterior face is shiny, impunctate; mesepisterna

very densely punctured with fine punctures, much smaller than those of mesoscutum or scutellum, punctures almost contiguous, surface dull; propodeum with basal area obscurely pitted, pits varying in shape from quadrate to irregular, lateral and posterior faces very dull and roughened; tegulae dark brownish hyaline; wings dusky, densely covered with abundant, deep fulvous pubescence, nervures brown; legs deep brown to black; posterior basitarsi three and one-half times as long as broad. Metasomal terga with apical fasciae in abruptly depressed apical margins, fascial depressions light brownish hyaline, impunctate; metasomal terga one to three coarsely, densely punctate, punctures no more than one-half puncture width apart, interspaces moderately dull; metasomal sterna dull, densely and finely folliculated, last metasomal sternum with apical one-half sharply depressed, impunctate, with a basal fringe of long, overhanging, fulvous pile.

Distribution:

The species has been recorded from the following states: Illinois, Mississippi, Missouri, Iowa, Minnesota, South Dakota, Nebraska, Kansas, Oklahoma, New Mexico, Colorado, and Wyoming, as well as from the Province of Manitoba in Canada. Peripheral localities include: Carlinville, Illinois; Shuqualak, Mississippi; San Jose, New Mexico; Texas County, Oklahoma; Grand Canyon, Arizona; Aladdin, Wyoming; and Transcona, Manitoba.

Flight Records:

The species has been recorded as flying between June 8 and August 31.

Plant Records:

Amorpha canescens, Monarda punctata occidentalis, Petalostemon candidus, Petalostemon violaceus.

The holotype is located in the Illinois State Natural History Survey Collections.

Colletes timberlakei Stephen, new species

Timberlake first based his concept of robertsonii on what is now the type of this species. This error was corrected in his most recent paper (1951) after he had opportunity to make genitalic observations. The two species are so close that accurate determination is impossible without the removal of the seventh ventral plates. Contrary to Timberlake, I find that the penis valves (sagittal rods of Timberlake) are convoluted to the same degree as those of metzi and timberlakei but the dorsal convolution is often less obvious on removal of the capsule. The seventh ventral plates of timberlakei, while having the similar basal area to those of robertsonii, have broad, median apical expansions. There are other very minor differences mentioned by Timberlake, which do not hold true when the entire range of the species is

considered. The tegulae of timberlakei are very finely punctate, and the prothoracic spine is usually shorter, about as long as broad. These characters hold true in the western plains, where robertsonii has the coarsely punctate tegulae and usually a long prothoracic spine. In the eastern extent of the range, even these characters fail. Supplementary males from Boulder, Colorado, and from Wyoming are now available. In addition I have two females taken with the two males at Lusk, Wyoming, on July 14, 1937, by C. L. Johnson. There are no obvious differences between these specimens and those of robertsonii, but I shall arbitrarily designate these as females of timberlakei, solely on the basis of the collection data.

MALE: length 10.5 mm., wing length 7.5 mm.

The males very closely resemble those of robertsonii and can only be distinguished with certainty on the basis of the seventh ventral plates. Seventh ventral plates with transverse basal area much as in robertsonii, however with median apical areas with broad membraneous expansions, making plates roughly quadrate, tapering slightly laterally, surface area rather densely clothed with long hairs, particularly on medio-apical and latero-apical portions, apical margins with a long fringe of tawny pile; penis valves of capsule with a dorsal convolution just slightly greater than that of robertsonii. (See fig. 31).

FEMALE:

The association of this female with the male is based exclusively on collection data, having been found at the same place and at the same time with males which have proved to be solely those of metzi. There is no distinctive morphological character evident to me on which this species can be distinguished from robertsonii.

Distribution:
Holotype, male, Boulder, Colorado, VIII.14.35 (C. D. Michener). Paratypes, 1 male, Boulder, Colorado, VIII.14.35 (C. D. Michener). 2 males, Boulder, Colorado, VII.21.35 (C. D. Michener) on Petalostemon; 1 male, Torrington, Wyoming, VII.1930 (G. B. Fairchild); 2 males, 1 female, Lusk, Wyoming, VII.14.37 (C. L. Johnson); 1 female, Lusk, Wyoming, VII.14.37 (R. H. Beamer).

The holotype is in the Snow Entomological Collection of the University of Kansas.

Colletes larreae Timberlake

larreae Timberlake, 1951, Wasmann J. Biol., vol. 9, pp. 193-5.

This is a close relative of C. robertsonii but is readily distinguishable from that species. Both sexes have the malar space long; as long as wide in the male and

two-fifths as long as wide in the female. The terga are very sparsely punctate to almost folliculated and shiny and the prothoracic spines are vestigial or absent. It is much smaller than robertsonii. The last ventral sternum of the female has the apical one-half sharply depressed and partially concealed with a long fringe of basal pubescence; the ocular areas are deep and broad; and the thorax is coarsely punctate, much as in robertsonii. The seventh ventral plates of the male closely resemble those of robertsonii; however, they are much narrower and extend laterally to a greater degree; there is a fringe of pile on the medio-apical margins rather than along the entire apical margin as in robertsonii.

MALE: length 10 mm., wing length 7 mm.

Pile of face very long, white, and dense, concealing the clypeus, antennal bases, and supra-antennal regions; vertex with pile long, fine, and white; genal areas with upper surfaces having abundant, long, erect, white pile, pile becoming longer, finer, and pure white below; mesoscutum with pile long, white, and dense, tending to partially conceal surface; scutellum with pile predominantly white about lateral and posterior faces, becoming tinged with grey medially; mesepisterna with pile long, dense, and white; propodeum with dense, long, white fringes on latero-posterior margins, extending well down toward pedicle, lateral and posterior faces with abundant,

erect, whitish pile; legs with pile long, white, and moderately dense, particularly on femora; first metasomal tergum with apical fascia narrow, moderately dense, and white, lateral fringes of pile white and extending to apical fascia, disc with abundant, long, erect, whitish pubescence; metasomal terga two to five with fasciae broad, white; metasomal terga three to six with abundant, erect, tawny to whitish pile on discal areas; metasomal sterna with weak apical fasciae or fringes of pile expanded slightly medially and composed of shorter, greyer pile in these medial areas.

Antennae long, dark brown to black, flagellar segments one and one-half times as long as broad; malar space as long as broad; clypeus convex, rather finely and densely punctate over basal two-thirds, punctures becoming very sparse and weakly striate on apical one-third, apical one-third shiny, virtually impunctate; vertex rather densely punctate with shiny interspaces; fascial foveae just distinguishable, extending above inner orbital margins. Prothoracic spines absent; mesoscutum rather densely and coarsely punctate over anterior one-half and lateral faces, impunctate area large; scutellum densely, rather coarsely punctate over posterior one-half, punctures no more than one-half puncture width apart, anterior one-half shiny, impunctate; mesepisterna densely punctate, punctures smaller than those of mesoscutum, no more than one-half puncture width apart above, tending to one

puncture width apart on lower posterior faces; tegulae deep brown hyaline; wings whitish hyaline with sparse, light fulvous pubescence on apical portions, nervures brown; legs black; posterior basitarsi four times as long as broad. First metasomal tergum shiny, very finely and sparsely punctate, punctures two to four puncture widths apart; second metasomal tergum with punctures much as first, punctures slightly more dense; metasomal sterna moderately shiny and very finely roughened; seventh ventral plates narrow, transverse, with median apical margins protruding, a moderately long fringe of tawny to light ochreus pile along apico-median margins, extreme lateral portions of each plate often reflexed.

FEMALE: length 12 mm., wing length 8 mm.

Pile of face long, dense, and white, particularly about antennal bases and inner orbital margins, however clypeus having sparse, overhanging, white pile; vertex with pile dense in ocellar triangle and white; upper genal areas with pile short, fine, and white, becoming much longer and finer below, a very weak fringe of short, appressed, white pubescence immediately posterior to each compound eye; mesoscutum with the pile long, tinged with pale grey, and moderately dense; scutellum with a dense fringe of pale grey to light ochreus pile about lateral and posterior faces; mesepisterna with pile long, white, and dense; propodeum with dense fringes of white to pale

grey pile along latero-posterior margins, longest on dorsal face, becoming shorter toward pedicle, lateral faces bare, posterior face with abundant, erect, grey to white pile; anterior two pairs of legs with pile long on the femora and white to grey, pile of tibiae short and white to tinged with light ochreus; posterior legs with abundant, very long, plumose, light ochreus to pale grey pile; first metasomal tergum with apical fascia narrow, weak, and white, often interrupted medially, lateral fringes of short, white, dense pile extending to fascia, disc with abundant, erect, white pile; metasomal terga two to four with fasciae broad, rather weak, and white; metasomal terga two and three with very weak, white, basal fasciae, fasciae often concealed; metasomal sterna two to five with discal areas having abundant, erect, pale grey to whitish pile, forming a weak scopa.

Antennae deep brown to black, flagellar segments as long as broad; malar space two-fifths as long as broad; clypeus convex, rather densely and coarsely punctate, punctures tending to be weakly striate, no more than one-half puncture width apart above, tending to be slightly sparser apically; vertex finely and densely punctate with shiny interspaces; facial foveae exceedingly deep and broad, extending well above inner orbital margins and two-thirds of way from inner orbital margins to lateral ocelli. Prothoracic spines absent; mesoscutum densely and coarsely punctate over anterior half and lateral margins,

impunctate area large; scutellum with posterior two-thirds coarsely and densely punctate, punctures one-half to one puncture width apart and not at all striate, anterior face with a few, sparse, finer punctures to shiny impunctate; mesepisterna with punctures much finer than those of the mesoscutum, densely and finely punctate, rather dull, punctures no more than one-half puncture width apart; propodeum with basal area shallowly and irregularly pitted, lateral and posterior faces dull and roughened; tegulae deep brown to black; wings dusky with a rather sparse covering of deep fulvous pubescence, nervures brown; legs deep brown to black; posterior basitarsi three and three-quarter times as long as broad. First metasomal tergum shiny, very finely and sparsely punctate, punctures two to four puncture widths apart, surface with a deep metallic blue-black lustre; second metasomal tergum with punctures much finer and sparser than on first, maintaining a deep blue-black lustre; metasomal sterna dull, densely and finely folliculated, last metasomal sternum with apical one-half sharply depressed with a basal arcuate band of overhanging, light ochreus pile.

Distribution:

Holotype, male, Palm Springs, California, March 30, 1945 (Timberlake), on Larrea divaricata; allotype, female, Palm Springs, California, April 10, 1932, on Larrea glutinosa (Timberlake); paratypes, 1 male, Palm Springs,

California, March 20, 1916 (C. L. Fox); 1 male, Tetley Park, San Bernardino Mountains, on Barbaraea orthoceras, May 8, 1940 (P. H. Timberlake).

Timberlake records one other male paratype which I have not seen, taken at Lovejoy Buttes, Mohave Desert, Los Angeles County, California, May 10, 1944 (Timberlake), on Acamtopappus sphaerocephalus.

Other material: 1 male from Olancha, Inyo County, California, May 20, 1937 (C. D. Michener), and 1 female from Welton, Arizona, taken on April 6, 1935 (A. L. Melander).

The holotype and allotype are located in the collections of the Citrus Experiment Station, Riverside, California.

Colletes turgiventris Timberlake

turgiventris TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 196.

This is a sibling species to C. larreae Timberlake, with the malar space much shorter, approximately one-half as long as broad, and the first metasomal tergum sparsely covered by a few coarse punctures in both sexes. The seventh ventral plates and the capsules of the male are identical to those of larreae, and it does not seem at all impossible that this may eventually prove to be a subspecies

of larreae, despite the gross differences in the length of the malar space.

MALE: length 11 mm., wing length 7 mm.

Pile of face very long, dense, and white, completely concealing clypeus and antennal bases; vertex with pile pale grey and densest in ocellar triangle; upper genal areas with pile very long, tinged with pale grey to white, pile becoming much longer and finer below; mesoscutum with abundant, very long, dense, white to pale grey pile; scutellum with a dense covering of long, dusky pile, particularly dense on lateral and posterior margins; mesepisterna with pile long, fine, and white, tending to be somewhat grey above; propodeum with rather dense clumps of pile on upper latero-posterior margins, lateral and posterior faces with abundant, fine, erect, pale grey pile; pile of legs long, sparse, and whitish; first metasomal tergum with the apical fascia narrow, weak, and white, lateral fringes of pile weak and white, barely extending to apical fascia, disc with abundant, long, erect, pale grey pile over entire surface; metasomal terga two to five with fasciae narrow, rather weak, and white; metasomal terga three to six with discs having abundant, erect, pale grey pile, not at all concealing surface; metasomal sterna two to four with apical fringes of pale grey pile, pile much shorter medially.

Antennae long, deep brown to black above, flagellar segments one and one-third times as long as broad; malar space one-half as long as broad; clypeus convex, very finely and densely punctate over basal two-thirds, punctures tending to be very weakly striate on latero-apical portions, apex shiny impunctate; vertex dull, rather coarsely punctate with punctures one-half puncture width apart. Prothoracic spines vestigial; mesoscutum rather coarsely and densely punctate over anterior one-third and lateral margins, punctures one-half puncture width apart, impunctate area large, shiny; scutellum very densely, contiguously punctate on extreme lateral margins, posterior discal area deeply punctate with punctures one-half to one puncture width apart, becoming much sparser toward anterior faces, anterior face shiny impunctate; mesepisterna densely, almost contiguously punctate, with interspaces dull; propodeum with basal area not distinctly quadrately pitted but transversed by a number of longitudinal rugae, lateral and posterior faces dull and finely roughened; tegulae deep brownish to black hyaline; wings dusky with abundant, short, deep fulvous pubescence, most dense apically, nervures brown; legs black; posterior basitarsi four times as long as broad. First metasomal tergum shiny, deep bluish black, deeply and sparsely punctate, punctures two to four puncture widths apart; second metasomal tergum shiny, black, punctures just appreciably finer and closer than on first metasomal tergum, varying from one and a

half to three puncture widths apart; metasomal sternum dull, very finely roughened; seventh ventral plates as in larreae.

FEMALE: length 11 mm., wing length 7.5 mm.

Pile of face long, white, and dense, particularly about antennal bases and along inner orbital margins, with a few pale grey hairs overhanging clypeus; pile of vertex dusky to tinged with light ochreus, sparse, and erect; upper genal areas with pile short, tinged with yellowish, becoming much longer and whiter below; mesoscutum with pile pale grey to tinged with light ochreus, short, and rather dense; scutellum with pile tinged with ochreus, dense, particularly along lateral and posterior margins; mesepisterna with pile long, fine, and white; propodeum with dense fringes of long, pale grey pile along latero-posterior margins extending down toward pedicle, lateral faces with a few, short, pale grey hairs, posterior face with abundant, erect, pale grey pubescence extending in from latero-posterior fringes; anterior two pairs of legs with pile short, fine, and white, posterior pair of legs with abundant, long, erect pubescence, exceedingly plumose and tinged with light ochreus; first metasomal tergum with apical fascia broad, dense, and white, lateral fringes of very short, white pile not reaching to apical fascia, disc with sparse, erect, tawny to white pile; metasomal terga two to four with fasciae broad, dense, and white; fascia

of the fifth metasomal tergum narrow and white; metasomal terga three to six with abundant, erect, pale grey pile on discal areas; metasomal sterna two, three, and four having posterior half of each disc with short, erect pile, forming a weak scopa.

Antennae long, deep brown, flagellar segments three-quarters as long as broad; malar space one-quarter as long as broad; clypeus convex, rather coarsely, striately punctate, with shiny interspaces, punctures much finer along a median longitudinal line; vertex deeply punctate with shiny interspaces, punctures one-half puncture width apart; fascial foveae very deep and broad, extending slightly over half way from inner orbital margins to lateral ocelli, just barely narrower than in larreae. Prothoracic spines very short and sharp; mesoscutum very densely and coarsely punctate over anterior one-half and lateral margins, punctures less than one-half puncture width apart, impunctate area small; scutellum finely and densely punctate about extreme peripheral margins, punctures coarse, approximately one-half puncture width apart on posterior half of disc, becoming much sparser anteriorly, punctures extending to extreme anterior face; mesepisterna very densely, almost contiguously punctate, interspaces dull, punctures somewhat smaller than those of mesoscutum; propodeum with basal area shallowly pitted, pits irregular, not at all uniformly quadrate, lateral and posterior faces dull and roughened; tegulae deep brownish black; wings

dusky with abundant, deep fulvous pubescence, especially on apical portions, nervures dark brown; legs dark brown to black; posterior basitarsi three and one-half times as long as broad. First metasomal tergum shiny with a deep bluish-black metallic lustre, punctures small and sparse, two to four puncture widths apart; second metasomal tergum very finely punctate to coarsely folliculated, shiny; metasomal sterna very finely and densely folliculated, dull, last metasomal sternum with apical one-half abruptly depressed, shiny, with a basal arcuate band of overhanging, fulvous pile.

Distribution:

Antioch, California, May 8, 1937 (R. M. and G. E. Bohart) (holotype); Antioch, California, May 11, 1937 (R. M. and G. E. Bohart) (allotype and paratype), on Phacelia; Banning, Riverside County, California, May 3, 1925 (P. H. Timberlake) on Phacelia hispida (paratype); Antioch, California, May 8, 1937 (G. E. Bohart).

The holotype and allotype are located in the collections of the Citrus Experiment Station, Riverside, California.

Colletes kansensis Stephen, new species

The metapleural prominence of this species is strong, coarsely rugose, and with an indistinct deep brown, while the seventh ventral plates closely resemble those of robertsonii. This species is arbitrarily assigned to the americanus group because of this character, however I believe it is related to the robertsonii group. The capsule is more reminiscent of the robertsonii group than any others, while the puncturation of the metasomal terga approaches that of robertsonii. The two specimens in my possession were both taken from Kansas.

MALE: length 8.5 mm., wing length 6 mm.

Pile of face long, fine, and white, concealing basal portion of clypeus and antennal bases; vertex with pile sparse, erect, and white; upper genal area with pile dense and white, becoming much finer and longer below; mesoscutum with a sparse covering of long, white pile, becoming much sparser on median discal area; scutellum with a narrow fringe of white to pale grey pile about lateral and posterior faces; mesepisterna with pile long, fine, and white; propodeum with dense fringes of long, white pile on upper latero-posterior margins, lateral and posterior faces with a sparse covering of erect, pale grey pile; pile of legs short, sparse, and white; first metasomal tergum with a broad apical fascia of pure white pubescence, lateral fringes of pile weak, white, and reaching apical fascia,

disc with a moderately dense covering of erect, pale grey pile, not concealing surface; metasomal terga two to four with fasciae broad, dense, and white, narrowed laterally; fifth metasomal tergum with a very narrow fringe of white pile; metasomal terga three to six with sparse, very short, fuscous, erect pile; metasomal sterna two to four with weak fringes of pale grey pile, pile short, particularly medially.

Antennae brown, flagellar segments one and one-half times as long as broad; malar space three-eighths as long as broad; clypeus convex, finely and densely punctate over basal two-thirds, punctures becoming sparser and weakly striate apically, apical one-third shiny, impunctate; vertex densely and coarsely punctate with shiny interspaces, punctures no more than one-half puncture width apart; fascial foveae rather distinct, especially above where they are very narrow and extend medially from inner orbital margins. Prothoracic spines rudimentary; mesoscutum rather densely punctate over anterior half and extreme lateral margins, punctures one-half to one puncture width apart, becoming much sparser medially where they may be one to two puncture widths apart, impunctate area small; scutellum coarsely, irregularly punctate on discal area, punctures one-half to one and one-half puncture widths apart, extreme anterior face shiny, impunctate; mesepisterna densely and coarsely punctate with shiny, linear interspaces, punctures one-half puncture width apart; upper metapleura strongly protuberant, protuberance sharply rugose with

a very narrow, deep brown to black rim; propodeum with basal area sharply sloping ventrally, obscurely and irregularly pitted, pits very shallow and irregular, lateral and posterior faces dull and roughened; tegulae deep brown; wings dusky with abundant, deep fuscous pile, nervures brown; legs brown to black; posterior basitarsi four and one-half times as long as broad. First metasomal tergum coarsely and densely punctate, punctures finer and sparser on extreme anterior face, punctures of discal area one-half to one puncture width apart with shiny interspaces; second metasomal tergum very finely and densely punctate with shiny interspaces, tergum with a very weak basal depression; metasomal sterna dull, finely and densely follioulated; seventh ventral plates narrow, transversely extended with long fringes of whitish pile on excavated apical margins (See Fig. 29).

Distribution:

Holotype male, Garden City, Kansas, June 15, 1949 (Michener-Beamer), taken from the flowers of Monarda punctata occidentalis; paratype male, Clark County, Kansas, 1962 feet, May (F. H. Snow).

The holotype is located in the Snow Entomological Collection of the University of Kansas.

Colletes metzi Timberlake

metzi TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 192.

A series of specimens collected by C.D. Michener at Boulder, Colorado, were included as paratypes of metzi when the species was described. These have now been designated as timberlakei and the single male collected by Metz from Boulder remains as the holotype. The species is only distinguishable from robertsonii and timberlakei on a peculiarity of the seventh ventral plates. In metzi, the basal portion of the disc is as in robertsonii, but to the medio-apical process of each plate there is attached a densely pilose ovate membranous plate. These plates extend laterally and obscure the basal transverse process of each disc, giving an outward appearance of the distended plates of timberlakei (see fig. 31).

Distribution:

Holotype, male, Boulder, Colorado (Metz) in the American Museum of Natural History.

GROUP VII - nudus

Colletes nudus Robertson

nudus ROBERTSON, 1898, Trans. Acad. Sci. St. Louis, vol. 8, p. 43; ROBERTSON, 1904, Canadian Ent., vol. 36, p. 275; COCKERELL, 1908, Proc. Ent. Soc. Washington, vol. 10, p. 67; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 48; GRAENICHER, 1910, Bull. Pub. Mus. Milwaukee, vol. 1, p. 228; SMITH, 1910, Ann. Rept. New Jersey State Mus. for 1909, p. 695; BANKS, 1912, Ent. News, vol. 23, p. 107; CRIDDLE, et al, 1924, Rept. Ent. Soc. Ontario, vol. 33, p. 99; COCKERELL, 1928, Univ. Colorado Studies, vol. 16, p. 99; ROBERTSON, 1928, Flowers and Insects, p. 10; PEARSON, 1933, Ecolog. Monog., vol. 3, p. 384; GRAENICHER, 1935, Ann. Ent. Soc. Amer., vol. 28, p. 301; BRIMLEY, 1938, Insects of North Carolina, p. 451; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 399.

hydrophilus COCKERELL, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 17, p. 313; COCKERELL, 1907, Univ. Colorado Studies, vol. 4, p. 240; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 47; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 399.

viereoki SWENK, 1905, Canadian Ent., vol. 37, p. 301; SWENK, 1908, Univ. Nebraska Studies, vol. 1, p. 48.

The holotype and the allotype have been designated and placed in the collection of the Illinois Natural History Survey by Mrs. K. W. Sommerman. These two specimens, which have been designated only by labeling and not by publication, appear to have been selected by random rather than by careful examination, for among material lent me by the Illinois Natural History Survey are a pair of specimens, both labelled 'type' by Robertson, bearing the numbers 19692 for the male and 19933 for the female. The type label is also assigned to these two specimens in the original Robertson record book, and I assume there has been an error in the lectotype designation by Sommerman. These two specimens have been labelled paratypes, I presume by Sommerman, but are here designated as lectotypes. The types thus designated are located in the Illinois Natural History collection.

This species, described from Illinois, is found sparingly distributed over America east of the Great Divide. The females are most liable to be confused with robertsonii or metzi but differ in not having the last metasomal tergum apically depressed and in having the first metasomal tergum sparsely punctate with coarse punctures, with punctures at least one to two puncture widths apart. The males of nudus are readily distinguished from robertsonii by their sparser tergal punctuation, strong admixture of black pile on the mesoscutum, and distinctive seventh ventral plates. Specimens from the

south and southeastern states are slightly different from those from the north. Both sexes have the wings more dusky and the metasomal terga slightly more sparsely punctate. The males have a few black hairs on the clypeus and frons, and in the females the fascial foveae are just appreciably smaller and less distinctly depressed. Due to the minuteness of the differentiations I do not consider them to warrant subspecific differentiation even though specimens from the south have been called dark-winged varieties. The Colorado specimens designated as Colletes hydrophilus Cockerell are unquestionably C. nudus as Timberlake indicates and the slight difference in punctuation appears to be a random variable occurring throughout the range of this species.

MALE: length 10.5 mm., wing length 8.5 mm.

Pile of face long and dense about antennal bases and over clypeus, pale grey to pure white; vertex with pile tinged with ochreus, sparse, and long, a few, slightly darker hairs; upper genal areas with pile long, sparse, and pale grey, becoming longer and much whiter on lower faces; mesoscutum with an admixture of pale grey and black pile, pile sparse medially; scutellum with a sparse covering of pale grey and black pile, particularly about peripheral margins; mesepisterna with pile fine, long, pale grey and very plumose; propodeum with very weak fringes of long, pale grey pile on upper latero-posterior

margins, lateral and posterior faces with sparse, erect, pale grey pile; pile of legs sparse, long, and white; first metasomal tergum with apical fascia narrow and white, interrupted or nearly interrupted medially, lateral fringes weak and pale grey, barely reaching apical fascia, disc with very sparse, short, pale grey erect pile; metasomal terga two to five with fasciae narrow, weak, and white; metasomal terga three to five with the discs having very short, deep fuscous to brown, erect pile on discs, not at all concealing surface; metasomal sterna two to four with weak apical fringes of short, white pile.

Antennae long, deep reddish brown to brownish black, flagellar segments one and one-half times as long as broad; malar space one-quarter as long as broad; clypeus weakly convex, very densely, coarsely, rugosely punctate to apex; vertex shiny, sparsely and shallowly punctate; fascial foveae narrow and distinctly depressed, extending along upper inner orbital margins. Prothoracic spines short and sharp, three-quarters as long as width across base; mesoscutum very coarsely punctate, punctures one-half puncture width apart about anterior and lateral margins to one puncture width apart over median discal area, impunctate area absent; scutellum rather coarsely and deeply punctate, punctures of variable size, varying from one-half to one puncture width apart, only extreme anterior face impunctate, scutellum not at all striately punctate; mesepisterna deeply, coarsely punctate, punctures one-half to one

puncture width apart with shiny interspaces; propodeum with basal area deeply, quadrately pitted, pits slightly longer than broad, lateral and posterior faces shiny and weakly roughened with a few, sharp rugae, particularly on upper latero-posterior margins; tegulae deep brown; wings dusky, very closely covered with fulvous pubescence, nervures light brown; legs reddish brown to brown; posterior basitarsi four and one-quarter times as long as broad. First metasomal tergum shiny, sparsely and shallowly punctate, punctures three to four puncture widths apart; second metasomal tergum with surface finely punctate, punctures closer than on first, varying from one to three puncture widths apart; terga two to five distinctly depressed basally; metasomal terga two to five with apical fascia lying in depressed rims, this depression most evident laterally; metasomal sterna dull, coarsely and sparsely folliculated; seventh ventral plates short, expanded laterally, with extreme lateral margins rounded, surface uniformly covered with abundant, fine, tawny pubescence.

FEMALE: length 12 mm., wing length 9 mm.

Pile of face rather sparse, clumped principally above antennal bases and along inner orbital margins, pile white to pale grey; vertex with sparse, erect, black pile, particularly in ocellar triangle; upper genal area with pile predominantly pale grey but with a few intermixed black hairs, pile becoming longer, denser, and whiter

below; mesoscutum with a strong admixture of pale grey and black pile, black pile becoming most dense and most abundant on median discal surface; scutellum with a weak fringe of dusky grey pile about lateral and posterior edges, disc with abundant, erect, black pile; mesepisterna with pile long, white, and plumose; propodeum with long fringes of white pile on upper latero-posterior surface, lateral and posterior faces with a few, long, pale grey hairs; legs with pile long, plumose, white to tinged with ochreus, particularly on posterior femora, posterior tibiae with a few, shorter, black hairs on upper surfaces; first metasomal tergum with apical fascia weak and pure white, interrupted medially, lateral fringes very weak, short, and white, barely reaching apical fascia, disc with a few, very short, pale grey hairs on anterior face; metasomal terga two to five with fasciae weak and white, often interrupted medially; metasomal terga four and five with sparse covering of short, deep fuscous pile on discs; metasomal sterna with a very weak fringe of pale grey pile on apical margins, a few, erect, pale grey hairs on discal surface.

Antennae long, deep brown to black, flagellar segments as long as broad; malar space linear; clypeus weakly convex, very densely, coarsely, rugosely punctate to apex; vertex shiny, sparsely and shallowly punctate; fascial foveae deep, extending well above tops of compound eyes and at least half way to lateral ocelli. Prothoracic spines

rather long, coarse, and sharp, one and one-half times as long as width across base; mesoscutum coarsely and densely punctate, punctures coarser and slightly sparser on median discal area, impunctate area absent; scutellum very coarsely and deeply punctate, punctures one-half to one puncture width apart, not at all striate; mesepisterna coarsely, densely, contiguously punctate with linear interspaces; propodeum with basal area very deeply, quadrately pitted, lateral and posterior faces dull and very finely roughened, extreme upper portion of posterior face with a few, sharp rugae, lateral and posterior faces separated by a weak ridge; tegulae deep brown to black; wings dusky, very densely covered with short, fulvous pubescence, nervures brown; legs deep reddish brown; posterior basitarsi three and one-half times as long as broad. First metasomal tergum shiny, coarsely punctate, punctures one to three puncture widths apart, becoming finer towards apical margins; second metasomal tergum with punctures closer, one to two puncture widths apart, being much finer along anterior and median faces; metasomal terga with fasciae lying in abrupt apical depressions, the depressions most evident laterally; metasomal terga two, three, and four abruptly depressed basally; metasomal sterna very coarsely and densely folliculated; metasomal terga two to five with apical margins rimmed with light brownish hyaline.

Distribution:

The species has been recorded from the following states: Colorado, Nebraska, Kansas, Iowa, Wisconsin, Illinois, Missouri, Louisiana, Alabama, Mississippi, Florida, Georgia, North Carolina, Virginia, New York, Massachusetts, Pennsylvania, Michigan, and Ontario.

Swenk in 1908 also recorded the species as occurring in Maryland, Arkansas, New Jersey, and Texas.

Flight Records:

The species has been recorded from April 12 to 18 in Florida through August 19 in the more northerly and westerly regions of its range.

Plant Records:

Melilotus alba, Monarda mollis, Verbena urticifolia.

The lectotypes are located in the Illinois State Natural History Survey Collection.

Colletes carolinus Mitchell

carolinus Mitchell, 1951, J. Elisha Mitchell Sci. Soc., vol. 67, pp. 233-4.

This species was described from a series of females taken in North Carolina and Georgia. The present work contains a description of a neoallotype taken at New River, North Carolina, IV and V, 1942, by G. E. Bohart. The males

of this species were incorrectly determined by Mitchell as distinctus Cresson as mentioned above. I suspect that this species is a synonym of nitidus Smith but further examination of the type is necessary to confirm this. The males can readily be distinguished from closely related species by having the malar space as long as wide, a strong mixture of black pile on the vertex and thoracic dorsum, and the first metasomal tergum shiny and impunctate. In the females the malar space is one-half as long as wide, there is abundant black pile on the vertex and thoracic dorsum, and the ocular areas extend almost to the lateral ocelli.

MALE: length 10 mm., wing length 7 mm.

Pile of face dense, thick, and tinged with yellow; pile of vertex sparser, erect, and tending towards deep ochreus, concentrated principally in ocellar triangle; pile of genal areas rather short and tinged with light ochreus; mesoscutum and scutellum having light ochreus pile of discal areas intermixed with black pile, black pile concentrated principally on median discal area of mesoscutum and medio-lateral areas of scutellar disc; pile of the mesepisterna long, plumose, and light ochreus; pile of legs rather short and light ochreus; metasomal sternal fasciae weak and easily removed by rubbing, fasciae pale grey becoming broader and denser on metasomal terga three to five; first metasomal tergum with a lateral fringe of pale grey pile extending to apical fasciae,

discal area with abundant erect, pale grey pile; metasomal terga three to five with discs having abundant short, erect, deep brown to black pile, not at all concealing the surface; metasomal sterna with fasciae weak and weakly expanded medially.

Antennae long, black above, deep reddish brown below, flagellar segments approximately one and one-quarter times as long as broad; malar space as long as broad; clypeus weakly convex, rather closely and densely punctate over basal two-thirds, punctures not at all striate, apical one-third sparsely punctate and shiny; vertex sparsely punctate with broad, shiny interspaces on the posterior portion. Prothoracic spines as long as the width across base, sharp; mesoscutum distinctly punctate, punctures much finer than those of the scutellum or mesepisterna, interspaces shiny, impunctate area large; scutellum very coarsely punctate to anterior margin not at all striate, a weak longitudinal median sulcus extending to anterior margin; mesepisterna with upper half very deeply, rugosely punctate, almost pitted, punctures becoming sparser and finer with broad, shiny interspaces on latero-ventral portion; propodeum with basal area deeply pitted with broad, quadrate pits, upper portions of lateral and posterior faces with many striae or rugae forming a few deep shiny pits on extreme upper portions of lateral and posterior faces; tegulae brownish-black with a few scattered punctures; wings testaceous covered with abundant short

testaceous pile, nervures deep brown; legs reddish brown to black, tarsi and ends of tibiae tending to brown; posterior basitarsi five times as long as broad; first metasomal tergum shiny with a weak scattering of follicles becoming more evident at lateral surfaces, interspaces broad and shiny; metasomal terga two and three finely folliculated, shiny; metasomal sterna two to six rather coarsely folliculated rather than punctate, shiny; seventh ventral plates resembling mandibularis Smith but a greater lateral expansion and discal area completely covered with short, light ochreus pile (See Fig. 33).

FEMALE: length 13 mm., wing length 7.5 mm.

Pile of face sparse, erect, and pale grey, not at all concealing surface; pile of vertex sparse, light ochreus except for a few intermixed ochreus to testaceous hairs, a very small patch of appressed, light grey pubescence immediately posterior to compound eye; pile of lower genal areas sparse, long, erect, and pale grey; mesoscutum with an admixture of light ochreus and black pile, black pile concentrated principally on median discal area between parapsidal lines; scutellum with a marginal fringe of ochreus pile bordered along inner margins by abundant black pubescence; mesepisterna with pile long, fine and weakly tinted with ochreus; legs with pile light ochreus except on posterior tibiae where there are a number of very short, spine-like black hairs particularly on basal

half of the tibia; metasomal terga with white fasciae becoming broadest on terga three and four; first metasomal tergum with fascia almost absent medially, broadening laterally but nowhere as strong as on other metasomal terga, tergum with a very weak, lateral fringe of white to pale grey pile just reaching apical fasciae, anterior portion of disc with a few scattered, fine, pale grey hairs; second metasomal tergum with a very weak, virtually absent, basal fascia, evident only medially; metasomal terga three to five with abundant, short, erect, ochreus pubescence, not at all concealing the surface; metasomal sterna with weak apical fringes of pale grey pile, not sufficiently dense to form a fascia or a scopa.

Antennae long, brownish black, flagellar segments three-quarters as long as broad; malar space five-eighths as long as broad; clypeus strongly convex and densely punctate over basal two-thirds, punctures becoming sparser, more striate, towards apical one-third; vertex is shiny and very sparsely and finely punctate, fascial foveae broad and weakly depressed along upper, inner margins, reaching at least half way to ocelli at their upper extremity. Prothoracic spines short and blunt, roughly triangular; mesoscutum densely punctate over anterior half and lateral portions, punctures not as coarse as those of scutellum or mesepisterna; scutellum coarsely punctate over posterior five-eighths of surface, punctures not at all striate and having shiny interspaces; mesepisterna

densely, rugosely punctate, punctures contiguous over surface of mesepisterna; basal area of propodeum with deep, quadrate pits, median pits broader than long, upper lateral surfaces of posterior face of propodeum deeply, rugosely pitted with shiny surfaces, rugae becoming much weaker below; tegulae light brown and finely punctate; wings testaceous hyaline with abundant, short, ochreus pubescence, nervures light brown; legs black, posterior tibiae with a shallow longitudinal groove on upper posterior surfaces; posterior basitarsi three and one-half times as long as broad. First metasomal tergum shiny, impunctate, a few weak follicles scattered over surface; metasomal terga two and three much as first; metasomal sterna rather coarsely folliculated over posterior one-half of each sternum.

Distribution:

North Carolina: Southport (holotype and 4 paratypes); Fort Fisher (paratype); New River (neoallotype).

Georgia: Albany (paratype); Waycross (10 paratypes); Billy's Island, Okefenokee Swamp (2 paratypes).

Florida: Indian Town (paratype); Winter Park (paratype); Royal Palm Park (paratype); Island Grove (paratype); Punta Gorda (paratype); Suwanee Springs; Bradenton; Dade City; Orlando; Biscayne Bay.

Flight Records:

March 8 to July 6.

Plant Records:

Hypericum.

The holotype is located in the collections of F. T. B. Mitchell.

The neoallotype New River, North Carolina, April-May, 1942 (G. E. Bohart), is located in the United States National Museum.

Colletes brimleyi Mitchell

brimleyi MITCHELL, 1951, J. Elisha Mitchell Sci. Soc., vol. 67, p. 231-2.

This is a close relative of carolinus Mitchell but smaller in size. The males have a few dark hairs on the mesoscutum but these hairs are more fuscous than black; the mesepisterna are more sparsely punctate below than in carolinus, with punctures two to three puncture widths apart; the males are only about 8 millimeters in length to the 10 millimeters of carolinus. The females are readily distinguished by their dense covering of ochreus to light ochreus pile combined with an impunctate first metasomal tergum. I have placed two females determined as distinctus from Biscayne Bay by Mitchell in with this species.

MALE: length 8.5 mm., wing length 6.5 mm.

Pile of face long, dense and tinged with light ochreus, pile completely concealing clypeus; vertex with a few, light ochreus, erect hairs, principally in ocellar triangle; pile of upper genal areas light ochreus, becoming pale grey below; mesoscutum with pile pale grey to light ochreus, occasionally a few deeper ochreus hairs on scutellum but these hairs never black; scutellum almost completely concealed by a dense mat of light ochreus pile; mesepisterna with pile long, fine, and pale grey to light ochreus; pile of legs very short, fine, and pale grey; metasomal fasciae composed of weak, pale grey to light ochreus pubescence; first metasomal tergum with a lateral fringe of dusky grey pile extending to apical fascia, tergum with abundant, erect, dusky pile, not at all concealing surface; discal pile of terga four to seven a pale grey to light ochreus, not at all black or testaceous; sternal fasciae weak, composed of a very narrow fringe of pale grey pile.

Antennae long, reddish brown beneath and brownish black above, flagellar segments one and one-half times as long as broad; malar space seven-eighths as long as broad; clypeus convex, very densely, contiguously, striately punctate over entire surface, punctures a little more separated at extreme apical margin; vertex dull, closely and deeply punctate. Prothoracic spines short and sharp, barely as long as width across base; mesoscutum very coarsely and densely punctate, impunctate area small;

scutellum densely almost contiguously punctate over lateral and posterior surfaces, medio-anterior surface shiny and free from punctures; mesepisterna with upper one-half closely, coarsely punctate, lower faces of mesepisterna with punctures sparser and interspaces shiny, punctures becoming feeble towards posterior margin of mesepisterna; propodeum with basal area deeply pitted with quadrate pits, lateral and posterior faces rugose and shiny, a few shallow pits on upper latero-posterior faces; tegulae light hyaline brown; wings dusky hyaline with abundant, short, ochreus to fuscous pubescence over surface, nervures brown; legs black tending to brownish on apeces of tibiae and tarsi; posterior basitarsi four times as long as broad. First metasomal tergum shiny, very finely punctate, punctures approximately two puncture widths apart, becoming sparser medially; second metasomal tergum very finely punctate with punctures one to two puncture widths apart; metasomal sterna shiny, very sparsely folliculated; seventh ventral plates much as in carolinus, however with median reflexed portions greatly expanded (See illustration).

FEMALE: length 10 mm., wing length 7.5 mm.

Pile of face pale grey, erect and most dense at antennal bases; genal areas with pile light ochreus, pile becoming longer and finer below; mesoscutum and scutellum with pile ochreus to deep ochreus with no admixture of black pile, pile rather dense and tending to obscure surface;

mesepisterna with pile long, plumose, and pale grey; legs with pile very long, plumose, and pale grey; first metasomal tergum with fascia expanded laterally, almost absent medially, fascia white to slightly tinged with ochreus, tergum with a lateral fringe of light ochreus pile extending to fascia, anterior portion of disc with abundant erect pale grey pile, not at all obscuring surface; fasciae of metasomal terga two to five broader than first, more dense, and a little whiter; metasomal terga five and six with discs having abundant semi-erect, pale grey to light ochreus pile; metasomal sterna with a weak fringe of pale grey pile on extreme apical margins, a few erect, scattered, ochreus hairs on discal area.

Antennae deep brown to black, flagellar segments three-quarters as long as broad; malar space three-eighths to one-half as long as broad; clypeus weakly convex with a very faint median longitudinal sulcus; surface is closely and densely striately punctate to apex; vertex shiny and finely punctate; fascial foveae distinct, not reaching half way to lateral ocelli at upper extremity. Prothoracic spines short and sharp, barely as long as width across base; mesoscutum very densely and coarsely punctate, impunctate area small; scutellum coarsely and densely punctate over posterior three-quarters, anterior one-quarter shiny and sparsely punctate, a very weak trace of a longitudinal median line extending to anterior margin of scutellum; mesepisterna coarsely and densely punctate,

surface dull; basal area of propodeum deeply pitted, upper portions of lateral and posterior faces of propodeum transversed by numerous weak rugae, surface dull; tegulae light hyaline brown; wings dusky with abundant, short, ochreus to fuscous pubescence, particularly on apical half, nervures brown; legs deep reddish brown; posterior basitarsi two and three-quarters times as long as broad. First metasomal tergum shiny, very feebly punctate or folliculated, follicles just barely discernible towards lateral faces; second metasomal tergum sculptured much as first; metasomal sterna rather coarsely folliculated, shiny, follicles coarsest on apical half of each sternum.

Distribution:

North Carolina: Fort Macon (holotype, allotype and 19 paratypes), Morehead (paratype); Laurel Hill (paratype).

Georgia: St. Marys.

Florida: Inverness (32 paratypes); Miami (paratype); Island Grove (paratype); Tarpon Springs (paratype); Orlando; Ormond; Biscayne Bay.

New Jersey: Camden County.

Flight Records:

The species has been recorded as flying between February 24 and May 11.

Plant Records:

Ilex.

The holotype is located in the collection of the North Carolina State College.

GROUP VIII - americanus

Colletes americanus Cresson

americanus CRESSON, 1868, Proc. Boston Soc. Nat. Hist., vol. 12, p. 167; CRESSON, 1872, Trans. Amer. Ent. Soc., vol. 4, p. 248 (questionable); PUTNAM, 1876, Proc. Davenport Acad. Sci., vol. 1, p. 195 (questionable); PATTON, 1879, Proc. Boston Soc. Nat. Hist., vol. 20, p. 142; COCKERELL, 1896, Bull. Univ. New Mexico, no. 24, p. 19 (questionable); EVANS, 1896, Canadian Ent., vol. 28, p. 12; COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 51 (questionable); COCKERELL, 1898, Zool., ser. 4, vol. 2, p. 312 (questionable); COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 43 (questionable); COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 43 (questionable); COCKERELL, 1899, Catalogo de las Abejas de Mexico, Secretaria de Tomento, p. 4 (questionable); BIRKMANN, 1899, Ent. News, vol. 10, p. 244 (questionable); COCKERELL, 1901, Canadian Ent., vol. 33, p. 282 (questionable); COCKERELL, 1901, Ann. Mag. Nat. Hist., ser. 7, vol. 7, p. 125 (questionable); COCKERELL, 1902, Amer. Nat., vol. 36, p. 810 (questionable); COCKERELL, 1902, Amer. Nat., vol. 36, p. 810 (questionable); COCKERELL, 1903, Psyche, vol. 10, p. 74 (questionable); ROBERTSON, 1904, Canadian Ent., vol. 36, p. 276; Pierce, 1904, Univ. Nebraska Studies, vol. 4, p. 24; COCKERELL, 1905, Psyche, vol. 12, p. 68; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32,

p. 292 (questionable); SNOW, 1906, Kansas Acad. Sci., vol. 20, p. 136 (questionable); ROBERTSON, 1906, Science, vol. 23, p. 309; LOVELL, 1907, Canadian Ent., vol. 39, p. 364; COCKERELL, 1908, Proc. Ent. Soc. Washington, vol. 10, p. 67; SMITH, 1910, Ann. Report New Jersey State Museum, for 1909, p. 694; ROBERTSON, 1914, Ent. News, vol. 25, p. 70; VIERECK, 1916, Connecticut Geol. Nat. Hist. Survey Bull., no. 22, p. 741; CRESSON, 1916, Mem. Amer. Ent. Soc., vol. 1, p. 106; GIBSON and CRIDDLE, 1920, Rept. Ent. Soc. Ontario for 1919, p. 21; CLEMENTS and LONG, 1923, Carnegie Inst. Washington Publ., no. 336, p. 249 (questionable); ROBERTSON, 1926, Ecology, vol. 7, p. 387; ROBERTSON, 1926, Psyche, vol. 33, p. 116; LEONARD, 1926, Cornell Univ. Agr. Exper. Sta. Mem., no. 101, p. 1021; ROBERTSON, 1928, Flowers and Insects, p. 10; PEARSON, 1933, Ecol. Monographs, vol. 1, p. 384; BRIMLEY, 1938, Insects of North Carolina, p. 451; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 404.

Considerable confusion has existed and still exists when dealing with this species. The closely related mitchelli and annae Cockerell are very difficult to separate from americanus and there is some probability that annae may eventually prove to be a montane subspecies of the plains americanus. The males of annae have the punctures of the mesepisterna coarse and separated by broad shiny interspaces in contrast to the finely punctured and roughened

pleura of americanus, the rims of the metapleural prominences are narrower and the prothoracic spines slightly longer in annae. The female of annae lacks the broad testaceous rims which occur in americanus, the procoxal spines are much shorter and the pile of the body tends to be finer and tinged with light yellow.

The seventh ventral plates of mitchelli are roughly square with the pile of the dorsal surface restricted to the median portions compared to the larger quadrangular plates of americanus. The females of meredosiensis species lack the testaceous rim completely having but a weak black margin.

I have not had access to the recorded specimens from Arizona (Snow), New Mexico (Cockerell), Colorado (Cockerell), Utah (Putnam) or Texas (Cockerell and Cresson) and therefore have not been able to verify or refute these determinations. I strongly question their validity as americanus for on the basis of the material at hand the western limits of americanus appear in the Carolinian zone of the plains states. There is a strong possibility that the specimens from Colorado, Utah and Texas were either solidaginis or mandibularis for these species are superficially similar.

MALE: length 9 mm., wing length 6 mm.

Pile of face dense over clypeus and about antennal bases, tinged with light yellow, especially above; vertex with pile yellowish to dusky yellowish, concentrated

principally in ocellar triangle; upper genal areas with pile yellowish to dusky yellowish, pile becoming longer, finer, and pure white below; mesoscutum with pile long and dense over anterior one-half and lateral margins, pile strongly tinged with a dusky yellow; scutellum with a broad lateral and posterior fringe of dusky yellow to light ochreus pile; mesepisterna with pile long, fine, pale grey above, becoming whiter below; propodeum with long fringes of dusky pile along latero-posterior margins, fringes longest and most dense above, becoming progressively shorter and weaker toward pedicle, lateral and posterior faces with a sparse covering of erect, pale grey pile; pile of legs short, sparse, and pale grey to white; first metasomal tergum with apical fascia weak but complete, pubescence tinged with duskiness, especially at median portions, lateral fringes of dusky pile weak, barely reaching apical fascia, disc, especially anterior portion, with abundant, erect, pale grey to dusky pile; metasomal terga two to five with fasciae broad, dense, and pale grey; metasomal terga three to six with discs having abundant, erect, light yellowish to dusky pile; metasomal sterna two to four with narrow apical fringes of pale grey pile.

Antennae reddish brown to dark brown above; malar space one-third as long as broad; clypeus short, weakly convex, very densely and finely punctate to apex, punctures slightly larger and tending to be very weakly striate apically; vertex dull, finely and shallowly punctate.

Prothoracic spines sharp, not as long as width across base; mesoscutum very finely and shallowly punctate with broad, shiny interspaces, punctures one to two puncture widths apart, impunctate area small; scutellum densely, almost contiguously punctate over posterior one-third, punctures becoming sparser and more distinct on median discal area, anterior one-third shiny, impunctate; mesepisterna shallowly punctate, punctures of same size as mesoscutum, dense above, becoming sparser below; metapleural prominence strong with a broad hyaline testaceous rim, abruptly declivous beneath; propodeum with basal area narrow and sloping rather sharply ventrally, shallowly, quadrately pitted, lateral and posterior faces dull and weakly roughened; tegulae light hyaline brown; wings dusky with abundant, light fulvous pubescence, nervures light brown; legs reddish brown to black basally; posterior basitarsi four times as long as broad. First metasomal tergum shiny, finely and rather sparsely punctate laterally, punctures one to two puncture widths apart, punctures becoming sparser and follicle-like medially where surface is almost impunctate; second metasomal tergum dull, finely and densely folliculated, weakly depressed basally; metasomal sterna dull, finely, rather obscurely folliculated; seventh ventral plates roughly quadrate with a broad transverse basal margin of pile, extreme lateral margins non-plumose and hyaline (See fig. 35).

FEMALE: length 10 mm., wing length 6.25 mm.

Pile of face strongly tinged with yellow, concentrated principally about antennal bases and lower inner orbital margins, a few sparse, finer hairs on clypeus, not at all concealing surface; vertex with pile tinged with ochreus, dense in ocellar triangle; upper genal areas with pile strongly tinged with yellow, pile becoming finer and sparser below, a very narrow, weak rim of appressed pubescence immediately posterior to each compound eye; mesoscutum with a dense covering of yellow to light ochreus pile, being most dense about anterior and lateral margins; scutellum with a broad lateral and posterior rim of dusky yellowish to light ochreus pile; mesepisterna with pile long, fine, pale grey above, tending to pure white below; propodeum with long fringes of light yellowish pile along latero-posterior margins, fringes longest and most dense on dorsal surface, lateral faces with a few overhanging hairs from metapleural propodeal margin, posterior face with abundant, erect, pale grey pile; pile of anterior two pairs of legs short and white to pale grey, rather sparse, posterior legs with pile long, plumose, and pale grey; first metasomal tergum with apical fascia weak and broad, often interrupted medially, pubescence dusky, lateral fringes of pile weak, becoming short and barely reaching apical fascia, disc with abundant, erect, dusky pile, particularly on anterior face; metasomal terga two to five with apical fasciae broader, denser, and dusky to pale grey; metasomal

terga three to six with discs having abundant, erect, pale grey to fuscous pile; metasomal sterna with very weak apical fringes of pale grey pile.

Antennae reddish brown to black above, flagellar segments about as long as broad; malar space very short, one-sixth as long as broad; clypeus short, weakly convex, tending to be flattened medially, densely, obscurely punctate to apex, punctures tending to become somewhat more striate apically; vertex shiny, very finely and rather densely punctate; fascial foveae rather indistinct, weakly rounded dorsally and not extending above inner margin of the compound eyes. Prothoracic spines long and sharp, at least longer than width across base; mesoscutum finely and densely punctate, punctures no more than one-half puncture width apart about anterior and lateral margins, impunctate area small; scutellum densely, obscurely punctate over posterior one-third and lateral margins, punctures becoming more distinct and shallower on median discal area, anterior one-third shiny, impunctate; mesepisterna tending to be dull, very densely and shallowly punctate, punctures almost contiguous above and along the anterior margin, becoming finer, sparser, and more obscure posteriorly; metapleural prominence strong with a broad, testaceous rim, abruptly declivous beneath; propodeum with basal area narrow, sloping rather sharply ventrally and irregularly, quadrately pitted, lateral faces shiny, posterior faces shiny and rather finely and sparsely

punctate; tegulae light hyaline brown; wings dusky with abundant, very light fuscous pile, nervures brown; legs brown, becoming somewhat blackened basally; procoxal spines short, about twice as long as wide; posterior basitarsi four times as long as broad. First metasomal tergum shiny, very finely and sparsely punctate laterally, punctures becoming sparser and folliole-like on median surfaces where they may be three to six follicle widths apart; second metasomal tergum densely and coarsely folliculated, surface dull; metasomal sterna two to five dull, very densely and coarsely folliculated.

Distribution:

The species abounds in the eastern portions of America, becoming scarcer in the western great plains. Marginal records include Bryson City, North Carolina; Atlanta, Georgia; Cartersville, Georgia; Hattiesburg, Mississippi; Orono and Booth, Maine; Tenaga and Kazabazua, Quebec; Aweme, Manitoba; Phillip, South Dakota; and Lawrence, Kansas.

Flight Records:

This is an autumnal species, having been recorded between August 12 and October 30.

Plant Records:

Aster, Chrysopsis microcephala, Solidago.

The types are located in the Academy of Natural Sciences of Philadelphia.

Colletes annae annae Cockerell

annae COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 48; COCKERELL, 1897, Bull. Univ. New Mexico, no. 24, p. 24; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 43; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 43; COCKERELL, 1905, Psyche, vol. 12, p. 87; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292.

crucis COCKERELL, 1902, Ent. News, vol. 13, p. 304; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292 (new synonymy).

cockerelli TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 221 (new synonymy).

An examination of the type of crucis Cockerell reveals it to be identical with C. annae Cockerell, both of which have been virtually unknown except for the originally designated specimen. The species is very sparsely distributed throughout the southwestern portion of the United States and northern Mexico, apparently an autumnal polytropic member of the americanus group, closely related to solidaginis Swenk.

Recently Timberlake described his new species cockerelli from two females taken in Arizona which resemble the males of annae closely in punctuation characteristics as well as in the distribution of the pubescence. These I believe to be the females of the poorly known annae.

The females can readily be distinguished by having the procoxal spine short, yet well developed; the metapleural prominence weak without a distinct testaceous rim; and in having the pile of the typical specimens tinged with light yellow.

The males closely resemble C. americanus except in having the mesepisterna with the punctures coarse and separated by broad, shiny interspaces; the rim of the metapleural prominence much narrower in annae; and the prothoracic spines somewhat longer.

MALE: length 8 mm., wing length 5.5 mm.

Pile of face long, dense, and very lightly tinged with yellow, completely concealing clypeus and antennal basal region as high as median ocellus; vertex with abundant pile, light ochreus; upper genal areas with pile dense, light ochreus, becoming longer, finer, and whiter below, a very narrow rim of appressed, whitish pubescence immediately posterior to each compound eye; mesoscutum with abundant, erect pile tinged with light yellow; scutellum with a very dense lateral and posterior fringe of plumose, light ochreus pile; mesepisterna with pile long, fine, white below, tending to be tinged with yellow above; propodeum with dense fringes of long, yellowish pile along latero-posterior margins, fringes most dense dorsally, lateral and posterior faces with abundant, erect, light yellowish pile; pile of legs short, moderately dense, and

white to tinged with light yellowish; first metasomal tergum with apical fascia very broad, dense, and yellowish, lateral fringes of long yellowish pile extending to apical fascia, disc with abundant, long, yellowish pile obscuring surface; metasomal terga two to five with fasciae very broad, dense, and tinged with light yellow; second metasomal tergum with a broad, dense basal fascia; metasomal sterna two to four with dense apical fringes of pale grey pile, slightly broadened medially.

Antennae reddish brown, flagellar segments one and one-half times as long as broad; malar space narrow, one-quarter as long as bread; clypeus short, weakly convex, very finely and densely punctate over basal two-thirds, punctures not at all striate and close, apex and latero-apical margins with punctures sparser and tending to be weakly striate; vertex shiny, finely and sparsely punctate. Prothoracic spines long and needle-like, at least twice as long as width across base; mesoscutum distinctly punctate with shiny interspaces, punctures one-half to one puncture width apart, impunctate area small; scutellum very finely, densely, contiguously punctate about lateral and posterior one-third, punctures becoming sparser and more distinct on median and anterior discal area; mesepisterna with punctures just appreciably coarser than those of mesoscutum, separated by one-half to one puncture width, interspaces shiny; propodeum with basal area broad, deeply, quadrately pitted, lateral and posterior faces shiny,

posterior face finely and sparsely punctate; metapleural prominence with a narrow testaceous rim; tegulae light hyaline brown; wings whitish hyaline with a sparse covering of light pubescence, nervures light brown; legs brown, bases and apeces of tibiae very light brown, intermediate area darker brown; tarsal segments light yellowish brown. First metasomal tergum shiny, impunctate, a few, very fine punctures or follicles evident on lateral margins; second metasomal tergum finely and sparsely folliculated, interspaces shiny; metasomal sterna shiny, finely and sparsely folliculated; seventh ventral plates much as in americanus but with discal pubescence not nearly so strong along median portion, pubescence in annae extending to extreme lateral margins (see fig. 36).

FEMALE: length 9.5 mm., wing length 6 mm.

Pile of face short, moderately sparse, more densely concentrated about antennal bases and lower inner orbital margins where it tends to be semi-appressed; clypeus weakly covered with fine, non-plumose pile, not at all concealing surface; vertex with sparse pile concentrated principally in ocellar triangle; upper genal areas with pile long and yellowish, tending to be longer, finer, and pale grey to white below, a narrow rim of appressed, whitish pubescence immediately posterior to each compound eye; mesoscutum with abundant, short, rather plumose, yellowish pile, tending to obscure surface; scutellum with posterior and

lateral portions covered with plumose, yellowish pile; mesepisterna with weak covering of fine, long, pale grey to white pile, becoming much shorter on upper faces; propodeum with long fringes of dusky pile along lateral and posterior margins, pile longest and most dense on dorsal surface, becoming shorter below; anterior two pairs of legs covered with long, whitish pile, posterior femora and tibiae with long, curved, plumose hairs over surface, hairs almost pure white; first metasomal tergum with a dense, appressed covering of long, whitish pile, lateral fringes of light yellow to pale grey pile extending to apical fascia; metasomal terga two to four with apical fasciae broad and pure white; second metasomal tergum with a dense, white basal fascia; third metasomal tergum with a weak, white basal fascia; sternal fasciae absent; sixth metasomal tergum with appressed, dark brown pile.

Antennae light reddish brown, becoming lighter toward base of flagellum; malar space narrow, approximately one-fifth as long as wide; clypeus weakly protuberant, rather rugosely punctate over entire surface; vertex shiny, impunctate. Prothoracic spines long, directed dorso-laterally; mesoscutum coarsely and closely punctate on anterior half, punctures becoming sparser about median impunctate area, which is large, surface uniformly coarsely punctate about anterior, lateral, and posterior portions; scutellum weakly rugosely punctate over posterior half, anterior half shiny, impunctate; mesepisterna with deep,

coarse punctures separated by narrow, shiny interspaces, punctures somewhat smaller and denser above; metapleural prominences weak with a very narrow, deep testaceous to dark brown rim, not abruptly declivous beneath; propodeum with basal area having shallow, quadrate pits, lateral and posterior faces shiny, impunctate; tegulae light brown; wings whitish hyaline with sparse covering of light pubescence, nervures light brown; legs reddish brown, anterior coxae with spines approximately twice as long as wide; posterior basitarsi four and one-half times as long as wide. First metasomal tergum with disc shiny and shallowly punctate, punctures more evident at extreme lateral margin where they are still obscure; metasomal terga two and three with discs shallowly folliculated; metasomal sterna shiny, very coarsely and densely folliculated on apical one-half of each sternum.

The colour of the pile of the typical specimens of annae is prone to variation and in many specimens the yellowish tinge, so vivid on the types, is not evident and the pile tends to tawny grey or whitish.

Distribution:

Two males, Las Cruces, New Mexico, August 27 (T.D.A. Cockerell) on Solidago canadensis arizonica; one female, Phoenix, Arizona, October 16 (T.D.A. Cockerell) on Baccharis; one female, Tempe, Arizona, October 28 (T.D.A. Cockerell) on Baccharis.

The holotype is located in the United States National Museum.

Colletes annae dissentus Timberlake

dissentus TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 223.

A comparison of the male of a. dissentus with the type of C. annae convinces me that they are members of the same species, and that dissentus should rank as no more than a subspecies of annae. The three determined specimens of dissentus are from in the coastal regions of California and the females are difficult to separate from annae on any other character except colour.

The pile of the metasomal terga of the males is lighter, almost white, and the testaceous rim of the metapleural prominence is slightly narrower than annae. However, Timberlake records a male from Conception Bay, Baja California, in which the pubescence is strongly tinged with yellow, much as in the males from Las Cruces, New Mexico and Coahuila, Mexico. Genitalically the two forms are identical. The males of this sub species differ from a. annae in having the wings dusky hyaline with close darker pubescence over the surface; the antennae are deep brownish-black and nervures dark brown.

The female is much as the male with integument deep

black, the pile more strongly tinged with ochreus and with the basal fascia of the second metasomal tergum absent.

Distribution:

Holotype female, Riverside, California, October 9, 1948 (P. W. Weber); allotype Los Angeles County (Cequillett); one male, Turlock, California, August 1950, has been recorded as disseptus by Timberlake, while another male from Conception Bay, Baja, California, October 25, 1941, was placed with the species provisionally. The species is distributed along the western coast of California and Baja, California. The eastern limit of this subspecies is still unknown but probably intergrades with a. annae in southeastern California.

The holotype is located in the collections of the Citrus Experiment Station, Riverside, California and the allotype is in the collections of the University of Nebraska.

Colletes laticinctus Timberlake

laticinctus TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 220.

The species was described from a series of females taken in New Mexico, Arizona, and Idaho. Additional material from the Swenk collection compared with the

paratypes shows the synonymy between this species and the Swenk manuscript species named after the plant Gutierrezia. Many specimens, labeled as paratypes, were distributed by Swenk. It is a sibling species to annae Cockerell and can be accurately distinguished only with difficulty from that species. The males differ from annae in having the pile of the body light tawny, the disc of the second metasomal tergum just appreciably more sparsely folliculated, and in having the seventh ventral plates broadly rounded apically rather than abruptly truncated as in annae. The females closely resemble annae except that the procoxal spines are rudimentary. (In annae the spines are approximately twice as long as wide.) It is also similar to americanus and mandibularis but can most readily be distinguished by the short procoxal spines and the very narrow rim to the metapleural prominence, this rim being black in laticinctus and broadly testaceous in the other two species.

MALE: length 8 mm., wing length 5.5 mm.

Pile of face dense and long, completely concealing clypeus, subantennal and supra-antennal areas, tinged with light yellow above; vertex with pile light, yellowish, and sparse, concentrated principally in ocellar triangle; upper genal areas with pile short, dense, and tinged with light yellow, pile becoming very long, fine, and white below with a very narrow, appressed rim immediately

posterior to each compound eye; mesoscutum with pile long, dense, and tinged with yellow; scutellum with a very dense fringe of long, light ochreus pile about lateral and posterior margins; mesepisterna with pile long, fine, and pale grey to white, partially concealing surface; propodeum with long fringes of pale grey pile on latero-posterior margins, particularly dorsal surface, lateral and posterior faces with abundant, long erect, pale grey pile; first metasomal tergum with apical fascia very dense, long, and weakly tinged with yellow, lateral fringes of pile long, dense, and fusing with apical fascia, pile of disc very long, dense, and tinged with yellow, partially concealing surface; metasomal terga two to five with fasciae broad, dense, and very weakly tinged with light yellow; second metasomal tergum with a weak basal fascia; metasomal terga three to six with discs having abundant, short, erect to semi-erect, whitish pile; metasomal sterna two to four with dense, long apical fringes of pile, these apical fringes or fasciae broad and pale grey to tinged with light yellow.

Antennae reddish brown, long, flagellar segments one and one-half times as long as broad; malar space one-half as long as broad; clypeus short, convex, very finely and densely punctate over basal three-quarters, apex with punctures sparser and tending to be weakly striate laterally, with shiny interspaces; vertex dull, finely and densely punctate. Prothoracic spines very short and

sharp; mesoscutum densely punctate with shiny interspaces, punctures one-half to one puncture width apart on anterior and lateral faces, impunctate area large; scutellum with extreme lateral and posterior margins finely, densely, contiguously punctate, disc with punctures more distinct and separated by broad shiny interspaces, punctures one-half to one puncture width apart, anterior one-third shiny, impunctate; mesepisterna closely punctate, punctures no more than one-half puncture width apart with shiny interspaces; metapleural prominence abrupt with a very narrow, hyaline rim; propodeum with basal area sloping sharply ventrally, obscurely and irregularly pitted, pits not at all uniformly quadrate and very shallow, lateral and posterior faces moderately shiny and obscurely punctate, weakly roughened on latero-posterior margins; tegulae very light hyaline brown; wings whitish hyaline with a sparse covering of very short, whitish pile, nervures very light brown hyaline; legs brown basally, becoming a very light brown apically, ends of tibiae and also tarsi light brown; posterior basitarsi four times as long as broad. First metasomal tergum shiny, sparsely and finely punctate, punctures one to two puncture widths apart laterally, becoming much sparser and shallower medially; second metasomal tergum rather densely folliculated or very finely punctate, with follicles close, no more than one puncture width apart, especially medially; apical fascial depressions on metasomal terga one to five light brownish hyaline;

second metasomal tergum weakly depressed basally; metasomal sterna shiny, rather densely and finely folliculated over posterior one-third of each sternum; seventh ventral plates much as in annae, however with apical margins broadly rounded and membranous.

FEMALE: length 9.5 mm., wing length 6 mm.

Pile of face short and dense about antennal bases and lower inner orbital margins; clypeus with a weak covering of short, pale grey pile; vertex with abundant, erect pile tinged with light ochreus, concentrated principally in ocellar triangle; upper genal areas with pile dense, short, and tinged with ochreus, becoming much longer, finer, and whiter below, a broad band of appressed, white pubescence immediately posterior to each compound eye; mesoscutum densely covered with abundant, short pile tinged with yellowish; scutellum with a broad lateral and posterior band of short, plumose pile, strongly tinged with yellowish; mesepisterna with abundant, fine, pale grey to white pile, tinged with light yellow above, becoming pure white below, obscuring surface; propodeum with long fringes of pile tinged with light yellow along latero-posterior margins, longest and most dense above, lateral faces virtually bare, posterior face with abundant, erect, pale grey pile; pile of anterior two pairs of legs sparse and white to tinged with yellow, pile of posterior legs long, plumose, and tinged with light ochreus; first

metasomal tergum with apical fascia broad, dense, and white, lateral fringes of white pile dense and extending to apical fascia, disc with abundant, erect, pale grey pile, partially concealing surface; metasomal terga two to four with fasciae very broad, dense, and white; second and third metasomal terga with broad, dense basal fasciae of pure white pile; metasomal sterna two to four with apical fringes of short, weak, pale grey pile, narrowed medially.

Antennae reddish brown, short, flagellar segments three-quarters as long as broad; malar space one-eighth as long as broad; clypeus convex, short, rather coarsely, striately punctate to apex, interspaces linear and shiny; vertex very shallowly punctate with shiny interspaces, punctures exceedingly fine; fascial foveae shallow, impunctate, extending above inner orbital margins and over one-third of way to lateral ocelli. Prothoracic spines very short, roughly triangular; mesoscutum finely and distinctly punctate, punctures very close, less than one-half puncture width apart on anterior faces, punctures becoming coarser and sparser posteriorly to median discal area, impunctate area large; scutellum very densely, contiguously punctate on extreme latero-posterior margins, disc with punctures distinct and separated by shiny interspaces, punctures one-half puncture width apart, anterior one-third shiny, impunctate; mesepisterna finely and densely punctate, punctures almost contiguous with linear interspaces, surface rather dull; metapleural prominence

weak with a very narrow, hyaline rim, rim just barely visible from above; propodeum with basal area sharply sloping ventrally, very shallowly, obscurely pitted, pits hardly quadrate, lateral and posterior faces shiny, posterior face finely and sparsely punctate; tegulae very light hyaline; wings whitish hyaline with extremely short, light fulvous to tawny pile apically, nervures light brown; procoxal spines rudimentary; legs brown; posterior basitarsi three and three-quarters times as long as broad. First metasomal tergum shiny, virtually impunctate, a few, exceedingly fine punctures evident on latero-apical margins of disc; second metasomal tergum very finely and rather densely folliculated, apical fascial depressions broad and light brownish hyaline; metasomal sterna coarsely and densely, uniformly folliculated, apical margins of sterna two to five with a very narrow, hyaline rim.

Distribution:

Holotype, female, near Tecalote, New Mexico, September 5, 1930 (P. H. Timberlake) on Pectis papposa; neoallotype, male, Glen Sioux County, Nebraska, 4000 feet, August 20, 1906 (L. Bruner); paratypes: 3 females, near Rowe, New Mexico, September 5, 1930 (P. H. Timberlake) on Gutierrezia sarothrae; 1 female, Huachuca Mountains, Arizona, September 11, 1928 (E. R. Leech); 1 female, Grand Canyon, Arizona, August 19, 1939 (E. C. Van Dyke); 1 female, Blackfoot, Idaho, September 5, 1932 (Louise Ireland); 1 female, Sandia

Mountains, New Mexico, 5000 feet, August 13, 1935 (C. D. Michener).

Others: 2 males and 1 female, Glen Sioux County, Nebraska, 4000 feet, August 18, 1906 (M. H. Swenk) on Gutierrezia sarotheae; 2 males, 1 female, Glen Sioux County, Nebraska, 4000 feet, August 20, 1906 (L. Bruner); 1 female, Crawford, Nebraska, September 13, 1911 (J. T. Zimmer) on Gutierrezia sarotheae; 1 male, Lingle, Wyoming, August 10, 1949 (Dreisbach and Schwab); 1 female, Niobrara County, Wyoming, September 1, 1943 (Pfadt and Seaton); 3 males, Conant, Idaho, September 2, 1925, 4400 feet (R. W. Haegele) on Gutierrezia sarotheae; 1 male, Delle, Utah, August 21, 1931 (G. F. Knowlton); 1 male, Boulder, Colorado, August 24, 1900 (S. A. Rohwer) on Polygonum; 1 male, Magdalena Mountains, New Mexico, August 1894 (F. H. Snow); 1 male, 45 miles east of Rock Springs, Wyoming, 7000 feet, August 5, 1934 (H. A. Scullen).

The holotype is in the collection of the collections of the Citrus Experiment Station, Riverside, California. The neoallotype is located in the collections of the University of Nebraska.

Colletes tectiventris Timberlake

tectiventris TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 218.

This is a sibling species to ochraceus and is found in the desert regions of southern California. Both sexes are smaller than ochraceus, have the wings more whitish hyaline and the pile of the body paler, almost dusky grey. The females have the metasomal terga completely covered with appressed pubescence and the rim of the metapleural prominence very narrow and brown to black. More difficulty may be encountered separating tectiventris from annae than from ochraceus but the propodeal characteristic cited in the key appears to be consistent.

MALE: length 7-8 mm., wing length 5 - 5 1/2 mm.

Hair of face dense and pure white, most dense about antennal bases and along inner orbital margins; upper clypeus with dense white hair on basal half, becoming suddenly sparse towards apex; hair of vertex pale grey, concentrated principally in ocellar triangle and upper genal areas, hair of lateral and lower genal areas pure white and long; pile of mesoscutum pale grey and sparse; scutellum with heavy fringe of pale grey pile about lateral and posterior edges; mesepisterna with long, pale grey to white pubescence, becoming whiter towards lower faces; lateral faces of propodeum with long, erect hair; first

metasomal tergum with few, long, pale grey hairs on disc, becoming more dense toward basal area but never sufficiently dense to obscure the surface, tergum with a dense fringe of hair laterally; metasomal terga two to five with fasciae of long, loose hair, very wide and almost pure white; sternal fasciae white, composed of apical fringes of long pile; femora with long, loose, white pile, tibiae and tarsi with short, sparse pile, tending towards ochreus.

Antennae long, flagellar segments at least one and one-half times as long as wide, dark brown tending to black basally; malar space one-third to one-half as long as wide; clypeus short with shallow, elongate punctures over surface, interspaces shiny. Prothoracic spines absent; mesoscutum shiny, punctures about one puncture width apart on surface, becoming more widely separated about small impunctate area of mesoscutum; scutellum shiny anteriorly with a few deep punctures; mesepisterna shiny below with deep, almost contiguous punctures, becoming shallower and more crowded on upper and posterior edges, surface becoming duller with increased crowding of punctures; metapleural prominence large with a wide hyaline rim; lateral faces of propodeum shiny and weakly rugose, becoming dull and roughened towards dorsal and posterior surfaces, latero-posterior edges of propodeum rounded, basal area with indistinct, quadrate pits, abruptly sloping behind scutellum; tegulae testaceous with darkened

areas at base, wings whitish hyaline with virtually no pubescence, nervures light brown except for subcosta-radius which is dark brown; legs black to dark brown at bases, tending to ochreus apically. First metasomal tergum impunctate with a few, fine, scattered follicles on the surface becoming indistinguishable towards mid line, disc shiny; second to fifth metasomal discs slightly folliculated over surface, surfaces very shiny, black.

FEMALE: length 9.5 mm., wing length 6.25 mm.

Hair of body short and plumose; pile of face white to pale yellow, clumped along inner orbital margins and about antennal bases; clypeus with a few ochreus hairs not obscuring the surface; vertex with yellowish-grey pile concentrated in the ocellar triangle; genal areas with appressed pile on upper surface, extending laterally immediately behind the eyes, lower genal areas with long, loose, erect pile; mesoscutum covered with yellow to ochreus, short, dense pile; scutellum with abundant, longer pile clumped on posterior margin extending laterally to mesoscutum; yellowish pile of mesoscutum extending laterally to the posterior lobe of pronotum and upper surface of mesopleura; pile of lower mesepisterna long, loose, pale grey to white; metasomal terga completely covered with ochreus-yellow, appressed pubescence, which may be worn from surface of some specimens; first metasomal disc with erect pile on anterior face, but completely appressed

apically; metasomal terga two to five completely covered with ochreus pubescence; sixth metasomal tergum with deep ferrugineous pile (not appressed); metasomal tergal fasciae distinguishable as denser mats of pubescence; sternal fasciae absent; pile of anterior two pairs of legs short, white to ochreus in color, that of posterior femora and tibiae long and curled, hind basitarsi with a number of long, erect hairs.

Antennae short, dark brown, becoming darker basally; malar space one-quarter as long as wide; clypeus convex covered with elongate punctures to apex; vertex shiny and very sparsely punctate. Prothoracic spines long and sharp, directed more dorsally than laterally; mesoscutum deeply punctate with close contiguous punctures anteriorly, punctures becoming larger, deeper, and separated by shiny interpunctate areas towards ends of the parapsidal lines, impunctate area shiny and small; scutellum with anterior half shiny impunctate; mesepisterna dull, densely punctate with close, contiguous, shallow punctures, becoming closer and finer towards upper and posterior surfaces; metapleural prominence relatively weak, rimmed with a very narrow, dark brown rim, not sharply concave beneath; lateral faces of propodeum shiny, smooth, basal area of propodeum with shallow, quadrate pits, posterior face of propodeum closely but weakly traversed by weak rugae, giving it a dull, roughened appearance, latero-posterior edge demarked by a very weak ridge, not sharply rounded; wings with short,

ochreus pubescence very abundant on apical membranes, becoming sparser toward the base, nervures light brown, membrane whitish hyaline, tegulae ochreus hyaline, darker brown at base; legs dark brown to black at base, becoming lighter apically; hind basitarsi 3.5 times as long as wide. Metasomal terga one to four with discs shiny and virtually impunctate beneath pubescent covering; apical bands of metasomal terga reddish brown compared to the shiny blackness of the discal surface.

Distribution:

One female, Victorville, California, September 28, 1938 (Timberlake) on Isocoma acradenia; 2 males, 2 females, Oro Grande, California, September 14, 1935 (Timberlake) on Isocoma acradenia; 5 males, 8 females, Oro Grande, California, September 14, 1935 (C. D. Michener) on Isocoma; Antioch, California, August 9, 1936 (C. D. Michener) on Eriogonum.

The holotype is located in the collections of the Citrus Experiment Station, Riverside, California.

Colletes mitchelli Stephen, new species

This is a sibling species to americanus and can be separated from the latter only with difficulty. The metapleural prominence of the male has the testaceous rim much narrower and the seventh ventral plates have much reduced lateral extensions making them roughly square; the pile

covering of the plates is concentrated principally on the basal medial portion of each disc. The female differs from americanus in having the testaceous rim of the metapleural prominence absent, the rim evident only as a weak, black margin. The species is very sparsely distributed over America east of the Great Divide, for individual males have been taken from Illinois, Virginia, Florida, New Jersey, and Texas, appearing in August and September in the north and October to the south.

MALE: length 9 mm., wing length 6.25 mm.

Pile of face erect, dense, and tinged with tawny, concealing antennal bases and upper clypeus, a weak fringe of appressed pubescence along inner orbital margins; vertex with pile sparse and tinged with light ochreus, most dense in ocellar triangle; upper genal areas with pile short and tinged with grey, becoming longer, finer, and pure white below; mesoscutum with pile long, erect, and pale grey, concentrated principally on anterior one-half; scutellum with a fringe of long, pale grey pile about lateral and posterior margins, discal area bare; mesepisterna with pile long, fine, and dense, dusky to pale grey above, becoming white below; propodeum with fringes of long, pale grey pile on latero-posterior margins, most dense on extreme upper face, lateral and posterior faces with sparse, erect, pale grey hairs; pile of legs rather long and fringe-like on femora, white to pale grey, pile of tibiae and tarsi

shorter, sparser, and pale grey; first metasomal tergum with apical fascia broad, dense, and white, lateral fringes of pile rather dense, particularly on anterio-lateral faces, fringes reaching apical fascia, disc with abundant, erect, pale grey pile; metasomal terga two to four with fasciae broad, very weak, and white, often broadly interrupted probably due to wear; metasomal terga three to six with disc having sparse, short, erect, dusky to light fuscous pile, not at all concealing surface; metasomal sterna two to four with very narrow apical fringes of pale grey pile.

Antennae long, reddish brown, flagellar segments one and one-third times as long as broad; malar space very short, approximately one-quarter as long as broad; clypeus convex and short, densely and finely punctate over entire surface, interspaces linear and shiny; vertex dull, very finely and rather densely punctate. Prothoracic spines very short and sharp; mesoscutum finely and rather sparsely punctate, punctures at least one puncture width apart on anterior one-half and lateral faces, becoming much sparser medially, impunctate area large; scutellum densely, contiguously punctate on extreme lateral and posterior faces, discal area sparsely punctate with punctures one to two puncture widths apart, anterior one-third shiny, impunctate; mesepisterna densely punctate, punctures one-half puncture width apart with shiny interspaces; metapleural prominence is abrupt with a very narrow, deep hyaline rim, rim very much narrower than in typical americanus; propodeum with

basal area shallowly and broadly quadrately pitted at median surfaces, pits becoming irregular and obscure laterally, lateral and posterior faces shiny and sparsely punctate; tegulae light hyaline brown; wings dusky with abundant, deep fuscous pubescence, nervures brown; legs with coxae, femora, and tibiae deep brown to black, tarsi brown; posterior basitarsi five times as long as broad. First metasomal tergum shiny, very finely folliculated, virtually impunctate, follicles becoming denser and more conspicuous laterally; second metasomal tergum shiny, rather densely folliculated, much more so than first tergum, very shallowly depressed basally; metasomal terga one to five with apical fasciae in shiny, light brownish hyaline depressions; metasomal sterna shiny, sparsely and finely folliculated; seventh ventral plates with plate area almost square, a very dense and long hair band over basal one-half of each plate, a very narrow, lateral, non-pubescent rim to each plate.

FEMALE: length 10 mm., wing length 6.5 mm.

Pile of face sparse, erect, and tinged with yellow, particularly about antennal bases and inner orbital margins; vertex with pile strongly tinged with light ochreus, concentrated principally in ocellar triangle; upper genal areas with pile tinged with ochreus, pile becoming finer and slightly longer below, tawny; mesoscutum with pile tinged with ochreus, short, and concentrated principally over

anterior half, lateral and posterior margins; scutellum with a broad, lateral and posterior fringe of ochreus pile; mesepisterna with the pile long, fine, tinged with ochreus above, becoming white below; propodeum with long fringes of light ochreus pile on latero-posterior margins, longest and most dense above, becoming finer, sparser toward pedicle, lateral and posterior faces with sparse covering of erect, pale grey to light ochreus pile; anterior two pairs of legs with pile sparse, rather long, and pale grey, posterior pair of legs with pile long, plumose, and tinged with ochreus; first metasomal tergum with apical fascia of light ochreus pubescence, fascia broadened laterally and interrupted medially probably due to wear, lateral fringes of light ochreus pile, longest and most dense on anterio-lateral margin, lateral fringes barely reaching apical fascia, disc with abundant, erect pile on extreme anterior face, pile becoming somewhat appressed on anterior-lateral portions of the disc; metasomal terga two to four with fasciae broad, weak, and tinged with yellowish, fasciae may be interrupted due to wearing; second metasomal tergum with a broad, weak basal fascia of pubescence tinged with yellow; metasomal terga three to five with discal areas having sparse covering of erect, pale grey pile; metasomal sterna with a few, scattered, pale grey hairs.

Antennae brown, short, flagellar segments three-quarters as long as broad; malar space very narrow, one-

fifth as long as broad; clypeus convex, very densely and striately punctate to apex, interspaces shiny; vertex dull, very finely and rather densely punctate; fascial foveae deep, broadened toward dorsal surface and narrowed again at extreme apex, apical portion of each fovea extending just barely above inner orbital margin and reaching but one-third of way to lateral ocellus. Prothoracic spines very short and sharp; mesoscutum densely and deeply punctate over anterior, lateral, and posterior margins, punctures approximately one-half puncture width apart with shiny interspaces, becoming sparser toward median discal area, impunctate area large; scutellum very finely, densely, contiguously punctate about lateral and posterior margins, disc with scattered, coarse punctures, approximately one-half to one puncture width apart, anterior one-third shiny, impunctate; mesepisterna densely, contiguously punctate and dull above, punctures becoming finer and sparser, especially on lower posterior faces; metapleural prominence is weak, with a very narrow, dark brown to black rim; propodeum with basal area shallowly, quadrately pitted medially, pits becoming irregular laterally, lateral and posterior faces shiny and finely punctate, weakly roughened; tegulae light hyaline brown; wings dusky with abundant, fuscous pubescence, nervures brown; legs deep brown; posterior basitarsi four times as long as broad; procoxal spines approximately one and one-half times as long as broad. First metasomal tergum shiny, very finely and

sparsely folliculated, principally on lateral and apical faces, follicles most dense on extreme lateral faces where they may be approximately one follicle width apart; metasomal tergum two with disc closely, finely folliculated, dull; metasomal sterna shiny, with sparse follicles.

Distribution:

Holotype male, Virginia Beach, Virginia, September 30, 1932; allotype female, Virginia Beach, Virginia, October 6 (Fred Knab); paratypes: 1 male, Virginia Beach, Virginia, September 30, 1932; 3 males, Brigantine, New Jersey, September 9, 1927 (C. H. Ballou); 2 males, Sandy Hook, New Jersey; 1 male, Seaside Park, New Jersey, September 8 (Weiss and West); 2 males, Meredosia, Illinois, August 19, 1913, and August 22, 1917; 1 male, Illinois Sands (Hart Collection); 1 male, Pensacola, Florida, October 11-14, 1914; 3 males, Lee County, Texas, October 1910 (A. Birkmann).

The species is named after Dr. T. B. Mitchell in recognition of his extensive studies on the bees.

The holotype and allotype are located in the United States National Museum.

Colletes ochraceus Swenk

ochraceus SWENK, 1906, Canadian Ent., vol. 38, p. 42; TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 217.

The male of this species closely resembles americanus Cresson, however, it can be distinguished from that species by the long malar space which is about two-thirds as long as wide; the close, contiguous punctures of the mesepisternum, without broad, shiny interspaces, and the coarse, dense punctures on the first metasomal tergum of ochraceus. The female of ochraceus is readily distinguishable from americanus in having the metasomal terga completely covered by sparse, ochraceus, appressed pubescence, the pubescence occasionally tending to yellowish on basal terga.

MALE: length 8-9 mm., wing length 5 1/2 - 6 mm.

Hair of face dense, ochreus, concentrated principally about antennal bases and along lower inner orbital margins; clypeus with moderately dense, ochreus to yellow pile on basal half; upper face with sparse, deep ochreus pile; vertex and ocellar triangle with a few scattered, yellow hairs; upper genal areas covered with moderately dense, light ochreus pile, becoming slightly appressed behind upper portion of compound eyes but much longer and looser on lower surfaces; mesoscutum covered with deep ochreus to yellow pile; scutellum with few ochreus hairs, chiefly on lateral and posterior margins; mesepisterna with a few long, pale grey hairs over surface, becoming deep ochreus

above, particularly on posterior lobes of pronotum and upper mesepisterna; metapleura with sparse, pale grey pile below prominence; dorso-lateral and posterio-lateral margins of propodeum with long fringes of light ochreus pile, extending from basal area to pedicel, posterior face with a few long, pale grey hairs, becoming denser on anterior face, tergum with dense lateral fringe of short, light ochreus pile extending posteriorly to apical fascia; metasomal terga with fasciae weak and broad, easily removed by rubbing; discs of metasomal terga two to five with abundant, erect, pale grey pile, giving surface a pale grey sheen; metasomal sterna with broad, pale grey fasciae, slightly broadened medially.

Antennae very long, flagellar segments at least one and one-half times as long as wide; malar space two-thirds as long as wide; clypeus weakly convex, densely and contiguously punctate over entire surface, punctures contiguous on basal half giving surface dull appearance, punctures becoming slightly sparser and minutely striate on apical lateral margins; vertex dull, closely punctate. Prothoracic spines absent; mesoscutum with disc covered with coarse punctures, approximately one puncture width apart, interspaces shiny, impunctate area small; scutellum with posterior two-thirds roughened and contiguously punctate, anterior one-third shiny impunctate; mesepisternum densely, coarsely punctate, punctures on medial discal area almost contiguous with very narrow interspaces,

punctures above close and dense; metapleural prominence strongly protuberant with a broad testaceous rim, broadest at posterior edge, sharply concave beneath; propodeum with lateral faces roughened and weakly striate, basal area with shallow quadrate pits, not sloping sharply behind, posterior face weakly striate and dull; tegulae dark ochreus to dark brown basally; wings dusky covered with sparse, short, ochreus pubescence, nervures dark brown, except for stigma which tends toward lighter brown; legs dark brown to black apically; posterior basitarsi five times as long as wide. First metasomal tergum with disc coarsely punctate particularly on lateral faces, punctures approximately one puncture width apart laterally becoming sparse and obscure at mid line, interspaces shiny; metasomal terga two to four with discs deeply folliculated, follicles about one follicle width apart with shiny interspaces; metasomal tergal fasciae in sharply depressed apical bands, depressions broad and light brownish hyaline; metasomal sterna with apical margins straight.

FEMALE: length 10-11 mm., wing length 6 mm.

Hair of face very dense and short about antennal bases and along inner orbital margins; clypeus with sparse covering of long, ochreus pile not obscuring surface; pile of face extending above antennal bases to vertex, becoming deep yellow above antennal bases; ocellar triangle and upper genal area with dense, deep yellow pile; pile of

occiput becoming light ochreus on lateral margins and appressed behind compound eyes, pile of lower genal areas light ochreus to pale grey; mesoscutum densely covered with light yellow pile; scutellum with abundant, deep yellow pile about lateral and posterior margins, with semi-appressed pile on posterior surface directed forward to conceal surface; mesepisterna covered with very long, weakly plumose, ochreus pile, becoming more yellow on upper surfaces and upper portions of pronotum; metapleura with abundant pile on surface below prominence; propodeum with lateral faces having considerable appressed pile particularly at metapleural margin, posterior portion of lateral face bare, dorso-lateral margin with dense fringe of deep ochreus pile, becoming much weaker on latero-posterior margin, posterior face with a few scattered, long, ochreus hairs; anterior two pairs of legs with sparse, short, pale grey pile; posterior femora with long, sparse, apical, plumose hairs; tibiae with pile pale grey to ochreus and very dense; metasomal terga completely covered with deep ochreus to yellow pubescence, completely concealing surface of metasomal terga one to four, fasciae discernible as denser layers of yellow pubescence; first metasomal tergum with abundant erect pile on anterior face and semi-erect lateral fringes extending posterior to fascia; metasomal terga five and six with at least some of discal area free of appressed pubescence; metasomal tergum six having disc covered with semi-erect, ferrugineous pile; metasomal sterna

with weak fringes of pale grey pile on apical margin of each sternum.

Antennae short, dark brown to black; malar space one-quarter as long as wide; clypeus weakly convex and deeply, densely striately punctured, interspaces shiny; vertex dull, punctate. Prothoracic spines short and sharp; mesoscutum with disc closely, deeply, and contiguously punctate, except for a small impunctate area; scutellum with posterior three-quarters deeply punctate and dull, anterior one-quarter shiny impunctate; mesepisternum dull, deeply contiguously punctate over entire surface; metapleural prominence greatly protuberant with a broad testaceous rim, abruptly concave beneath; propodeum with lateral faces shiny, basal area with shallow quadrate pits, posterior surface shiny and weakly roughened; tegulae dark brown hyaline; wings dusky covered with short, ochreus pubescence, nervures brown; legs dark brown to black apically; posterior basitarsi five times as long as wide. Metasomal terga one to four with surface shiny impunctate; metasomal sterna with apical margin straight.

Distribution:

Antioch, California, September 6, 1936 (G. E. Bohart); San Quentin, Baja, California, August 2, 1938 (Michelbacher and Ross); 20 miles west San Augustine, Baja, California, September 24, 1941 (Ross and Bohart) on Eriogonum; 31 miles north of Ensenda, Baja, California, August 1, 1934 (Timberlake) on Isocoma asermoides.

The single specimen examined from Antioch gives evidence that the female does not have the deep yellow pubescence common to those in Lower California. The appressed pubescence of the metasomal terga does not appear to be complete for on terga one to four there is a narrow, non-pubescent area just anterior to the metasomal fasciae.

The holotype is located in the collection of the University of Nebraska.

Colletes gypsicolens Cockerell

gypsicolens COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 47; COCKERELL, 1897, Bull. Univ. New Mexico, no. 24, p. 23; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 43; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 43; COCKERELL, 1905, Psyche, vol. 12, p. 86; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 400; TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 217.

The species originally described from New Mexico occurs in abundance in California, Utah, and northward as far as the valleys of British Columbia. It is a member of the americanus group, but the metapleural prominence is very weak and with very narrowly black rim which may often be overlooked. The body is densely covered with long,

white pile, which completely obscures the head, thorax, and the first metasomal tergum. The malar space is long for the americanus group, being as long as broad in the male and one-half as long as broad in the female. In addition, the first metasomal tergum is shiny, impunctate.

MALE: length 10.5 mm., wing length 6.25 mm.

Pile of face very dense, long, and pure white to a line well above antennal bases; vertex with pile long, dense, and pale grey, concentrated principally in ocellar triangular region; genal areas with pile long, dense, and white, becoming much longer and more dense below, completely obscuring surface; mesoscutum with pile pale grey, long, and partially obscuring surface; scutellum with pile very long, white, and dense about peripheral margins, pile overhanging and partially concealing discal area; mesepisterna with pile very long, fine, dense, and white, obscuring surface; propodeum with lateral and latero-posterior faces densely covered with long, white pile, posterior face with pile sparser and shorter; pile of legs long, white, and dense, particularly on femora; first metasomal tergum with apical fascia very broad, dense, and white, lateral fringes of white pile dense and extending to apical fascia, discal area with abundant, long, erect, white pile, partially obscuring surface; metasomal terga two to five with fasciae very broad, dense, and pure white; metasomal terga three to six with discs having abundant, erect, tawny pile,

pile long; metasomal sterna two to four with dense apical fringes of white pile.

Antennae long, deep brown to black, flagellar segments one and one-half to one and three-quarters times as long as broad; malar space as long as broad; clypeus convex, finely and densely punctate about fronto-clypeal margins and basal two-thirds, punctures becoming sparser and tending to be weakly striate at apex; vertex finely and rather densely punctate with narrow, shiny interspaces. Prothoracic spines very short and sharp; mesoscutum densely punctate about anterior and lateral margins, punctures no more than one-half puncture width apart, becoming sparser medially, impunctate area very small; scutellum strongly convex, finely and densely punctate, contiguous on extreme lateral and posterior margins, separated by one-half puncture width on posterior half, punctures becoming progressively sparser toward anterior face, which is shiny, impunctate; mesepisterna very finely and densely punctate with shiny, linear interspaces; metapleuron weakly protuberant above with a very narrow, deep brown to black rim; propodeum with the basal area very shallowly, quadrately pitted, lateral and posterior faces shiny, posterior face particularly very weakly punctate; tegulae light hyaline brown; wings tending to whitish hyaline with a sparse covering of very short, tawny pubescence, nervures light brown; legs brown to brownish black basally; posterior basitarsi long and slender, approximately five times as

long as broad. First metasomal tergum shiny, impunctate, with a few, fine, sparse follicles on median discal area, punctures becoming evident on extreme lateral faces where they are very shallow and approximately one to two puncture widths apart; second metasomal tergum finely folliculated with shiny interspaces; metasomal sterna shiny, finely and sparsely folliculated; seventh ventral plates much as in mandibularis, however larger and with but median and lateral patches of fulvous pubescence, median discal area is non-pubescent hyaline, median and lateral margins strongly reflexed (See fig. 40).

FEMALE: length 12 mm., wing length 7.25 mm.

Pile of face long, dense, and pale grey, particularly about antennal bases and inner orbital margins; clypeus sparsely covered with erect pale grey pile; vertex with pile long and dense, tinged with ochreus particularly in ocellar triangle; upper genal areas with pile dense and tinged with light yellow, pile becoming much longer, finer and whiter below, a narrow rim of appressed pubescence immediately posterior to each compound eye; mesoscutum densely covered with long erect pale grey pile, obscuring surface; scutellum with a long fringe of pale grey pile about lateral and posterior margins, pile tending to overhang discal area; mesepisterna with a dense covering of long, pale grey to pure white pile; anterior two pairs of legs with pile sparse, long, white to pale grey; posterior

pair of legs with pile long, plumose and dense, pale grey to tinged with light ochreus; propodeum with long fringes of pale grey pile along latero-posterior margins, posterior face with sparse covering of erect pale grey pile; first metasomal tergum with apical fascia broad, dense and white, lateral fringes of white pile extending to apical fascia, disc with abundant erect white pile partially concealing surface; metasomal terga two to five with fasciae very broad, dense and pure white; second metasomal tergum with a broad, white basal fascia; metasomal sterna two to four with apical fringes of long, pale grey pile.

Antennae brown to black, flagellar segments barely longer than broad; malar space three-eighths as long as broad; clypeus convex, rather coarsely and densely, striately punctate with shiny linear interspaces; vertex shiny, finely punctate; ocular areas weakly depressed, almost obscure on dorso-median margins. Prothoracic spines very short and sharp; mesoscutum densely and rather coarsely punctate, punctures no more than one puncture width apart, except on median discal area, impunctate area absent; scutellum finely, densely contiguously punctate about lateral and posterior margins, posterior portion of disc with punctures about one-half puncture width apart with shiny interspaces, anterior one-third shiny impunctate; mesepisterna densely punctate with punctures no more than one-half puncture width apart, interspaces shiny; metapleura weakly protuberant above with very narrow brown rims;

propodeum with basal area shallowly pitted, lateral and posterior faces shiny, posterior face weakly and sparsely punctate; teguale light hyaline brown; wings weakly covered with dusky pubescence, nervures brown; legs deep brown to black, posterior basitarsi long and slender approximately five times as long as broad. First metasomal tergum shiny, impunctate; second metasomal tergum very finely and sparsely folliculated, surface shiny; metasomal sterna shiny, coarsely and sparsely folliculated, with broad, shiny interspaces; extreme apical margin of terga two to five light hyaline brown.

Distribution:

New Mexico: Albuquerque; Embudo; White Sands.

Arizona: Grand Canyon.

Utah: Kelton; Grand Gulch; Wolf Creek Pass, Skull Valley; Clearfield; Promontory.

Colorado: Great Sand Dunes National Monument; Gardner.

Nevada: Austin; Carlin.

California: 9 miles south Victorville; Mill Creek, San Bernardino County; Oro Grande; Chimney Meadows, Tulare County; Phelam; Upper Santa Anna River, San Bernardino County.

Oregon: Rufus, Sherman County.

Washington: Yakima.

British Columbia: Oliver; Summerland; Okanagan; Penticton; Vernon.

Flight Records:

This is an autumnal species, having been recorded between August 23 and November 1. The species is most abundant in late September and throughout the month of October.

Plant Records:

Aster, Chrysothamnus nauseosus.

Timberlake also records the species as visiting Isocoma veneta var. vernonioides.

The holotype is located in the collection of T.D.A. Cockerell.

Colletes albescens Cresson

albescens CRESSON, 1868, Proc. Boston Soc. Nat. Hist., vol. 12, p. 168; CRESSON, 1872, Trans. Amer. Ent. Soc., vol. 4, p. 249; BRIDWELL, 1899, Trans. Kansas Acad. Sci., vol. 16, p. 209; ROBERTSON, 1904, Canadian Ent., vol. 36, p. 276; ROBERTSON, 1914, Ent. News, vol. 25, p. 73; CRESSON, 1916, Mem. Amer. Ent. Soc., vol. 1, p. 106; ROBERTSON, 1926, Ecology, vol. 7, p. 378; ROBERTSON, 1928, Flowers and Insects, p. 10; GRAENICHER, 1935, Ann. Ent. Soc. Amer., vol. 28, p. 301.

This species has often been confused with aberrans although the two are readily distinguishable. The long malar space in both sexes, half as long as broad in the

female, and as long as broad in the male, separate albescens from the majority of species in the group.

It is found to occupy the more arid areas of the western great plains extending from New Mexico northward to Manitoba with the known eastern limit at Lake County, Illinois. On the basis of the present data the species appears to be an oligotrophic visitor on Amorpha canescens, but much needed collection data may prove otherwise.

MALE: length 9.5 mm., wing length 6 mm.

Hair of face most dense along the inner orbital margins; clypeus with pile sparse and white; vertex with a few pale grey hairs particularly in the ocellar triangle; upper genal areas with a few scattered, pale grey hairs becoming more dense, longer, and whiter towards lower portion; mesoscutum with abundant, erect, plumose, pale grey pubescence; scutellum with moderate amount of long, loose pile about peripheral margins, not much denser than that of disc of mesoscutum; mesopleura with loose, plumose pubescence not concealing surface; propodeum with lateral faces covered with a weak covering of white, semi-appressed pubescence becoming longer toward latero-posterior and latero-dorsal margins where a fringe of long hair follows margins from basal area, half-way down to pedicel, posterior face with very long, plumose pile; legs with weak covering of long, pale grey pile on femora, pile of tibiae and tarsi short, pale grey to ochreus; first metasomal tergum

sparsely covered with a few erect, white hairs becoming semi-appressed but never concealing surface of dorsal surface of disc, lateral fringe of long, white pile extending to apical fascia; metasomal fasciae narrow and weak, easily removed by rubbing; second metasomal tergum with weak basal fascia of a few white hairs; discs of terga two to five covered with short, ochreus, semi-erect pile giving a sheen to surface; sternal fasciae complete, expanding slightly medially.

Antennae dark brown to black, flagellar segments slightly longer than broad; malar space as long as wide; clypeus weakly convex, slightly flattened medially but not furrowed, with sparse, fine, round punctures basally, extending down the centre of clypeus, leaving lateral portions of apex relatively free of punctures; vertex shiny black with a few fine punctures. Prothoracic spines absent; mesoscutum with coarse, dense punctures, approximately one puncture width apart, interspaces shiny, impunctate area large, punctures on extreme posterior surface very fine and dense, at least half the size of those on anterior part of mesoscutum; scutellum with deep, contiguous punctures behind, anterior face shiny impunctate; mesopleura shiny black, punctures deep and coarse, about one puncture width apart on lower surface, becoming shallower and denser on extreme upper surface; propodeum with lateral faces shiny with a few weak rugae towards posterior edges, lateral and posterior faces separated by a weak ridge extending

from basal area to pedicel, posterior face weakly rugose, basal area with deep, quadrate pits, not sloping sharply posteriorly; tegulae deep brown hyaline; wings whitish hyaline with dark brown nervures; legs dark reddish brown; posterior basitarsi long and slender, at least five times as long as wide. First metasomal tergum shiny black with few fine punctures over surface, at least four puncture widths apart; second and third metasomal terga dark, shiny, and rather densely folliculated; apical fascial depressions becoming progressively wider from first to second to third metasomal terga, depressions ochreus compared to shiny black surface of disc.

FEMALE: length 10-11 mm., wing length 6 mm.

Hair of face sparse, concentrated principally along lower inner orbital margins; clypeus with a few short, white hairs; vertex with a little pale grey pile in ocellar triangle; genal areas with whitish pile dorsally, becoming longer and whiter ventrally; mesoscutum with abundant pale grey hair on surface; scutellum with dense concentration of greyish pile about lateral and posterior edges; mesopleura covered with long, sparse, plumose hairs not concealing surface; propodeum with latero-posterior margin having fringe of long, white hair extending from basal area to pedicel, posterior face with a few long, white hairs; legs with abundant, long, white pile on femora, hind legs with pile long, curved, and extremely plumose,

tibiae and tarsi with short, dense, light ochreus pile; first metasomal tergum with weak anterio-lateral fringes extending part way to fascia, anterior face of disc with moderate scattering of long, white, erect pile, becoming appressed on anterior portion of dorsal face of disc; fascia of short, white pubescence, becoming progressively wider from first to third metasomal terga; second metasomal tergum with a broad basal fascia of short, white pile; discs of terga two to five with a few white hairs; metasomal tergum six with disc covered by abundant ochreus to light ferrugineous pile giving surface a deep golden appearance; sternal fasciae virtually absent, a few short, ochreus hairs on extreme apical margins.

Antennae short, dark brown to black; malar space three-quarters as long as wide; clypeus weakly and uniformly convex, shiny, with a few elongate, coarse punctures, punctures becoming sparser toward apex; fascial foveae deep and distinctly depressed; vertex dull and roughened. Prothoracic spines absent; mesoscutum shiny, black, with coarse, dense punctures on anterior surface, punctures less than one puncture width apart, impunctate area large; scutellum with coarse, deep punctures on posterior half; mesopleura dull, punctures coarse and deep, much larger below, becoming smaller and denser toward dorsal surface; metapleural prominence large with a broad, testaceous rim; propodeum with lateral and posterior faces dull and weakly papillated, basal area with deep quadrate pits; legs dark

brown to black basally, tending to brown apically; posterior basitarsi four times as long as wide with a shallow, longitudinal groove on posterior portion of dorsal surface; tegulae deep brown hyaline; wings whitish hyaline, covered with short, ochreus pubescence, especially at tip, nervures dark brown. First metasomal tergum virtually impunctate, shiny; second and third metasomal terga closely folliculate giving surface a dull appearance.

Distribution:

Illinois: Lake County.

Wisconsin: Prescott, Pierce County; St. Croix County; Burnett County.

Manitoba: Aweme.

South Dakota: Rosebud.

Nebraska: Halsey; Crete.

Colorado: Fort Garland.

Utah: Goshen.

New Mexico: Portales.

Flight Records:

June 28 to August 6.

Plant Records:

Amorpha canescens.

The holotype is located in the Academy of Natural Sciences of Philadelphia.

Colletes aberrans Cockerell

aberrans COCKERELL, 1897, Ann. Mag. Nat. Hist., ser. 6, vol. 19, p. 44; COCKERELL, 1897, Bull. New Mexico, Univ. Studies, No. 24, p. 19; COCKERELL, 1898, Bull. Denison Univ., vol. 11, p. 44; COCKERELL, 1898, Bull. Univ. New Mexico, vol. 1, p. 42; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292; GRAENICHER, 1910, Bull. Pub. Mus. Milwaukee, vol. 1, p. 228; GRAENICHER, 1935, Ann. Ent. Soc. Amer., vol. 28, p. 301; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 404.

This species is easily distinguished from the rest of the americanus by the peculiarity of the prothoracic segment. The anterior edge of the pronotum is raised and protruded as an erect plate, most evident as an abruptly protruding edge above the coxal bases. The prothoracic tergum is very broad with both the anterior and the posterior edges raised slightly to form a broad, weakly convex plate. In the more northerly limits of the range the pile of the female, in particular, becomes more yellowish or almost ochreus. This is most evident in the Wisconsin and Medicine Hat specimens. A tinge of yellow is noticeable on specimens taken in western Kansas. It may well be that the age of the individual is a factor for the change from white to yellow. All records of nesting sites have been in or about sand dunes.

MALE: length 9 mm., wing length 7.25 mm.

Pile of face long, dense, and pure white, concealing clypeus and antennal basal area up to median ocellus, pile weakly tinged with pale grey above antennal bases; vertex with pile pale grey to tinged with yellowish, pile concentrated principally in ocellar triangle; upper genal areas with pile short, pale grey, becoming much longer and finer below, a very narrow rim of appressed, whitish pile immediately posterior to each compound eye; mesoscutum very densely covered with abundant, short, pale grey to light yellow pile; scutellum with a long, broad fringe of pile about lateral and posterior margins, pile tinged with light yellow; mesepisterna with pile long, pale grey above, becoming whiter below; propodeum with dense fringes of long, dusky pile on latero-posterior margins, most dense on dorsal surfaces, lateral and posterior faces with abundant, erect, pale grey pile; pile of legs short and white; first metasomal tergum with apical fascia very broad, dense, and white, lateral fringes of long, white pile very dense to apical fascia, disc with abundant, erect, whitish pile, partially concealing surface; metasomal terga two to five with fasciae broad, dense, and pure white; metasomal terga four to six with sparse covering of short, erect, white pile; metasomal sterna two to four with broad apical bands of pale grey pile, bands slightly broadened medially.

Antennae long, reddish brown to black above, flagellar segments one and one-half times as long as broad; malar

space one-half as long as broad; clypeus weakly convex, rather flattened medially, very finely and densely punctate over basal three-quarters and along median line, extreme apico-lateral faces with punctures sparser and weakly striate with shiny, linear interspaces; vertex finely and densely punctate with shiny interspaces. Prothoracic spines vestigial; mesoscutum finely punctate with shiny interspaces, punctures one-half puncture width apart along anterior and lateral faces, impunctate area small; scutellum strongly convex, densely punctate on extreme lateral and posterior edges, disc with punctures coarser and sparser, being one-half to one puncture width apart and having shiny interspaces, punctures extending almost to anterior face; mesepisterna distinctly punctate with punctures about size of those on mesoscutum, punctures one-half puncture width apart with shiny, linear interspaces; metapleural prominence strong, abruptly declivous beneath with a very broad, hyaline rim; tegulae light hyaline brown; wings tending to whitish hyaline with sparse, very light pile becoming denser at apex, nervures brown; legs brown, much more blackened basally; posterior basitarsi four times as long as broad. First metasomal tergum densely and finely punctate with shiny interspaces, punctures about one puncture width apart, becoming finer and sparser on the anterior faces; second metasomal tergum very densely and finely punctate or very coarsely folliculated, punctures no more than one puncture width apart, usually much less; metasomal

sterna shiny, very finely and sparsely folliculated; seventh ventral plates large and ovate with a dense fringe of light fulvous pile about basal and medial margins, median margins strongly reflexed.

FEMALE: length 11.25 mm., wing length 7.75 mm.

Pile of face very short, dense, plumose, and tinged with yellow, particularly about antennal bases; vertex with pile short and tinged with yellow, particularly in ocellar triangle; upper genal areas with pile very short and erect, becoming sparser and much finer below, a very broad band of appressed, whitish to pale grey pile immediately posterior to upper and lateral faces of compound eyes; mesoscutum very densely covered with short, ochreus, mossy pile, completely obscuring surface; scutellum with broad, dense band of light ochreus pile about lateral and posterior margins, pile short, extremely plumose, and moss-like; mesepisterna with pile of upper surface short, dense, and similar to that of mesoscutum, pile becoming much finer, longer, and erect below; propodeum with long fringes of light ochreus pile on lateral and posterior margins, pile most dense and longest on extreme dorsal surface, extending as a weak fringe toward the pedicle, lateral faces partially concealed by appressed yellowish pubescence, posterior face with pile erect and tawny; pile of anterior two pairs of legs very short, sparse, and tinged with pale grey, posterior pair of legs with pile of femora very long,

plumose, and tinged with light yellow, tibiae with pile predominantly light ochreus and long, however with abundant, shorter, erect, darker hairs; first metasomal tergum with apical fascia broad, dense, and weakly tinged with yellow, lateral fringes of pile very short and appressed to apical fascia, disc with abundant, short, appressed pubescence, concealing surface except for a very narrow rim immediately anterior to apical fascia; metasomal terga two and three with very broad basal bands of appressed, yellowish pubescence, leaving non-pubescent areas approximately as broad as apical fascia; metasomal terga two to five with the fasciae very broad, fine, and dense, weakly tinged with yellow; metasomal sterna two to five with a weak covering of very fine, erect, tawny pile, not at all forming a fascia.

Antennae deep brown to black, flagellar segments as long as broad; malar space one-third as long as broad; clypeus convex, shallowly and rather coarsely striately punctate over surface with broad, shiny interspaces; vertex very shallowly and densely punctate, almost roughened, rather shiny; fascial foveae deep with abundant, appressed pubescence extending at least two-thirds of way from inner orbital margins to lateral ocelli. Prothoracic spines absent; mesoscutum very densely and coarsely punctate over anterior half, lateral and posterior faces, punctures almost contiguous, impunctate area small; scutellum very densely, contiguously punctate over posterior one-half, punctures becoming sparser toward anterior face, extreme

anterior portion shiny, impunctate; mesepisterna coarsely punctate, punctures almost contiguous, interspaces linear and dull; metapleural prominence abrupt and strong with a very broad, hyaline rim; propodeum with basal area obscurely, quadrately pitted, weakly sloping ventrally, lateral and posterior faces shiny with a few sparse, fine punctures evident on posterior face; tegulae brownish hyaline; wings dusky apically with abundant, light fulvous pubescence, nervures brown; legs black; posterior basitarsi four times as long as broad. First metasomal tergum very finely punctate beneath appressed pubescence, punctures one to three puncture widths apart, becoming much finer and sparser on anterior faces; second metasomal tergum very densely and finely punctate, rather dull, punctures almost contiguous; metasomal sterna shiny, black, sparsely and finely follicolated, metasomal terga two to five with anterior margins brownish hyaline.

The females from the more southerly regions, almost without exception, do not have the metasomal terga one to four completely covered with appressed, whitish pubescence. There is usually a broad, non-pubescent area between the basal and the apical fasciae on metasomal terga two and three. There is usually no appressed pubescence at all on the fourth tergum. In the majority of the females taken from the more northerly areas the metasomal terga one to four are completely covered with appressed, whitish pubescence. This would appear to indicate evidences of

subspeciation. However, a number of females from Minnesota and Wisconsin agree very closely with the New Mexican material in the manner of the tergal covering.

Distribution:

New Mexico: Jemez Springs; Las Vegas; Albuquerque.

Colorado: Roggen.

Kansas: Clark County; Decatur County; Phillips County; Ellsworth County; Medora; Syracuse; Manhattan.

Nebraska: Neligh.

South Dakota: Buffalo.

Iowa: Sioux City.

Minnesota: Scott County; Anoka County; Jordan.

Alberta: Medicine Hat.

Wisconsin: Pierce County; Burnett County; St. Croix County.

Michigan: East Lansing.

Flight Records:

The species flies from June 19 to August 14, most abundant from mid-July to mid-August.

Plant Records:

Melilotus, Petalostemum flavescens, Petalostemum villosum.

This is the first record of a male of this species. A single male taken from Las Vegas, New Mexico, July 24, 1950 (J. G. Rozen) has been designated as the neoallotype and is located in the Snow Entomological Collections of the University of Kansas.

The holotype is located in the United States National Museum.

Colletes saritensis Stephen, new species

This is a sibling species to susannae Swenk and the males especially are exceedingly difficult to tell apart. The males of saritensis differ from susannae in the much more coarse but sparse puncturation of the first metasomal tergum and the absence of a basal fascia to the second; the seventh ventral plates of the two species are similar but in saritensis there is a long discal band of pile extending very close to the basal articulatory condyle and this rim of pile is uniform in length and density about the basal half of each plate. The females key out near americanus; however, they have the mesepisterna weakly punctate and dull, and have the ocular areas deep, slightly narrowed and curved medially at the dorsal extremity toward the lateral ocelli.

MALE: length 10 mm., wing length 6.5 mm.

Pile of face long, rather sparse, about antennal bases and over clypeus, clypeal surface readily visible through weak covering of long, white pile; vertex with pile sparse and pale grey, concentrated principally in ocellar triangle; upper genal areas with pile long, fine, and white, becoming much longer and whiter below, a weak fringe of appressed, white pile immediately posterior to

each compound eye; mesoscutum with pile long, sparse, and dusky, median discal area with a large bare patch; scutellum with a weak fringe of long, dusky pile about lateral and posterior margins; mesepisterna with a rather dense covering of long, white, fine pile; propodeum with lateral fringes of long, pale grey pile on upper latero-posterior margins extending part way down to pedicle, lateral and posterior faces with abundant, erect, pale grey pile; pile of legs sparse, short, and pale grey, first metasomal tergum with apical fascia weak, moderately broad medially, becoming narrowed laterally often interrupted due to wear, pubescence is white, lateral fringes weak and white, concentrated principally on anterio-lateral margins, barely reaching apical fascia, disc with abundant, erect, whitish pile on extreme anterior face, dorsal face very sparsely covered metasomal terga two to four with fasciae broad, white, and weak, often interrupted probably due to wear; metasomal terga three to six with sparse covering of short, erect, pale grey pile, not at all concealing surface; metasomal sterna two to four with a fringe of whitish pile on apical margins, slightly broadened medially.

Antennae reddish brown, flagellar segments one and one-quarter times as long as broad; malar space short, one-quarter as long as broad; clypeus convex, densely and finely punctate over entire surface, punctures becoming striate on apical one-third; vertex dull, very densely punctate, fascial foveae narrow and depressed, especially

along inner and dorsal margins, extending just a short way above inner orbital margin. Prothoracic spines short, roughly triangular; mesoscutum rather shallowly punctate with shiny interspaces, punctures approximately one puncture width apart on anterior and lateral margins, becoming very sparse over median posterior discal area where they may be up to two and three puncture widths apart; scutellum with extreme lateral and posterior margins roughened, contiguously punctate, punctures of discal area sparser and separated by linear interspaces, anterior one-third shiny, impunctate; mesepisterna rather shallowly and densely punctate, punctures contiguous above to one-half puncture width apart below, interspaces shiny on lower surfaces; metapleural prominence strong with a broad, hyaline rim; propodeum abruptly sloping ventrally, irregularly and shallowly pitted, pits not uniform and some barely quadrate, lateral and posterior faces shiny and finely punctate, latero-posterior margins weakly rugose and rather dull; tegulae deep brown to black; wings dusky with abundant, deep fulvous pubescence, nervures brown; legs with coxae and femora deep brown to black, tibiae with extreme apex and base and basitarsi brown, median portions of tibiae deep brown to black; posterior basitarsi four and one-quarter times as long as broad. First metasomal tergum rather densely punctate with shiny interspaces, punctures approximately one puncture width apart laterally, becoming sparser on median and anterior faces where they are up to

three and four puncture widths apart, punctures approximately same size as those of mesoscutum; second metasomal tergum very densely and finely punctate, punctures no more than one puncture width apart over entire disc, second metasomal tergum is depressed basally; metasomal terga one to four with apical fascial depressions light hyaline brown; metasomal sterna dull, finely and rather sparsely folliculated; seventh ventral plates much as in susannae, however, with broad, dense, arcuate basal band of erect, fulvous pile extending well up to articulatory condyle and well about the median basal and lateral margins of each plate.

FEMALE: length 10 mm., wing length 6.75 mm.

Pile of face erect, white, and sparse, concentrated principally just above antennal bases; vertex with pile tinged with light ochreus, concentrated principally in ocellar triangle; upper genal areas with pile short, dense, and pale grey, becoming much longer, finer, and whiter below, a broad, appressed band of white pubescence immediately posterior to each compound eye; mesoscutum with pile rather dense about anterior one-third and lateral margins, pile tinged with fulvous, median discal area bare; scutellum with a broad fringe of dusky to light fuscous pile about anterior and lateral margins; mesepisterna with pile long, fine, and white; propodeum with dense fringes of long, dusky pile on latero-posterior margins, most dense on upper surfaces, lateral and posterior faces with sparse, erect, pale grey pile; pile of anterior two pairs of legs short,

sparse, and dusky, posterior legs with pile predominantly long, plumose, and tinged with light ochreus except on upper surface of posterior tibiae which have abundant, very short, erect, black pile; first metasomal tergum with a broad apical fascia of white pubescence, lateral fringes of long, white pile dense anteriorly, becoming very sparse at apical fascia, disc with abundant, erect, pale grey pile, particularly on anterior surfaces and median discal area, not at all concealing surface; metasomal terga two to five with fasciae broad, white, and rather weak; metasomal terga three to five with discs having a sparse covering of short, erect, pale grey pile; metasomal sterna with apical portions of each disc having a sparse covering of erect, pale grey pile, pile not evident as fringes or a scopa.

Antennae brown, flagellar segments three-quarters as long as broad; malar space very narrow, approximately one-sixth as long as broad; clypeus convex, densely and weakly striately punctate to apex, interspaces shiny; vertex very finely and densely punctate, dull; fascial foveae very broad, narrowed on median dorsal extremity and curved toward lateral ocelli, extending almost three-quarters of way from inner orbital margins to lateral ocelli. Prothoracic spines short and sharp, barely as long as width across base; mesoscutum densely punctate about anterior one-half and lateral margins, punctures about one-half puncture width apart, with shiny interspaces,

impunctate area small; scutellum densely punctate over posterior half, punctures almost contiguous, anterior one-third shiny, virtually impunctate; mesepisterna dull, densely punctate, punctures just finer than those of mesoscutum; metapleural prominence strong with a broad hyaline rim; propodeum with basal area sloping sharply ventrally, very shallowly pitted, pits not uniformly quadrate but irregular, lateral faces dull, posterior face shiny and sparsely punctate; legs dark brown to black; procoxal spines about one and one-half times as long as broad; posterior basitarsi four and one-quarter times as long as broad. First metasomal tergum shiny, weakly and finely punctate, punctures approximately one puncture width apart laterally, becoming much sparser over median surface where they may be up to four puncture widths apart; second metasomal tergum densely follicolated and dull; metasomal sterna dull, rather sparsely follicolated over entire surface; sterna two to five with a narrow, hyaline apical rim.

Distribution:

Holotype male, allotype female, and paratypes 5 males, 71 females, 29 miles south Sarita, Texas, April 14, 1950 (Beamers, Stephen, Michener, Rozens) taken on Dalea grisea.

The holotype is located in the Snow Entomological Collection, University of Kansas.

Colletes howardi Swenk

howardi SWENK, 1925, Amer. Mus. Nov., no. 186, p. 5; BRIMLEY, 1938, Insects of North Carolina, p. 451.

This species is most closely related to susannae and species F but can be distinguished from both with little difficulty. The females of howardi have the mesoscutum with short, dense plumose pile giving the surface a moss-like covering while the males have the metapleural prominence but slightly protuberant and rimmed with a very narrow dark rim.

It is known only to occur in the vicinity of Southern Pines, North Carolina where it fairly abundant, appearing later in the season than either of its close relatives.

MALE: length 10-12 mm., wing length 6 mm.

Hair of face weak and scattered, very sparse over clypeus, becoming denser toward inner orbital margins and immediately above antennal bases; vertex with very sparse pubescence; hair of face yellowish, becoming lighter on genal areas and pale grey on lower genal areas; mesoscutum with hair yellowish; pile of mesepisterna greyish white, becoming more grey dorsally; pubescence of abdomen tinged with yellow, especially on basal segments; tergal fasciae wide, yellowish; first metasomal tergum having disc covered sparingly with long, pale yellow pile, short pile clumped along lateral margins; discs of metasomal terga two to

six with ferrugineous, short, semi-erect pile giving surface a reddish tinge; fasciae becoming narrower on metasomal terga four and five and almost non-existent on sixth metasomal tergum; sternal fasciae pale grey and very narrow, forming a fringe to sterna two to four, slightly broader at mid line; pubescence of legs short, sparse, and pale yellow.

Antennae short, flagellar segments as long as wide, reddish brown in color, becoming darker brown basally; malar space one-half as long as wide; clypeus long with weak, shallow punctures over surface, surface dull, flattened medially leaving a weak median longitudinal groove, barely noticeable towards apex. Prothoracic spines strong; mesoscutum with punctures distinct but rather sparse, punctures mesad to parapsidal lines approximately one puncture width apart, becoming sparser and weaker towards median impunctate area; mesepisterna with surface shiny, punctures close but not contiguous or rugose, approximately one puncture width apart on lower surface, becoming closer on upper surface; hypoepimeral area only slightly protuberant; metapleural prominence weakly protuberant with a very narrow, dark rim; propodeum with lateral faces covered by short, sparse, semi-appressed pubescence, surface weakly rugose toward posterior edge, lateral posterior edges rounded, becoming more rugose over posterior surface, basal area of propodeum with very weak, quadrate pits, propodeum sloping abruptly behind; wings fulvo-

hyaline, with very weak, scattered pubescence at apex, pubescence ochreus but short, becoming longer and more dense toward the base of wing; wing membrane with whitish tinge, nervures light brown; legs light brown to ochreus, darker brown basally but never black; tarsal segments light to almost yellowish. First metasomal tergum with shallow, dense punctures laterally, becoming shallower and sparser towards mid line, where they are two puncture widths apart, surface shiny and reddish black; second and third metasomal terga with discs roughened giving impression of very close, shallow punctation.

FEMALE: length 12 mm., wing length 6.5 mm.

Hair of face yellowish, short, and dense, clumped about antennal bases, clypeus free of pubescence; vertex with a few yellowish hairs in ocellar triangle and upper genal areas, pile of lower genal areas sparser, longer, and more pale grey than above; pile of mesoscutum very short, yellow, and moss-like in appearance; pile of scutellum clumped about lateral and posterior edges where it is very dense and very plumose, median anterior portion of scutellum free or relatively free of any pile, yellow pubescence of mesoscutum extending laterally to posterior lobe of pronotum and also to extreme upper surface of mesepisterna; pile of mesepisterna becoming progressively lighter, longer, and paler ventrally; metasomal terga with pubescence very short and appressed; first metasomal tergum

with much appressed yellowish hair on disc, becoming longer toward the basal portion of first segment, a rim of hair on lateral margins of first tergum; metasomal fasciae composed of short, abundant hairs with a yellowish cast most evident on basal terga, fasciae absent on terga five and six; appressed pubescence covering basal half of second and third metasomal terga, becoming sparser on third, not extending to extreme lateral margins on either terga; fasciae of terga two to four sharply narrowed laterally as in male; sternal fasciae completely absent; pile of legs very short and ochreus on first two pairs, posterior femora with pile long and yellow.

Antennae short, dark reddish brown; malar space half as long as wide; clypeus weakly convex, flattened medially, surface with weak, elongate punctures, becoming less distinct towards upper lateral edges, surface dull. Prothoracic spines very long, directed laterally; punctures of mesoscutum shallow but very dense, those on anterior portion almost contiguous, becoming elongate mesad from the posterior edges of parapsidal lines, impunctate area small; mesepisterna with surface dull, punctures on lower half very shallow and separated by at least one puncture width, punctures becoming obscure and closer toward upper and posterior edges of mesepisterna; metapleural prominence weakly protuberant, rimmed with a very narrow, dark rim, only slightly concave beneath; lateral surface of propodeum covered with short, semi-appressed hairs, surface very

weakly rugose, basal area of propodeum with distinct, quadrate pits; wings whitish hyaline with short, scattered, fulvous pubescence, nervures yellowish brown; tegulae ochreus hyaline; legs dark brown to ochreus in color, darkest at base of each leg; posterior basitarsi with a weak longitudinal groove on the posterio-dorsal surface. First metasomal tergum with minute, shallow punctures over entire surface, most dense at lateral extremities, sparser towards mid line; second and third metasomal terga with discs feebly but densely punctate, fascial portions of terga impunctate, smooth, and shiny; metasomal sterna with discs densely folliculated.

Distribution:

Southern Pines, North Carolina.

Flight Records:

September 7 to 20.

Plant Records:

Kuhnistera pinnata, Petalostemon corymbosum.

The holotype is located in the collection of the University of Nebraska.

Colletes susannae Swenk

susannae SWENK, 1925, Amer. Mus. Noe., no. 186, p. 1; COCKERELL, 1928, Univ. Colorado Studies, vol. 16, p. 99;

TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 400.

The resemblance of susannae to howardi and especially saritensis is striking, and their separation is at times difficult. The isolated howardi is the most easterly member of this subgroup and can readily be distinguished by the short dense moss-like pile of the mesoscutum. C. susannae and saritensis appear to be mutually exclusive in range; susannae occuring in or north of Kansas and Colorado while saritensis is known only from Texas. Morphologically the differences are minor but consistent and the two species can be separated by characters cited in the preamble to saritensis.

MALE: length 9 mm., wing length 6.5 mm.

Hair of face pure white and erect, becoming more erect along inner orbital margins; clypeus with pile dense basally, becoming sparse apically; vertex with a clump of pale grey pubescence in ocellar triangle; genal areas covered with long, loose, pure white pile; mesoscutum with pile long, white, and slightly plumose; scutellum with pile long, white, and dense on lateral and posterior edges, anterior face free of pile; lateral lobe of pronotum with a weak covering of white pile; mesopleura with long, loose, sparse, white pile not concealing surface; propodeum with lateral faces concealed by a few partially appressed, white hairs, a dense fringe of long, white pile on upper

dorso-lateral surface, posterior face with a few long, white hairs; femora with abundant, long, white pile, tibiae and tarsi having short, whitish, non-plumose pubescence; first metasomal tergum with abundant, long, erect pile on anterior face of disc, becoming sparser toward dorsal face, tergum with dense lateral fringe of long, white pile extending posteriorly to fascia; metasomal terga with wide fasciae of pure white pubescence; second metasomal tergum with a weak basal fascia; discs of metasomal terga two to five with sparse, short, white, semi-erect pubescence giving a whitish sheen to surface when viewed laterally; sternal fasciae complete, slightly broadened medially, pure white.

Antennae reddish brown, becoming black basally, flagellar segments as long as wide; malar space three-quarters as long as wide; clypeus weakly convex, basal half covered with dense, minute punctures, giving surface dull appearance, punctures sparser and more elongate apically, extreme latero-apical surfaces shiny with a few elongated, coarse punctures, punctures uniformly dense along mid line from base to apex; vertex dull, densely punctate with minute punctures. Prothoracic spines absent; mesoscutum shiny with extreme anterior face finely punctate with a few sparse punctures becoming deep and coarse laterally and posterior to median anterior portion of scutum, punctures along inner margins of parapsidal lines fine and approximately one puncture width apart, punctures along

extreme posterior edge of mesoscutum much finer than those on disc, impunctate area large; scutellum dull, posterior two-thirds rough and rugosely punctate, punctures obscure; mesopleura with surface dull, punctures shallow but distinct, about one to one and one-half puncture widths apart on disc, becoming denser almost contiguous above and obscure on extreme posterior margin; metapleural prominence greatly protuberant with a very broad, light testaceous rim, sharply concave beneath; propodeum with lateral faces rather dull beneath semi-appressed pubescence, weakly and finely rugose, latero-posterior margins of propodeum weakly rounded with no ridge, basal area with shallow, quadrate pits, posterior face roughened and much duller than lateral faces; tegulae light brownish hyaline; wings whitish hyaline with some sparse, whitish pubescence, nervures light yellowish brown, except for subcosta-radius which is dark brown; legs deep red-brown basally, tarsi and tibiae yellowish; posterior basitarsi five to six times as long as wide. First metasomal tergum with disc finely and densely punctate, punctures on lateral margin approximately one puncture width apart, becoming sparser toward mid line but never more than two puncture widths apart; apical fasciae of first metasomal tergum in a weakly depressed rim; metasomal terga two to four densely folliculated.

FEMALE: length 10-11 mm., wing length 7 mm.

Hair of face white, concentrated principally along inner orbital margins and about antennal bases; clypeus

with a few shorter hairs, never concealing surface; genal areas with short, white, erect pile over entire surface, except for a narrow portion with appressed pubescence immediately posterior to compound eyes; mesoscutum with abundant, short, plumose pubescence over surface, shortest and most dense at extreme posterior edge; scutellum with lateral and posterior fringe of longer, more plumose, and much denser pile, disc free of pile; propleura with sparse covering of pure white, sparse pubescence; mesepisterna with abundant, long, erect, white pile over surface, pile not distinctly plumose on lower portions; metapleura covered with shorter, somewhat appressed pubescence; propodeum with lateral faces having sparse, appressed, long, white pile, latero-dorsal edge with a dense, long, white fringe of hair extending posteriorly half-way towards the pedicel; first and second pairs of legs with posterior fringes of long, white pile on femora, becoming very short on tibiae and tarsi; posterior legs with femora covered with long, curved pile tinged with ochreus, tibiae with dense, short pile, also with a slight ochreus tinge; metasomal terga almost completely covered with short, white, appressed pubescence, a very narrow, shiny, non-pubescent area immediately anterior to apical fasciae and posterior to appressed pubescence of each disc; first metasomal tergum with weak lateral fringes extending to fascia, disc with basal three-quarters covered with short, white, appressed pubescence; fasciae dense, white; shiny surface

of disc partially visible beneath weak, appressed pubescence; metasomal tergum six with disc covered with semi-erect, fulvous to ferrugineous pile giving surface a golden sheen; sternal fasciae weak and uniform, composed of a few rows of long, white pile at extreme apical margin, most evident on metasomal sterna two and three.

Antennae short, reddish brown to base; malar space one-third as long as wide; clypeus weakly convex, shiny black, covered with coarse, elongate punctures to apex; vertex dull, finely punctate. Prothoracic spines short and sharp; pronotum expanded between spine and mesoscutum to form a weakly convex area; mesoscutum coarsely and densely punctate on disc, punctures becoming much shallower, finer, and more dense on extreme anterior median face, punctures median to parapsidal lines less than one puncture width apart, impunctate area large; scutellum with posterior two-thirds dull, with shallow, obscure punctures; mesopleura dull, shallowly and obscurely punctate, punctures barely distinguishable on ventral portion of mesopleura, becoming completely obscure on dorsal and posterior faces; metapleural prominence greatly protuberant, with a broad, light testaceous rim; propodeum with lateral faces weakly papillate, giving it a weakly roughened appearance, latero-posterior edges weakly rounded with no sharp ridge separating the two surfaces, basal area with broad, shallow, quadrate pits; tegulae light hyaline brown; wings whitish hyaline with a sparse covering of short, white pubescence, nervures

yellow except for subcosta-radius which tends to reddish brown; legs brown, blackened basally; posterior basitarsi four times as long as wide with a shallow groove on dorsal posterior surface; posterior tibiae with evidence of a continuation of the weak shallow groove on the posterior portion of upper face. First metasomal tergum with disc shiny and very finely punctate beneath appressed pubescence, punctures at least two puncture widths apart covering the surface; second metasomal tergum with punctures very much finer.

Distribution:

Manitoba: Aweme; Onah.

Alberta: Medicine Hat.

Wisconsin: Burnett County; St. Croix County; Waukesha County.

Minnesota: Fort Snelling; Hennepin County; Scott County; St. Croix County; Washington County; Winona County.

Iowa: Sioux City.

South Dakota: Brookings; Buffalo; Mobridge; Hot Springs; Pierre; Redig.

Nebraska: Glen Sioux County; Haigher; Lincoln; Meadow; Mitchell; Sioux County; Weeping Water.

Kansas: Clark County; Jewell County; Republic County.

Colorado: Poudre River.

Flight Records:

July 1 to August 18.

Plant Records:

Helianthus, Kuhnistera purpurea, Petalostemon violaceus.

The appressed pubescence on the metasomal discs of the female appears to be almost complete on the type specimens as described from western Nebraska. Specimens taken in Kansas, eastern Nebraska, Iowa, South Dakota, Minnesota, and Manitoba indicate that this appressed pubescence is very weak and sparse in many cases and only rarely does it completely cover the disc to the fasciae. There is usually a distinct, narrow, non-pubescent area just anterior to the apical fascia of each of the first five metasomal terga. I am sceptical of the specimen labelled Okanagan Falls, B.C., as it is well out of the logical range of the species.

The holotype is located in the collections of the University of Nebraska.

Colletes thysanellae Mitchell

thysanellae MITCHELL, 1951, J. Elisha Mitchell Sci. Soc., vol. 67, p. 238.

This species is easily distinguishable from the rest of the americanus group for it is the only member of this group which has a strong admixture of black and dark brown hairs on the disc of the mesoscutum and on the lateral and

posterior edges of the scutellum. The metapleural prominence is narrowly rimmed with dark brown.

MALE: length 8-9 mm., wing length 5 - 5 1/2 mm.

Hair of face light ochreus to pale grey, pile short, not obscuring surface; clypeus with sparse pile; ocellar triangle with a few long, erect, ochreus hairs; genal areas with erect, ochreus pile dorsally, becoming pure white and much longer on extreme ventral portions; mesoscutum covered with pale grey to ochreus pile with a strong admixture of black hairs; scutellum with a similar strong admixture of black hairs among dominating ochreus pile; pile of scutum and scutellum sparse, not obscuring surface; pronotum with lateral faces free of pile, posterior lobe with a dense white clump of pubescence; mesepisternum with sparse, pale grey to ochreus pubescence, becoming more grey above; propodeum with lateral and posterior faces with little to no pubescence, dorso-lateral edge with a rather dense, long fringe of white to grey pile; legs with short, plumose pile on coxae, trochanter, and femora, pile of tibiae and tarsi short, semi-appressed, and weakly plumose; first metasomal tergum with a few erect, pale grey hairs most evident on anterior face of disc, extending to the dorsal face, lateral fringes weak and grey; metasomal fasciae weak and narrow, broadest laterally; discs of metasomal terga two to five with abundant, short, semi-erect, ochreus to light ferrugineous pile; metasomal

terga five and six with fasciae absent; sternal fasciae straight composed of a few rows of weak, white pile, most evident on sterna two, three, and four.

Antennae reddish brown, blackened basally, flagellar segments slightly longer than broad; malar space one-third as long as wide; clypeus weakly convex and shiny, with abundant shallow punctures over surface, punctures rounded except on extreme apical margin where they tend to be striate; vertex dull with abundant coarse punctures. Prothoracic spines short and sharp, directed dorsally; pronotum expanded slightly between spine and mesoscutum; mesoscutum shiny, coarsely but shallowly punctate, punctures approximately one puncture width apart anteriorly, becoming sparser towards ends of the parapsidal lines where they are one and one-half puncture widths apart; scutellum with basal two-thirds dull and shallowly punctate; pronotum with lateral faces shiny impunctate; mesepisterna shiny with weak, shallow punctures, most evident on lower face, becoming obscure dorsally and posteriorly; hypoepimeral area as strongly protuberant as metapleural prominence, with a strong ridge on lower edge; metapleural prominence strong with a narrow, dark brown to black rim, not sharply concave beneath; propodeum with lateral faces shiny, latero-dorsal and latero-posterior faces weakly rounded, posterior face rugose, dull, basal area with deep quadrate pits; tegulae light hyaline brown; wings with whitish hyaline membrane, dusky due to abundant, short, ochreus pubescence on surface,

nervures brown, stigma dark brown; legs brown; posterior basitarsi four times as long as wide. First metasomal tergum with disc shiny impunctate; metasomal terga two and three with discs shiny, weakly and sparsely folliculated.

FEMALE: length 9-11 mm., wing length 6 mm.

Hair of face sparse, almost absent except for a few erect, pale grey to ochreus hairs on surface; vertex with a few dark brown hairs; genal areas with upper portion having a few scattered, ochreus to greyish hairs, becoming denser and more distinctly greyish below; mesoscutum sparsely pubescent with a strong admixture of black and dark brown pile amongst the ochreus; scutellum with a few black hairs especially noticeable on lateral and posterior edges; pronotum with lateral faces shiny; mesepisterna with sparse covering of erect, plumose, white to grey pile; propodeum with lateral faces free of pile, fringes of long, whitish pile on latero-dorsal edge, extending ventrally to the pedicel, posterior face with a few scattered, long, white hairs; anterior two pairs of legs with sparse pile tinged with ochreus except for that of basitarsi which tends towards deep ochreus, pile of posterior femora very long, dense ochreus, and extremely plumose, that of tibiae shorter, dense, and tending to ferrugineous at base, basitarsi with deep ochreus to ferrugineous pile; first metasomal tergum with a few scattered, ochreus hairs on anterior surface and a weak lateral clump of hairs at dorso-anterior edge

of disc; metasomal terga with very weak, white to ochreus fasciae, easily removed by rubbing; first metasomal tergum with fascia very narrow medially, almost absent; metasomal terga two to five with discs covered with short, deep ochreus, semi-erect pile giving the surface a golden sheen; sternal fasciae absent.

Antennae short, grey brown, becoming deep reddish brown basally; malar space one-quarter as long as wide; clypeus weakly convex, dull, with a few coarse, shallow punctures scattered uniformly over the surface; vertex dull and roughened; fascial foveae deep and dull. Prothoracic spines short and sharp, directed dorso-laterally; mesoscutum shiny with dense, coarse, shallow punctures on anterior portion, becoming sparser and deeper towards the end of the parapsidal lines, impunctate area small; scutellum with posterior three-quarters roughened and dull; pronotum with lateral faces shiny, expanded slightly as in aberrans; mesepisterna rugosely punctate, punctures obscure giving surface dull roughened appearance; hypoepimeral area sharply protuberant, about as equally protuberant as is metapleural prominence with strong ridge at ventral edge; metapleural prominence strong with a very narrow, dark brown rim, not strongly concave beneath; propodeum with lateral faces dull, weakly papillated, giving it a finely roughened yet shiny appearance, basal area with shallow, quadrate pits, latero-posterior edges separated by a weak ridge running from dorsal surface to pedicel; tegulae brownish hyaline;

wings dusky, covered with fine, ochreus pubescence, nervures brown, stigma dark brown; legs deep reddish brown; posterior basitarsi four times as long as broad. First metasomal tergum with disc shiny impunctate; second and third metasomal terga with discs shiny, weakly folliculated; sterna with posterior margins straight.

Distribution:

Holotype and allotype, Pensacola, Florida, October 11-14, 1914; paratypes: 9 females, Inverness, Florida, 1918 (Chas. Robertson); 6 males, 2 females, Pensacola, Florida, October 11-14, 1914; 2 males, Miami, Florida, October 21 and 23, 1934 (J. Pearson); 1 male, St. Simon's Island, Georgia, October 22, 1910; Others: 1 male, Gainesville, Florida, October 9, 1946; 1 female, Gainesville, Florida, November 6, 1946; 2 males, New River, North Carolina, September 20-30, 1944 (G. E. Bohart); 2 males, 6 females, Virginia Beach, Virginia, October 6 (Fred Knob).

The holotype is located in the American Museum of Natural History.

Colletes wilmattae Cockerell

wilmattae COCKERELL, 1904, Canadian Ent., vol. 36, p. 14; COCKERELL, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 292; TIMBERLAKE, 1943, Bull. Amer. Mus. Nat. Hist., vol. 81, p. 404.

This is one of the most distinctive members of the americanus group and is found nesting in the sandy regions of the great plains from New Mexico to Manitoba. The female has metasomal terga one to five entirely covered with short appressed pubescence and in both sexes the legs are yellow to brown-yellow.

MALE: length 10 mm., wing length 6 mm.

Hair of face dense whitish, tinged with yellow, hair long and loose over clypeus and about antennal bases; vertex with short, white appressed pubescence extending below ocelli; ocellar triangle and upper genal areas with considerable, long, erect, yellowish pile, pile close and appressed immediately behind compound eyes, becoming longer, more erect, and whiter over remaining portion; mesoscutum with hair dense, tinged with ochreus; scutellum with a heavy fringe of pale grey to white hair about lateral and posterior margins; mesepisternum with long, loose, white to pale grey pile not obscuring surface; metapleura more densely haired than mesopleura with pile shorter, whiter, and much more plumose; propodeum with lateral faces concealed by semi-appressed pubescence varying from pale grey to pure white, posterio-lateral margin and posterior face of propodeum with abundant, erect, long hair; legs with sparse, white pubescence, short and not distinctly plumose; first metasomal tergum with anterior face of disc covered with abundant, long, white, erect pile, occasionally tinged with yellow or ochreus, pile becoming shorter and

more appressed toward posterior portion of the disc, weak lateral fringes; metasomal terga one to five with very broad, dense fasciae; second metasomal tergum with broad basal fascia; metasomal terga two to five with discs covered by fine, erect, whitish pile giving the surface a whitish sheen unlike snowy white fasciae; sternal fasciae uniform throughout.

Antennae short, flagellar segments barely longer than wide; malar space about one-half as long as wide; clypeus convex, densely punctate with fine punctures on basal half, punctures becoming sparse on lateral portions of apex, where interspaces are large and shiny; vertex shiny beneath appressed pubescence with a few scattered punctures. Prothoracic spines short and sharp; pronotum expanded slightly behind prothoracic spines forming a concave depression before mesoscutum; mesoscutum deeply and densely punctate with fine punctures, punctures on anterior portion of mesoscutum not more than one puncture width apart, becoming sparser toward impunctate area, punctures posterior to impunctate area as dense as those on anterior portions; scutellum with posterior half finely, rugosely punctate, anterior half shiny, impunctate; mesepisterna shiny below, punctures shallow and at least one and one-half puncture widths apart, punctures on upper portion becoming more dense and almost contiguous giving surface a dull cast; metapleural prominence abruptly protuberant with broad, testaceous rim, abruptly concave below; propodeum with

lateral faces shiny and smooth beneath appressed pubescence, basal area of propodeum with shallow, quadrate pits; tegulae yellowish hyaline; wings whitish hyaline with scattered, short, ochreus pubescence giving them a dusky tinge, nervures and stigma light yellowish brown, becoming darker apically; legs with coxae, trochanters, and basal portions of the femora dark, apical part of femora, tibiae, and tarsi bright ochreus-yellow; posterior basitarsi long and slender, at least four and one-half times as long as wide. First metasomal tergum with dense, shallow punctures most evident on lateral margins of the disc, punctures shallow and fine, approximately one puncture width apart, surface shiny black.

FEMALE: length 10-11 mm., wing length 6 mm.

Hair of face short, dense, and clumped about the lower inner orbital margins and antennal bases, extending up to form a mat of appressed pubescence about fascial foveae and completely obscuring vertex; ocellar triangle with abundant, erect, yellowish pile extending over upper genal areas; pubescence immediately behind the compound eyes short, white, and appressed, becoming more elongate and erect on posterior and ventral surfaces of genal areas; pronotum with lateral faces having long, slender, appressed, white pile on surface; mesoscutum with short, dense, moss-like pubescence strongly tinged with yellow concealing entire surface; scutellum with a dense, short, erect lateral and posterior fringe of plumose hairs, with a few weakly

appressed hairs extending forward to cover anterior surface of scutellum; mesepisterna with short, moss-like pubescence above, becoming longer and much finer below, changing from yellowish above to a tawny grey below; metapleura completely concealed by short, dense pile; lateral faces of propodeum covered by a fine mat of slender hairs appressed to the surface, upper lateral edge with a long fringe, extending down along the latero-posterior edge to pedicel, posterior face of propodeum covered with long, erect pile; first two pairs of legs with short, white pile, that of the posterior femora elongated, curved, and ochreus in color, pile of posterior tibiae and tarsi short and tinged with ochreus; metasomal terga completely obscured by short, appressed pubescence tinged with yellow, fasciae distinguishable as denser mats of pubescence; pile on vertical face of first metasomal tergum erect and dense, becoming more appressed as it reaches dorsal surface; metasomal tergum six with erect, dark ferrugineous pile giving surface a deep reddish brown tinge; sternal fasciae absent, except for a few ochreus hairs towards apical portion of each sternum.

Antennae short, dark brown to black except for the scape and pedicel which are light brown; malar space one-quarter as long as ide; clypeus weakly convex, with surface dull, covered with elongate punctures except on apical margin where punctures are very shallow to obscure; vertex dull and densely covered with fine punctures beneath appressed pubescence. Prothoracic spines short and

blunt, a weak pronotal expansion between prothoracic spines and mesoscutum; mesoscutum densely covered with shallow, dense punctures, punctures close and almost contiguous on anterior, lateral, and extreme posterior faces of mesoscutum, punctures no more than one puncture width apart except on small impunctate area; scutellum densely covered with fine, shallow punctures posteriorly, anterior one-third shiny impunctate; mesepisterna with shallow, sparse punctures below, punctures at least one puncture width apart, becoming much finer and extremely dense, almost contiguous on upper surface, punctures almost completely obliterated on posterior face, interspaces shiny on most of surface; metapleural prominence strong with a very narrow, dark brown rim, testaceous on the extreme margin; propodeum with lateral faces dull and weakly roughened, almost papillated surface, latero-posterior edge of propodeum weakly rounded, basal area with shallow, quadrate pits, posterior face dull and roughened as on lateral faces; tegulae ochreus hyaline; wings dusky hyaline covered with short, ochreus pubescence, nervures light brownish yellow; legs light brownish yellow, coxae occasionally dark brown to black; posterior basitarsi about three and one-half times as long as wide, with a shallow longitudinal groove on the posterior portion of dorsal surface. First metasomal disc shiny, covered with shallow, minute punctures beneath appressed pubescence, punctures very fine and separated by shiny interspaces at least two puncture widths

apart on lateral surfaces; second metasomal tergum as first, with punctures finer and denser.

Distribution:

Manitoba: Aweme; Onah.

Wisconsin: Burnett County; Pierce County; St. Croix County.

Minnesota: Ramsey County.

Iowa: Sioux County.

Nebraska: Halsey; Glena Sioux County; Sioux County.

Texas: Fedor; Romney.

New Mexico: Albuquerque; Hot Springs; Isleta; Las Vegas; San Jose.

Flight Records:

May 31 to September 9.

Plant Records:

Petalostemon cardidum; P. flavescens; P. oligophyllum.

The species appears to be an oligotrophic visitor on Petalostemon and data on hand would indicate it as having but one generation per year, flying from late May in the south to early September in the north.

The holotype is located in the collection of the Citrus Experiment Station, Riverside, California.

Colletes michenori Stephen, new species

The species closely resembles solidaginis Swenk except in having the hair pure white to tawny grey; the wings whitish hyaline with short, sparse, white pubescence over the surface; and the male genitalia closely resembling and almost indistinguishable from wilmattae Cockerell. The extreme apical margin of the seventh ventral plate of michenori is much longer in proportion to the height than it is in wilmattae; the pubescence of the former is also much sparser about the lateral apical edges. The female can readily be distinguished from other closely related species by the white hyaline wings, the short malar space, and the shiny, impunctate first metasomal tergum.

MALE: length 6-7 mm., wing length 5 mm.

Hair of face dense and white, completely concealing clypeus; vertex with pile sparse and slightly grey; upper genal areas with pale grey pile, becoming much longer and pure white on ventral surfaces; mesoscutum with sparse covering of long, fine, pale grey pile; scutellum with a few scattered, pale grey hairs, particularly about posterior and lateral margins; mesepisternum with long, sparse, fine, pale grey hairs; metapleura with a few pale grey hairs; propodeum with lateral faces covered by a few semi-appressed, pale grey hairs, dorso-lateral fringe weak to absent, posterior face with a few white hairs; legs with short, white, sparse pile; first metasomal tergum with distinct

lateral fringes of white pile extending to apical fascia, anterior face with a little grey pile, extreme lateral faces of disc with a few scattered, white hairs; fasciae broad and shaggy white; second metasomal tergum with a weak basal fascia; metasomal terga two to four with abundant, fine, white discal pile; metasomal sterna with uniform apical fringe of white hair.

Antennae short, flagellar segments about as long as wide, deep brown; malar space one-half as long as wide; clypeus weakly convex and shiny, covered with obscure shallow punctures, surface rugose, tending to striate rugoseness at apex; vertex shiny impunctate. Prothoracic spines long and sharp, directed dorsally; mesoscutum shiny, punctures of disc extremely sparse and fine, at least three puncture widths apart, punctures at extreme anterior lateral margins fine, obscure giving surface slightly roughened appearance; scutellum with posterior one-third rugosely punctate, anterior two-thirds shiny with a few scattered, weak punctures; mesepisternum shiny with a few sparse, shallow punctures, almost follicular, punctures at least three puncture widths apart, giving surface an impunctate appearance; metapleural prominence greatly protuberant with a very broad testaceous rim, sharply declivous beneath; propodeum with lateral faces shiny on anterior half, becoming roughened posteriorly, dorso-lateral and posterio-lateral margins weakly rounded, basal area with shallow quadrate pits, posterior face weakly roughened

and shiny; tegulae dark brown hyaline; wings whitish hyaline with sparse covering of light to tawny pubescence, nervures dark brown; legs deep brown except for tarsi which are tinged with yellow; posterior basitarsi about six times as long as wide. First metasomal tergum shiny with sparse, weak, follicle-like punctures separated by at least four puncture widths on mid discal area; metasomal terga two and three with discs densely folliculated, interfollicular areas shiny; metasomal sterna with posterior margins straight.

FEMALE: length 8 mm., wing length 5 1/2 mm.

Hair of face sparse and pure white concentrated principally about the antennal bases; clypeus with a few scattered, tawny hairs over surface; vertex with a few scattered, pale grey hairs; upper genal areas with short pale grey pile becoming much longer and denser towards ventral surface, a small amount of appressed, white pubescence immediately posterior to compound eyes; mesoscutum with sparse covering of pale grey pile; scutellum with weak lateral and posterior fringe of white to pale grey pile; metanotum with a few fine, pale grey hairs; propodeum with lateral face having a few long, fine hairs on extreme anterior margin, dorso-lateral margin with dense fringe of long, white pile extending half-way to pedicel, posterior face with a few long, white, scattered hairs; anterior two pairs of legs with short, sparse, pale grey to light ochreus

pile; posterior femora with long, curved, plumose pubescence, tibiae with very long, weakly plumose pile; first metasomal tergum with lateral fringes of white pile, longest and most dense at dorsal anterior margin becoming sharply reduced posteriorly towards fascia, anterior face with a few long, fine, white hairs; metasomal fasciae broadest on sixth tergum becoming progressively narrower towards first; second metasomal tergum with broad, white basal fascia; discs of metasomal terga two to five with very short, fine, light ochreus pile inconspicuous but giving surface a whitish sheen; metasomal sterna non-fasciate.

Antennae short, brown to black at base; malar space one-quarter as long as wide; clypeus weakly convex, shiny, covered with scattered, short, striate punctures; vertex shiny and sparsely punctate. Prothoracic spines short and sharp, directed dorsally; mesoscutum shiny, with obscure, shallow punctures which are distinct only on extreme anterior lateral face, surface weakly rugose, impunctate area very large; scutellum with posterior one-third deeply rugosely punctate, anterior two-thirds shiny with a few scattered punctures; mesepisterna dull and roughened due to extreme shallowness of puncture depressions, punctures obscure and very dull above; metapleural prominence strongly protuberant with a broad testaceous rim, sharply concave beneath; propodeum with lateral faces dull and weakly striately papillated, giving surface a roughened appearance,

basal area with shallow quadrate pits, sloping slightly posteriorly, posterior face roughened and dull; tegulae deep brown hyaline; wings whitish hyaline with short, tawny to white pubescence, nervures brown; legs deep brown to black to apex; posterior basitarsi five times as long as wide. First metasomal tergum with disc shiny impunctate, except for a few scattered, follicle-like depressions; metasomal terga two and three weakly but densely folliculated giving surface a roughened, dull appearance; metasomal tergal fasciae in lowered, brownish, hyaline depressions; metasomal sterna with posterior margin straight.

Distribution:

Holotype, male, Halsey, Nebraska, August 13, 1925 (R. W. Dawson); allotype, female, National Forest, Halsey, Nebraska, August 4, 1948 (Dreisbach); 2 male paratypes, National Forest, Halsey, Nebraska, August 4, 1948 (Dreisbach).

The holotype is located in the Snow Entomological Collections of the University of Kansas.

Colletes mandibularis Smith

mandibularis SMITH, 1853, Cat. Hymenoptera British Mus., vol. 1, p. 5; CRESSON, 1868, Proc. Boston Soc. Nat. Hist., vol. 12, p. 171; VIERECK, 1902, Canadian Ent.,

vol. 34, p. 329; VIERECK, 1903, Ent. News, vol. 14, p. 120; COCKERELL, 1904, Ent. News, vol. 15, p. 276; COCKERELL, 1905, Psyche, vol.12, p. 87; GRAENICHER, 1930, Ann. Ent. Soc. Amer., vol. 23, p. 154; BRIMLEY, 1942, Supp. Insects North Carolina, p. 36.

similis ROBERTSON (not Schenck), 1904, Canadian Ent., vol. 36, p. 276; GIBSON and CRIDDLE, 1919, Rept. Ent. Soc. Ontario, for 1919, p. 21; ROBERTSON, 1928, Flowers and Insects, p. 10; TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 224 (new synonymy).

simulator MICHENER, in Muesebeck, Krombein and Townes, Hymenoptera of Amer. North of Mexico, U.S.D.A. Agric. Monog. no. 2, p. 1048 (new name for similis Robertson) (new synonymy).

The short description of mandibularis Smith falls in close accord with specimens labelled similis from Georgia and the subsequent arrival of material from the Academy of Natural Sciences of Philadelphia has turned up two Georgia specimens labelled as mandibularis Smith which are identical with similis Robertson. (One of the determinations was made by Cockerell and the other presumably by E. T. Cresson Sr. - compared by J. A. G. Rehn). Dr. I. H. H. Yarrow of the British Museum has examined the Smith type and it is found to be identical with that of similis. The name simulator Michener proposed to replace similis Robertson (preoccupied by similis Schenck), similarly falls in favor

of the older mandibularis.

This species and solidaginis are sibling species with mandibularis occupying the southern portions of the area east of the continental divide and extending into Idaho, Colorado and Utah. The females, unlike solidaginis, have the appressed pubescence of the metasoma restricted to a basal fascia on the second tergum and have the first metasomal tergum finely and densely punctate laterally. In the males the first tergum is shiny, finely and sparsely punctate, the prothoracic spine is long and sharp and the flagellar segments are at least one and one half times as long as wide.

MALE: length 7-9 mm., wing length 5-6 mm.

Hair of face long and loose and tinged with yellow to pale grey, apical end of clypeus only lightly covered with pubescence; vertex almost bare with a few yellowish hairs over upper genal areas, lower genal areas with long, white pubescence; mesoscutum with hair long, pale grey yellow; pile of scutellum very long and concentrated on lateral and posterior faces; mesopleuron with scattered, white to pale grey pubescence over surface, becoming more pale yellow towards upper surface; pubescence of abdomen white, occasionally tinged with yellow or pale grey, especially on basal segments; first metasomal tergum with long, scattered, yellowish pubescence on disc; fascia of first metasomal tergum extending laterally to meet lateral

rim of clumped pubescence; abdominal terga two to five with fasciae ending at lateral margins by an abrupt tapering; discs of terga two, three, and four with a few, short, semi-erect, yellowish hairs giving a golden sheen to terga; sternal fasciae very weak, broadest at mid line, fasciae composed of a few white hairs.

Antennae long, flagellar segments one and one-half times as long as wide, basal flagellar segment less than one-half as long as second; malar space one-half to two-thirds as long as wide; clypeus deeply and closely punctate, punctures elongate giving surface a weak rugose appearance, clypeus flattened; vertex shiny with few, weak, shallow punctures. Prothoracic spines short and sharp; mesoscutum with surface shiny, punctures on anterior portion approximately one to two puncture widths apart with shiny interspaces, punctures becoming coarser towards ends of the parapsidal lines; anterior half of scutellum shiny impunctate except for a few scattered, very shallow punctures; mesepisterna very shiny over entire surface, punctures deep and distinct, at least one puncture width apart, interspaces smooth and shiny; metapleural prominence strong with a very broad, testaceous rim, abruptly declivous beneath; basal area of propodeum with shallow, quadrate pits, lateral face roughened to rugose posteriorly, latero-posterior angle of propodeum rounded and rugose; wings dusky, with abundant, ochreus, short pubescence over surface, nervures yellowish-brown; legs with abundant, short, tawny pile, apical end

of tibiae and tarsi ochreus to yellowish, coxae, femora, and apical portion of tibiae dark. First metasomal tergum punctate with very shiny interspaces, punctures on lateral margins of first metasomal tergum one to two puncture widths apart, becoming sparser towards mid line; second metasomal tergum with dense, close, minute, shallow punctures.

FEMALE: length 10.5 mm., wing length 5.5 mm.

Pile of head short, dense, clumped about antennal bases and along inner orbital margin, yellow to pale grey; pile on vertex yellowish, clumped in upper genal areas and in ocellar triangle; pubescence of lower genal areas white to pale grey; pubescence on mesoscutum short, plumose, and tinged with yellow over entire surface; scutellum with pubescence concentrated on posterior half, anterior half of scutellum without pile; mesepisterna with long, scattered, pale grey pile on surface, becoming more yellowish on upper areas; propodeum with short, somewhat appressed pubescence on upper part of lateral propodeal face, posterior face of propodeum with a few long, pale grey hairs; pile of legs white and long, especially on posterior femora and tibiae, that of anterior pairs of legs scarce except on posterior margins where it forms a long, brush-like rim; pubescence of abdomen pale grey to yellow on apical segments, becoming lighter to almost pure white on apical two segments; last segment of abdomen with ferrugineous, semi-erect pile; pubescence of first metasomal tergum appressed

to semi-erect extending from the extreme frontal region to apical fascia, tergum with lateral rim of yellowish pile; fascia narrow on first metasomal tergum, becoming progressively whiter apically; third metasomal tergum with weak basal fascia; discs of metasomal terga three and four with semi-erect, ochreus to pale yellow pile giving the surface a sheen; sternal fasciae absent, a few pale grey to yellowish hairs on extreme apical margins of sterna, especially sterna two and three.

Antennae reddish-brown to black at base of the flagellum, first flagellar segment as long as second; malar space one-quarter as long as wide; clypeus bare with deep, coarse punctures, tending towards elongation, interspaces shiny; vertex shiny with few, scattered, shallow punctures. Prothoracic spines very long and sharp, mesoscutum deeply punctate, interspaces very shiny, punctures less than one puncture width apart on anterior half, becoming more sparse to ends of the parapsidal lines, punctures about lateral and posterior edges as on anterior half of mesoscutum, a very small impunctate discal area; scutellum with anterior half smooth and shiny; mesepisterna with coarse, close punctures, becoming closer on upper faces and tending to rugosity, punctures on posterior edge of mesoscutum shallower than those on the disc of the mesepisterna but do not approach the rugosity as in americanus; metapleural prominence distinct with a narrow, testaceous rim, abruptly declivous beneath; propodeum with shallow, quadrate pits at basal area,

lateral faces of propodeum smooth and shiny, posterio-lateral edges separated by a distinct elevated ridge which runs from abdominal pedicel up to basal area of the propodeum; spine on front coxae short and stout, not more than twice as long as broad, hind basitarsi about three times as long as wide. First metasomal tergum with disc densely punctate with very fine, shallow punctures especially on lateral margins, punctures becoming much sparser and much weaker towards mid line where they are barely discernible; second metasomal tergum with many, dense, fine, shallow punctures giving surface a roughened appearance, punctures much more dense than those on first metasomal tergum.

Distribution:

The species is broadly distributed over America east of the Rocky Mountains and into the lowland areas of Utah, Idaho and British Columbia. Marginal localities include: Miami, Florida; Neal Gap, Georgia; Logansport, Louisiana; Sarita and Corrizo, Texas; Albuquerque, New Mexico; Lamar, Colorado; Goshen and Portage, Utah; Pingree, Idaho; Summerland, British Columbia; Omaha, Nebraska; Chicago, Illinois; Macalester, Indiana; Seaside Park, New Jersey; Willard, North Carolina.

Flight Records:

March 30 to December 3 in the far south with the peak of the population occuring during August to the north. It appears as if there may be two generations per year in the south.

Plant Records:

Amorpha canescens, Amphiachris, Chaneacrista fasciculata, Heterotheca subaxillaris, Isopappus divericalus, Medicago sativa, Melilotus alba, Prionopis ciliata.

The holotype is located in the collections of the British Museum (Natural History), London, England.

Colletes solidaginis Swenk

solidaginis SWENK, 1905, Canadian Ent., vol. 38, p. 40; BRIMLEY, 1938, Insects of North Carolina, p. 451; TIMBERLAKE, 1951, Wasmann J. Biol., vol. 9, p. 224.

This species was originally described by Swenk from Nebraska, but present distributional records indicate that Nebraska may be its western limit. It is found across the northern states and Canada and extends down the eastern coast as far as New Jersey. The species is a sibling species of mandibularis and appears to replace mandibularis in the north; insufficient material from the central eastern states does not permit us to speculate as to the extent of overlap. In the male the most significant character is the sparseness and minuteness of the punctures on the discs of the first metasomal tergum, the mesepisternum, and the disc of the mesoscutum. The seventh ventral plate differs slightly from that of mandibularis in that the hair band in solidaginis occurs about the anterior and lateral edges,

while that of mandibularis extends from lateral clumps about the posterior or lower portion of the plate. The female has the abdomen sparsely but completely covered with deep ochreus to yellowish pubescence, rather than having the non-pubescent discal areas as in mandibularis. The pile of the head and face in the female is most often tinged with yellow but may tend to tawny grey in some specimens.

MALE: length 8 mm., wing length 5 mm.

Hair of face dense, particularly along inner orbital margins and on clypeus, ochreus to pale yellow; very little pile above antennal bases; vertex with a few yellow hairs in ocellar triangle and upper genal areas; pile of genal areas becoming ochreus behind compound eyes and pale grey to white on lower faces; mesoscutum with moderately dense covering of yellowish pile; scutellum with weak lateral and posterior fringes of long, yellow to ochreus pile; mesopleura sparsely covered with long, pale grey pile which becomes light ochreus above; metapleura with little to no pile; propodeum with lateral faces bare, dorso-lateral and posterio-lateral margins with a strong ochreus fringe, posterior face with a few scattered, ochreus hairs; legs with short, ochreus pile, sparse and not distinctly plumose; first metasomal tergum with sparse covering of scattered, light ochreus pile, lateral fringes of first metasomal tergum short and moderately dense; metasomal terga with distinct apical fasciae strongly tinged with ochreus; discs

of metasomal terga two to five with strong covering of semi-erect, ochreus pile giving surface a light golden sheen; metasomal sterna with very weak apical fringes of light ochreus hairs.

Antennae short, flagellar segments barely longer than wide; malar space one-half as long as wide; clypeus weakly convex, closely punctured with fine punctures at base becoming scattered and striate on apical half which is shiny and shallowly striately punctate; vertex dull with a few coarse punctures. Prothoracic spines short, virtually absent; mesoscutum with very sparse, shallow, and minute punctures over surface, punctures about two to three puncture widths apart, interspaces shiny; scutellum with posterior half dull and rugosely punctate, anterior half shiny, impunctate; mesepisternum sparsely and shallowly punctate, punctures at least one puncture width apart on disc, becoming closer on dorsal surface, interspaces shiny; metapleural prominence strongly protuberant but with a very narrow, testaceous rim, slightly concave beneath; propodeum with lateral faces shiny, basal area with shallow quadrate pits, not sloping sharply behind, posterior face weakly roughened and shiny; tegulae light ochreus hyaline; wings with dusky ochreus pubescence over surface, nervures light yellowish brown; legs black except tarsi which tend to light brown; posterior basitarsi four times as long as wide and with a weak, longitudinal median furrow on upper surface. First metasomal tergum with disc shiny, impunctate; discs

of metasomal terga two and three shallowly folliculated giving surface roughened appearance; metasomal sterna with apical margins straight.

FEMALE: length 9-10 mm., wing length 5 mm.

Hair of face uniformly distributed about antennal bases and inner orbital margins, strongly tinged with yellow on upper portion of face; clypeus with moderate covering of light ochreus or yellowish pile which partially obscures surface; vertex with a few deep yellow hairs in ocellar triangle; upper genal areas covered with bright yellow pile, becoming white to grey immediately posterior to compound eyes, almost pure white on lower surfaces; mesoscutum with dense covering of yellowish pile; scutellum with yellow pile on lateral margins and posterior half of disc; mesepisterna with sparse, pale grey pile on disc, dorsal surface of mesepisterna and posterior lobes of pronotum with strong ochreus to yellow pile; metapleura with abundant light ochreus pile on lower surfaces; propodeum with some partially appressed pubescence along anterior and upper margins, dorso-lateral fringe of long, ochreus hair, posterior face with a few long, pale grey hairs; legs with pile short and sparse on first two pairs of legs, pale grey to ochreus, pile of posterior femora very long, curved, and plumose, that of posterior tibiae long, dense, but not plumose; metasomal terga one to three with discs sparsely covered with appressed ochreus to

yellowish pubescence, surface not completely obscured; first metasomal tergum with pubescence intermixed with longer, semi-erect or erect, yellow pile, most evident on anterior face; fasciae of metasomal terga one to four broad and weak, pubescence easily removed by rubbing and in many specimens may be rubbed from central portion of disc; metasomal terga four to six having pubescence sparser and semi-erect, not concealing surface; metasomal sterna without apical fasciae.

Antennae short, reddish brown apically, becoming darker basally; malar space one-eighth to one-quarter as long as wide; clypeus weakly convex, roughened with coarse, striate punctures over entire surface; vertex shiny with a few sparse, weak punctures. Prothoracic spines short and sharp, virtually absent; mesoscutum dull, covered with dense, shallow, fine punctures, no more than one puncture width apart on disc, impunctate area small; scutellum with posterior half roughened and rugose, anterior half shiny, impunctate; mesepisterna with disc covered with weak, shallow punctures, punctures approximately one puncture width apart on disc with very shiny interspaces, punctures becoming more dense dorsally and more obscure posteriorly; metapleural prominence strongly protuberant with a very narrow, brown rim, which curves ventrally at posterior edge, weakly concave beneath; propodeum with lateral faces shiny, basal area with distinct, shallow, quadrate pits, posterior face weakly papillated and shiny; tegulae light ochreus

hyaline; wings with a dusky covering of sparse, ochreus pubescence, nervures light brown; legs deep reddish brown; posterior basitarsi five times as long as wide, with a shallow, longitudinal furrow on upper surface; hind tibiae with a weak, longitudinal furrow evident on dorsal posterior surface. First metasomal tergum with disc shiny impunctate; second and third metasomal terga with discs weakly follicculated with sparse follicles and shiny interspaces; metasomal sterna with apical margin straight.

Distribution:

North Carolina: Raleigh; Swannanoa.

New Jersey: Bamber; Brown's Mills; Camden County; Clifton.

Massachusetts: Chilmark; Forest Hills; Nantucket; Needham; Sagamore.

Michigan: Gladwin County; Midland County.

Illinois: Carlinville; DuBois; Meredosia; Olive Branch.

Minnesota: Fort Snelling.

Iowa: Iowa County.

Nebraska: North Platte.

Flight Records:

July 15 to September 9.

The holotype is located in the collections of the University of Nebraska.