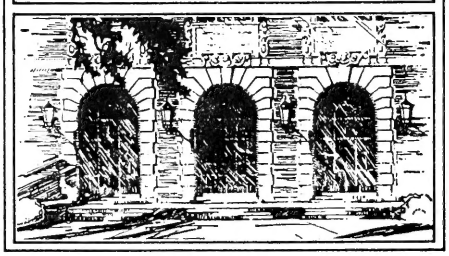

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# SAWFLIES OF THE SUB-FAMILY DOLERINAE OF AMERICA NORTH OF MEXICO

WITH SIX PLATES

BY

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An elaboration of a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Entomology in the Graduate School of the University of Illinois.

Contribution No. 140 from the Entomological Laboratories of the University of Illinois, in cooperation with the Illinois State Natural History Survey.

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## INTRODUCTION

The North American sawflies of the subfamily Dolerinae have never attracted the attention of students interested in the structure of the genitalia, and consequently have never been studied in so thorough a manner as the Eurasian species. Two or three workers have made notable contributions to our knowledge of the group, but their treatises are incomplete and do not cover the additional material which has since accumulated in the subfamily. The pioneer work was done by Norton, who, in 1867, first revised the Nearctic species known to him. MacGillivray, in 1916, keyed the eastern species, but some of the characters which he chose as criteria, in particular the punctuation and sculpture of the head, the punctuation of the mesonotum, and the striation of the post-tergite ("scutellar appendage" of MacGillivray), are too variable to be relied upon when applied to a large series of specimens. His key, also, does not include the western species, and it contains one or two evident mistakes, so that it is not a faithful guide to the Nearctic Dolerinae.

The Eurasian species, on the other hand, have received a great deal of attention. Several European workers have made careful studies of the female genitalia of the group, so that the status of the Palearctic forms is quite clear. It is interesting to note in this connection that Hartig, as early as 1837, figured parts of the saws of two or three species with such accuracy as to show us today definitely with which species he was dealing. Cameron, in 1882, used the dentation of the ventral edge of the saw of the female to aid in separating the British species. In 1913, Enslin illustrated his key to the Palearctic Dolerinae with line drawings of the lower portion of the saw, the lancet. A year later Morice published a comprehensive series of photomicrographs of the entire saws of thirty-six Palearctic species. More recently (1926) Zelochovtsev gave a series of line drawings illustrating the different types of saws, and drew from them his idea of the relationships within the group.

In this paper the attempt is made to apply to the Nearctic species of the Dolerinae the same critical examination of the genitalia which has been accorded the Palearctic forms. The masking of several species under the same color and the assumption of several color combinations by the same species have given rise to many homonyms and synonyms. On account of the complexity which has thus arisen, it has seemed advisable to select neotypes for the species of which the types can not be found. This has been a difficult problem in many cases, but with regard to each one the course has been followed which will permit of retaining the largest number of

names already in the literature. In some cases the saws of the females are characteristic of the species, in others the sheath, but in others again neither of these are of use except for complexes within the group, and in these cases an aggregate of other characters has been used.

Besides giving a mere tabulation and description of the species, an effort has been made to show the natural groupings and relationships within the subfamily. The almost complete picture afforded by the saws is in most cases well substantiated by the external morphology and to quite an extent by the male genitalia. There are, however, several points in the phylogeny open to question, and it is readily conceivable that some of the ideas brought out in this paper will be changed by further studies, especially of the immature forms.

In order to avoid confusion with the great color variations exhibited by some species, and to express the phylogenetic relations of closely allied forms, it has been necessary to use varietal and subspecific categories. In this paper, the term *variety* is used for forms differing from the typical condition of the species in color only and showing little or no geographic isolation; *subspecies* is used for forms differing from the typical form either in structure or markedly in color and geographic distribution.

In pursuing this revision, material has been assembled from all the major collections in North America, and from as many of the smaller ones as possible. Several thousands of specimens have been examined from a great many parts of the country, so that the distribution given for the various species should have some significance. The types of all but a few of the species have been studied and the genitalia removed from the majority of the types and examined. The types of the species to which I did not have access have very kindly been studied for me by other persons. A few types are no longer in existence.

Where so many specimens of a species have been examined and such a multitude of distribution records assembled that it is impractical to publish them all, the distributional data have been greatly condensed, but not in a way to obscure the general picture of the range of the species. Where, however, only scattered records have been obtained, they have been given in detail.

## Explanation of Terms

The terms used in this paper for the ridges, furrows, and areas of the head distinct to the sawfly group are chiefly those defined by MacGillivray (1916). For convenience, the definitions of those most frequently met are repeated here.

The *vertical furrows* (Figure 62, *f*) are the furrows situated on the dorsal aspect of the head, extending from near the lateral ocelli to the posterior margin of the head. They may be distinct and trench-like, reduced in length and pit-like, or reduced to linear scars.

The *postocellar area* (*po*) is the area on the dorsal aspect of the head directly behind the ocelli, bounded laterally by the vertical furrows. It may be rugose, pitted, or shining, and flat or mound-like.

The *postocular area* (*pc*) is the area on the dorsal aspect of the head lateral to the vertical furrows and posterior to the eyes, and includes the upper portion of the postgenae. Some authors have called this area the vertex, but since the postocellar area is also part of the vertex proper it does not seem advisable to use vertex in the restricted sense of the postocular area. In this paper the term *vertex* is used to designate the area comprising the entire dorsal portion of the head posterior to the eyes and ocelli.

The *ocellar basin* (*oc*) is the depression in front of the anterior ocellus. This area is rarely represented in the Dolerinae, but when present is usually shining and longitudinally striate.

The *malar space* is the area between the base of the eye and the base of the mandible.

For the thorax the current terms are used. The mesonotum (Figure 63) is divided into four lobes, the anterior lobe (*al*), consisting of two halves, two *lateral lobes* (*ll*), and a posterior lobe, the *scutellum* (*sc*). The posterior margin of the scutellum is differentiated into a crescentic or triangular area (*px*) for which the term *post-tergite* is used, after Smulyan (1923).

The *pectus* is the large flat area of the mesosternum below the mesoepisternum. In most species, in addition to the regularly scattered punctures, the pectus has a *diagonal row* of closely set punctures, two to four in width, extending from the postero–lateral corner to the antero-mesal corner.

The genitalia of the females play such an important part in the classification of this group that all the parts are named again in this paper to avoid confusion. The posteriorly-exserted, scabbard-like structure (Figure 1, *sh*) is called the *sheath* (Morice, 1912). MacGillivray's term "saw-guides" was a misnomer, since the lance (*sens* Rohwer) is the actual guide of the saw. The sheath consists of two similar chitinized plates, which form a housing for the saw. The saw (*ln* and *lt*) is composed of two similar blades closely applied together *in situ*. Each blade is made up of a dorsal half, the *lance* (*ln*), and a ventral half, the *lancet* (*lt*) (Rohwer, 1922). The lance is unarmed, firmly fixed at its base, capable of only a pendular movement, and the two are fused along the dorsal margin at the base. The lancet is attached to muscles within the abdomen and is moved in a saw-like backward and forward motion, slotted into the lance, which acts as a guide. Morice (1912) has shown that the "saw" is not used, strictly speaking, as a saw, but rather as a probing and macerating tool, the point being used first to produce a hole, which is then widened by a probing and sawing motion and lengthened into a linear, bleeding slit. To correct the erroneous use of the term "saw," Morice proposed the name *scalpellum* for this organ.

The Dolerinae exhibit a great diversity in lancet armature and it has been necessary to give names to the spines and processes which comprise it. The examination of a series of saws makes clear the origin and development of the different spurs and spines, and readily demonstrates their homology, so that one system of nomenclature applies equally well to both simple and complex forms. A hypothetical saw to illustrate all types of armature is shown in Figure 2. The lance is divided into segments by *annuli* (*b*), which are usually distinct. The segments at the apex are often rounded or angled dorsally, giving the lance a serrate or scalloped appearance. The ventral edge of the lancet is divided into *lobes* (*lb*) which are more or less toothed. These correspond closely in position to the segments of the lance, although annuli are not always present in the lancet. On the lateral face of the lancet are two rows of armature: a dorsal row of thin wing-like structures, the *alae* (*a*), extending diagonally across the dorsal half or three-quarters of the lancet and at an angle to the surface, and a row of spurs, the *spurettes* (*sr*), between the alae and the ventral margin. Each ala is produced into a sharp *alar spur* (*ad*) on its ventro–proximal angle, and frequently bears a row of spines, the *alar spines* (*ac*), along the basal margin. Where the annulus is present it often bears a row of spines, the *ventral spines* (*x*), between the ala and the spurette. Both the alae and the spurettes apparently arise as outgrowths of the annuli.

The simpler saws lack armature on the lateral face and have only the ventral lobes, which are more or less strongly dentate, as in Figures 41, 42, 43, etc. The first lateral armature to appear is the series of spurettes, which originate as very small outgrowths of the annuli near the ventral margin (Figure 50). The alar spurs, which are the fore-runners of the alae themselves, next appear, arising near the middle of the annuli (Figure 49). In Figures 52, 53, and 54 the enlargement of the alar spur and the development of the ala may be easily followed. The annulus is frequently broken between the alae and the spurette in the higher forms, but some species retain it intact (Figure 3). The spurette is always most distinct at the distal end of the saw, but towards the base it tends to coalesce with the ventral margin and becomes obscured as a tooth of the ventral lobes. The alar and ventral spines become conspicuous only in the *similis* group (Figures 57 to 59) and in the subgenus *Loderus* (Figures 4 to 6). In these the saw is of a highly developed nature.

For the convenience of students of other countries who may wish to use these names, Latin equivalents are given for the new terms proposed for the parts of the saw, as follows: annuli = *annuli;* ala = *ala;* lobe = *lobus;* spurette = *spiculella;* alar spur = *alaspicula;* alar spines = *alaspinulae;* ventral spines = *ventrospinulae.*

In addition to this armature, the lancet possesses two other structures, a linear chitinized strip (Figure 2, *r*) running the length of the dorsal mar-

gin of the lancet and ending in its extreme tip, and a series of duct-like "fingers" (Figure 44) leading into the lobes. The function of the "rod" (*r*) is undoubtedly to assist in forming a runner with the lance, and to strengthen the lancet. The function of the duct-like structures is problematic, but they may very likely be ducts through which secretions are applied to the wound made in the tissues of the host plant at the time of the sawing of the egg cavity or the laying of the egg.

The only parts of the male genitalia which are mentioned in this paper are the sclerites of the ventral aspect (Figure 64) for which the names established by Crampton (1919) are used. The parapenis, or *praeputium* (*pp*), is composed of the two large sclerites which form the central plate of the capsule; the *gonocardo* (*g*) is the crescentic sclerite below the praeputium; and the *gonostipes* (*st*) are the lateral sclerites adjacent to the praeputium and bearing the claspers, or *harpes* (*h*), on their apical margin. Within the cylinder formed by the gonocardo and gonostipes is situated the penis, composed of two paired rod-like structures. The upper portions, between the harpes, are the penis valves (*v*), and the lower portions, projecting beneath the gonostipes, are the penis rods (*p*).

The same sclerites are represented throughout the entire subfamily, varying only in their proportions. As a rule the type of genital capsule is constant for the groups herein treated, but there are one or two exceptions. They lack specific characters, however, so that they are of little value in identification.

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## BIOLOGY

But little is known of the life habits and immature stages of the North American Dolerinae, because most of the species frequent situations seldom studied by the entomologist, some are apparently rare, and none are of more than trivial economic importance.

The first records of the habits of these insects were the result of complaints from various sources that adults of *Dolerus unicolor* chewed the buds of pear trees, causing them to drop. Forbes (1885) investigated the matter and found that they "were neither biting nor piercing the buds or flowers, but that they were merely licking off the semi-fluid exudation from the surface of the bud scale." He added: "Dissecting the specimens and examining the contents of their stomachs with the microscope, I found only a clear fluid, without a trace of solid matter, except occasional spheres of clusters of threads of fungus parasites. . . . . Watching the flies with a glass, I could see that their biting jaws remained all the time closed, but that their flap-like maxillae were continually employed in mopping up the moisture from the viscid surface." He observed two species of Dolerus, which his descriptions indicate were *D. unicolor* and *D. neoagcistus*. The first rearing work to be done was that of Riley and Marlatt (1891), who drew attention to the fact that the species of Dolerus are among the earliest sawflies to appear in the spring and are very commonly taken on grass, particularly in moist and swampy localities. They described several types of larvae feeding on grasses and bred adults of two species, *D. unicolor* and a specimen determined as *D. collaris*, neither being definitely associated with any one of their described types of larvae, but certainly from larvae feeding on timothy grass (*Phleum pratense* L.). The record for *D. collaris*, however, can not be accepted without verification, since there are several species of the same color which have all been identified as *collaris* by the older workers. The need for work on the immature stages was expressed by MacGillivray (1913) in the following summary: "None of the larvae of the Dolerinae have been absolutely identified for the North American forms. What are believed to be larvae of this subfamily are grass and sedge feeders. They usually occur singly or several individuals on the same stem, clasping it with their thoracic and abdominal legs." Yuasa (1922), in studying the group, reared *D. similis* from larvae on the common horsetail, *Equisetum arvense*, and definitely established the identity of that species. In addition, he described seven other unidentified larvae which fed on grasses, sedges, or horsetail. Yuasa's work is the most recent in the field.

The European workers are almost equally in the same plight in regard to the Palearctic species of Dolerus. Of these species, which total about forty, only six have their larvae definitely known, with an additional three or

four very doubtfully established (Enslin, 1913). Of these, *D. madidus* and *haematodes* feed upon Juncus, *D. nigratus*, *gonager*, and *pratensis* feed on grass, and *D. palustris* on Equisetum. Konow (1901) lists, in addition, *D. coruscans* and *D. gibbosus* as doubtfully feeding on grasses, and keys this group of eight species by means of color pattern.

During the course of an intensive collecting campaign in the spring of 1929, several habitats were discovered which appeared to be ideal for the development of several species of Dolerus. The three most interesting places were situated at Seymour, Savoy, and Ogden, all within fifteen miles of Urbana, Illinois, where this work was undertaken. Of these, the Seymour area was most frequently visited, about fifteen collecting trips being made there between April 14 and June 14, 1929. From 50 to 500 specimens of Dolerus were collected on each trip. The data, although far from final or conclusive, being the result of only one year's observations, nevertheless bring out somewhat forcefully two conclusions: first, that the different species of the genus appear in a definite seasonal succession; and, second, that certain species are very definitely associated with certain ecological conditions and are useful as indicators of certain habitats. These results would be rendered more indicative if the immature stages were associated for certain with the adults, but for the present the probable identification of the larvae, based upon circumstantial evidence, is of great assistance. It is the author's intention to continue these observations over a number of years, and to make every attempt to rear the larvae of all the species on these areas; but, meanwhile, since our knowledge of the biology of the genus Dolerus is so scant, it seems worth while to present now this introduction to a study of the subject.

## Life History

All the species of Dolerus which have been observed in Illinois appear to have the same life-cycle, the type common to many groups of sawflies. In spring the insect emerges as an adult from the hibernation quarters in the ground. The males appear in large numbers before more than a few females have appeared, the latter becoming proportionately more numerous as the season advances, until towards the latter part of the regime of the species the females far outnumber the males. Little mating is apparent except on warm sunny days, when both sexes fly about very actively and are often seen in copulation. The eggs are laid in the tissues of the host plant, deposited in a cavity specially formed by the "saw," or scalpellum, of the female This process was described in great detail by Morice in 1914. The young larvae, soon after hatching from the egg, become external feeders upon their host. Those feeding upon sedges or grasses clasp the lateral edges of the blade and eat portions out of the sides The young larvae of those feeding upon Equisetum also eat out lateral portions of the

terete siliceous needles, but the larger larvae climb to the top of a needle and chew it completely down in one gradual operation In about a month the larvae become full-grown and enter the ground, where they pass the late summer, fall, and winter In Illinois three species feeding on Equisetum, namely, *D. similis*, *D. aprilis*, and *D. apricus*, dig among the roots of thick clumps of horsetail in fairly dry, well-drained soil to a depth of three or four inches, where they form an earthen cell. No cocoon is spun, either for a hibernaculum or for a pupal case. An Equisetum-feeding species occurring in British Columbia performed the same operations in preparation for hibernation. In early sping the larvae transform to pupae, and shortly thereafter into adults, which dig out of the ground and assume the activities of reproduction.

The Illinois species have only one generation each year, as is well shown by the fact that subsequent collecting in their favorite habitats never reveals more than a rare, stray specimen after the first wave of abundance of the species. The data borne by pinned specimens of the other species of the genus point to the same conclusion, so that the entire genus may be said to be characterized by a one-year cycle.

The larvae are entirely phytophagous, their hosts being chiefly various species of grasses, Carex, Equisetum, and Eleocharis, and possibly other species of the sedge and rush families. The food of the adults seems to consist entirely of sweet secretions of plants, such as nectar of flowers and flowing sap of trees. Adults of *D. unicolor* and *D. neoagcistus* are taken in great numbers feeding on the nectar of flowers of Crataegus, Prunus, etc., or on the sap of the sugar maples. *D. similis* and *D. aprilis* are frequently taken on the flowers of willows which occur near their breeding places. It is not likely that they partake of much solid food, for the proventriculus, or gizzard, has not a strong grinding apparatus.

## Habitat Relations

A detailed study of the habitat relations of the commoner species of Dolerus was made possible through the unique position of the habitats most frequented by these species. Running east, north, south, and west from Urbana are railway lines, paralleled by concrete highways, with a multitude of habitats, ranging from the wettest swamps to the driest of prairie situations, along the railway embankments. In certain of these areas the sawflies were found to be very abundant, and it was quite easy to go by automobile on the highways along these railroad lines and collect at a great many places of diverse ecological conditions and to determine exactly which were preferred by each species. It is remarkable that while sawflies of this genus abounded at many points along these lines of habitats, practically none were present on the vast extent of farm lands stretching on either side. Unless the railroad sites were chosen for a collecting venture,

a worker might conclude that these sawflies were of rare occurrence in this part of the state—a conclusion erroneous in the extreme, yet doubtless explaining why so many collections lack an abundance of some of the more habitat-selective species found during our excursions of 1929.

The habitat relations of the species which have been observed in detail appear to be constant and precise. Not only was each species definitely associated with the occurrence of its one host, but many were limited to local areas possessing very definite degrees of ecological conditions, indicated by the combination of plants growing thereon.

Here might be noted some of the habits of the adults which rendered their collection easy. In early spring when the first common species began to appear as adults, the ground was barren except for the stripped stalks of the weeds which had grown there the previous year, such as Solidago, Silphium, etc., and the bare stems of the willows. Upon these the adult sawflies preferred to rest; and upon cold, wet days, with which April abounded, they clung in great numbers to these slender posts, became inactive and almost torpid with the cold, and could be picked off with the fingers very quickly and efficiently. They clung so tightly that the picking process proved much faster than sweeping with the net. On warm, sunny days it was necessary to sweep, for they became too active to catch with the fingers. Later in the season sweeping Equisetum produced large numbers of *D. similis* and *D. apricus*.

The types of habitat in which Dolerus was studied are as follows:

1. Sedge (Carex), horsetail (*Equisetum arvense*), and willow (Salix) communities. Low, semi-swampy areas.

2. Horsetail and grass communities. Dry, well-drained areas, where a firm, long-undisturbed sod was developed.

3. Grass communities. Wet prairie situations with a preponderance of the coarser grasses rather than the finer grasses of cultivation.

An ideal example of the first type of habitat, sedge-horsetail-willow, was found at Seymour (Figure 72). Between a railroad embankment on one side and a state highway on the other was an area about twenty-five feet wide, swampy in the wetter seasons of the year and with a few inches of standing water in the rainy period of early spring. The plant population consisted chiefly of a mixture of a single species of Carex that was fairly luxuriant when in full growth, the common horsetail, and a scattering of the stalks of a small willow, most of which were dead. The species characteristic of this habitat and found in no other were *D. illini* and *D. agcistus*, which are Carex-feeding forms. *D. aprilis* and *D. similis*, which feed on Equisetum, were also abundant here but were taken plentifully elsewhere.

The extreme selectivity of *D. agcistus* and *D. illini* was demonstrated by collections made along the railroad in many localities north of Urbana. Collections were made every few miles along this stretch, but a represen-

tation of these two species was taken only from those areas which seemed identical with the Seymour habitat in all particulars, even to the presence of a few dead willow twigs. Spots which supported a luxuriant growth of the same species of Carex as the ideal type of habitat, but which were drier, had at most a very few specimens of Dolerus.

The horsetail-grass type of habitat was exemplified by areas along the railroad at Savoy (Figure 73), situated four miles south of Urbana; at Ogden, fifteen miles east of Urbana; and also at Seymour. In these places the two apparent essentials for the prolific development of Dolerus were an old, well-formed sod and a dry, well-drained soil. At Savoy only *D. aprilis* and *D. similis* were present, but in very great numbers. On one occasion about 200 specimens were taken in 100 linear yards of sweeping. At Ogden and Seymour, in addition to these two species, *D. apricus* was very abundant. In these latter two places, also, a small brown larva was found feeding on Equisetum late in July, after all the others had disappeared. It is suspected that this is the larva of *D. apricus*. Of the three species found in these Equisetum habitats, *D. similis* was least selective in its habitat preferences, for it was found in almost every kind of situation wherever there was a growth of Equisetum. *D. aprilis* was perhaps no more selective, but may have been missed in later collections at some points because its height of abundance was earlier. *D. apricus*, on the other hand, was very selective, being found only in areas in which the horsetail, grasses, and weeds appeared to be long established.

The coarse grass habitats were studied very little in this survey, for after investigations were well under way little remained in these situations but larvae. In the spring of 1928, however, it was noticed that *D. unicolor* appeared there very early in the spring in large numbers; and subsequent sweeping unearthed a large, abundant, cream-colored Dolerus larva believed to belong to this species. In captivity these larvae fed readily on any of the species of grass found in this habitat. Collected with them and feeding on the same grasses were Dolerus larvae which were white with lateral black spots (*Dolerus sp. 2* Yuasa, 1922). It is possible that these larvae may be *D. neoagcistus*, which is an early species, and often taken at flowers with *D. unicolor*.

Although no evidence of the fact had been noticed in 1929 collecting, there may be also a distinct forest-inhabiting group of Dolerus, for *D. nortoni* has been taken in the vicinity of Urbana in original forested land only, especially in University Woods, which is a semi-swampy woodland and may harbor certain sedges or grasses fed upon by the larvae of this species.

## Seasonal Occurrence

In this region the various species of Dolerus are among the very first of the hibernating insects to become active at the onset of spring. The

first individuals usually appear during the last two weeks of March, and by mid-April their numbers are manifold. By late June, however, most of the adults have disappeared, and by late July the larvae also have disappeared, so that the active period of the group as a whole is short. In regions where they occur abundantly, these sawflies are undoubtedly the first group of insects to be important defoliators of the vegetation, and they must hold a high place in the economy of such areas. This is further supported by the fact that in 1929, until midsummer, the specimens of Dolerus far outnumbered other species of insects taken on Equisetum and Carex; and the larvae seemed to attract a great number of parasitic Hymenoptera belonging to groups which are known to parasitize sawflies.

Data on the seasonal occurrence and abundance of the adults of the species of Dolerus taken in all localities during the season of 1929 are shown in Table I, and a summary of the data for the Seymour area alone is shown in Figure 71.

TABLE I—TOTAL NUMBER OF SPECIMENS OF DOLERUS COLLECTED AT ALL LOCALITIES IN ILLINOIS DURING 1929

| | March | | April | | | | May | | | | June | | | | July | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15–22 | 23–31 | 1–7 | 8–15 | 16–23 | 24–30 | 1–7 | 8–15 | 16–23 | 24–31 | 1–7 | 8–15 | 16–23 | 24–30 | 1–7 | 8–15 |
| D. unicolor | | 1 | 66 | 2 | | 9 | | | | | | | | | | |
| D. neoagcistus | | | 4 | | | 3 | | | | | | | | | | |
| D. illini | | | | 139 | 20 | 15 | | | | | | | | | | |
| D. collaris | | | 1 | | | | | | | | | | | | | |
| D. aprilis | | | 1 | 191 | 70 | 13 | 134 | 51 | | 2 | | | | | | |
| D. neoaprilis | | | | 3 | 1 | | 4 | | | | | | | | | |
| D. agcistus | | | | 53 | 4 | 73 | | | | | | | | | | |
| D. apricus | | | | | | | 2 | | | 155 | | 70 | 4 | | | |
| D. similis | | | | 13 | 23 | 124 | 59 | 8 | 9 | 71 | 11 | 19 | 61 | | 12 | |

*D. neoaprilis*, *D. collaris*, and *D. neoagcistus* were represented by so few specimens that they may be passed over as of merely incidental interest, and as possibly being rarities in this region. Urbana is likely the extreme southern limit of distribution for the first two, but all three of these species may prove to be abundant with further exploitation. *D. unicolor* is the first species to make its appearance. In 1928 and 1929 the adults were flying during the last week in March, and in 1930 they were extremely abundant on March 15. In 1929 they reached their peak of abundance during the first week of April, and thereafter soon dwindled away.

The next species to occur in large numbers were *D. illini*, *D. aprilis*, and *D. agcistus*. On April 14 these species were all at their greatest abundance at Seymour; but it is doubtful if they occur as early as *D. unicolor*. It is very probable that the great proportion of the population of each species of this group emerges within a comparatively short time, so that the graphic curve of their rise in numbers would be very steep, as is that

of *D. apricus*. *D. illini* and *D. aprilis* were especially abundant, while *D. agcistus* was only moderately plentiful. *D. agcistus* and *D. illini* disappeared from the area very rapidly.

In the Seymour region this wave of species had receded by about the first of May, except for a few specimens of *D. aprilis*, and left the field to *D. similis*. This latter species never reached very great numbers in the Seymour habitat but was represented in moderate quantities for about two months—a much greater length of time than any other species. This could be explained by various reasons: (1) greater longevity, (2) a natural tendency for different individuals to take a different length of time to develop, or (3) the selection of different hibernation sites by the larvae, so that they are subject to different temperatures in the early developmental period of spring, hence to different rates of growth, and as a result would emerge as adults over a longer period of time. It will be remembered from the discussion of habitat relations that *D. similis* is also the only species observed which was not apparently restricted to a certain type of habitat, but occurred abundantly wherever its food plant was plentiful, which strongly suggests the last alternative to account for its long period of adult activity. This species was much more abundant at Savoy and Ogden than at Seymour, and it is probably the most common species in the state, or at least second in rank to *D. unicolor*.

The last species to appear on the scene was *D. apricus*. At the Seymour habitat it appeared quite suddenly on the 21st. of May, and its numbers rose in a few days to their highest point. About three weeks after its first occurrence it was rapidly on the decline, and after the middle of June it together with *D. similis* formed the final retreat of the adults of Dolerus for the season.

## PHYLOGENY

The phylogeny of the Dolerinae is based essentially upon the picture of the development of the saw from the simple to the complex. It may be argued that such a utilitarian attribute should be disregarded in a consideration of phylogeny, since it is apt to vary within natural groups without respect to relationships, due to differences in the host plants of species within the same group. In this case, however, the grouping afforded by the saws is readily upheld by external morphological characters and to quite an extent by the male genitalia, which seems to me quite significant in a group so lacking in conspicuous specific characters. Also, from the meager evidence which can be collected, host selection seems to be a link in the phylogenetic chain. While other characters alone present good criteria for super-specific grouping, they do not show so clearly as the saws that which is so necessary to a family tree, namely, direction of development.

Zhelochovtsev (1926), using the evidence furnished by the Palearctic forms, considered the development within the subfamily to be linear, but when the Holarctic fauna is considered, there appear distinct groups which follow a line of development at divergence with the others. The point of origin of the different groups is speculative, of course, but the developmental lines within the groups are distinct.

The *unicolor* group is regarded as the most primitive outgrowth of the Dolerinae stem. In the lowest members, *e.g.*, *D. neocollaris*, the postocular area is very large and the eyes are therefore comparatively small. The saw is many-segmented, the lancet lacks lateral armature, and the annuli are represented by oblique areas of minute spines. The lobes are distinct and only very minutely toothed. In the higher forms the postocular area becomes slightly shorter and the lobes more coarsely toothed. The *sericeus* group probably branched off from the main stem near the same place as did the *unicolor* group. In saw characters these two groups are very similar, but morphologically the *sericeus* group is quite distinct from all other members of the subfamily, except *D. frisoni* Ross, in having the hind tibiae very clearly grooved on both the inner and outer sides, and, in the male, in having a triangular procidentia on the caudo-mesal portion of the eighth tergite. *D. frisoni* is a puzzling case which is discussed under the treatment of the species. The conformation of the pleurae and pectus of the *sericeus* group is also characteristic. The lancet in this group is simple, lacking lateral armature except in *D. neosericeus*, where rudimentary alae are developed. The lobes are distinct and coarsely dentate, and annuli are usually well indicated. A subgeneric name could be applied to this group with good

justification, for it is certainly as definitely separated from the mass of the Dolerinae as is the subgenus Loderus, but since it appears as only one group among the many in the general perspective of the subfamily it seems unwise to split the genus further.

It would appear that a dichotomous split occurs in the family tree above the point from which sprang the lower groups, one branch giving rise to the *bicolor* group and the other giving rise to the *similis* group and its allies. In the *bicolor* group the various steps in the development of the lateral armature of the saw are very graphically illustrated. In *D. collaris* (Figure 50) the annuli are distinct, with a small spurette developed at the ventral margin. In *D. clypealis* (Figure 49) first indications of alae appear near the dorsal margin of the lancet, the spurettes still being rudimentary. Progressing through *D. neoagcistus*, *D. bicolor*, and *D. agcistus*, the development of the alae and spurettes can be followed with clarity. In this group the alar and ventral spines are not developed. From the opposite stem arose the *similis* and *neoaprilis* groups, and the subgenus Loderus. The first two probably branched off close together, as the saw characters would indicate. The *similis* group exhibits a progressive reduction of the teeth of the lobes, a marked coalescence of the spurettes with the lobes, and a development of both alar and ventral spines. In the *neoaprilis* group the spurettes are distinct, the lobes have many fine teeth, the Palearctic species *D. dubius* has both alar and ventral spines, and the Nearctic species *D. neoaprilis* has only ventral spines. Loderus, which is characterized by long, emarginate eyes, seems to present a group of saws of a highly developed nature, but on analysis the difference between the saws of Loderus and the *similis* group is not as great as that between those of the *similis* and *unicolor* groups. The saw of *L. apricus* suggests a close relationship with the *elderi* section of the *similis* group. The chief differences are that in *L. apricus* (Figure 5) the alar spurs have become separated from the alae, and the spurettes are entirely fused with the ventral lobes. The other species of Loderus contain two types of saws (Figures 4 and 6) which are markedly different from each other and show no clear relationship to other groups in the subfamily. It seems apparent, however, that they have arisen from the series possessing alar spines; and the long, emarginate eyes, the development of alar spines, and (in *L. albifrons*) the coalescence of the spurettes with the ventral lobes, suggest their position as among the most highly developed group in the subfamily.

From the evidence furnished by the saws, Loderus is at most a highly specialized group comparable to other groups within the Dolerinae, and follows a chain of development from the lowest forms in the subfamily. Loderus Konow is therefore considered in this paper as being of only subgeneric rank. This viewpoint is further supported by a consideration of the character upon which Loderus is differentiated from Dolerus, namely,

the condition of the eyes. In the *unicolor* group, particularly *D. neocollaris*, the eyes are short and the postocular area long; in the *similis* group the eyes are longer and the postocular area short, while in some species the inner margin of the eyes show a distinct tendency to be emarginate; in *L. acidus* and *L. albifrons* the eyes are no longer than in *D. similis* but are distinctly emarginate; and in *L. apricus* the eyes are very long and emarginate. At no point in this gradation can a line be drawn to separate the subfamily into two distinct units.

The distribution of the subfamily is amazingly uniform. It is exclusively Holarctic, occurring in Northern Africa, throughout the Eurasian region with the exception of India and the Malayan region, and throughout North America. It is of especial interest, however, to note that almost all the groups into which the subfamily may be divided are represented throughout the Holarctic region. The greater number of the Nearctic species of Dolerus, and all the Nearctic species of Loderus have identical structural homologues in the Palearctic region. It is evident, therefore, that the group Loderus has not developed in geographic isolation, but with the rest of the Dolerinae.

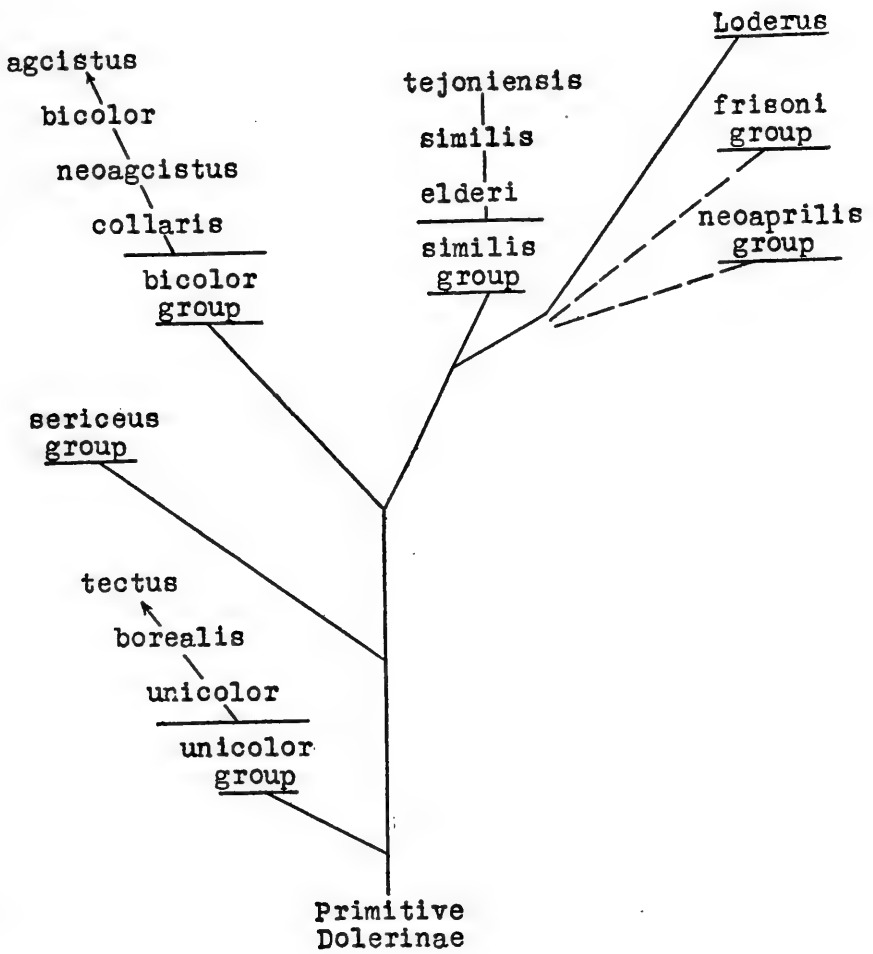
It is interesting in this connection to note that complexity of saw structure has progressed hand in hand with host selection. The evidence on this point is meagre, since very few of the larvae of this group have been reared, but what there is of it points out a fairly clear path. The following tabulation summarizes the host relations which have been found in the literature:

TABLE II

| Group | Species | Host |
|---|---|---|
| Unicolor | D. unicolor | Phleum pratense |
| | D. nigratus | Festuca sp. |
| | D. gonagra | Festuca sp. |
| Unicolor? | D. madidus | Juncus |
| | D. haematodes | Juncus and Scirpus |
| Bicolor | D. collaris | Rushes (Eleocharis?) |
| Similis | D. pratensis | Equisetum arvense |
| | D. palustris | Equisetum arvense |
| | D. similis | Equisetum arvense |
| | D. nicaeus? | Equisetum arvense |

The species with the simple saws choose for hosts the soft-tissued grasses, the species with highly developed, complex saws have hosts of a hard, siliceous texture. It will be interesting to find the host relationships of the higher members of the *bicolor* group, of the *neoaprilis* group, and of the subgenus Loderus.

The following diagram gives the author's conception of the phylogenetic tree of the subfamily:



## TAXONOMY AND NOMENCLATURE

### SUBFAMILY *DOLERINAE*

*Dolerides* Thomson, Hymen. Scandin., Tom. I, 1871, p. 278.
*Dolerides* Cameron, Monog. Brit. Phyt. Hymen., Vol. I, 1882, p. 157.
*Dolerinae* Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 1.
*Dolerinae* Ashmead, Can. Ent., Vol. XXX, No. 12, Dec., 1898, p. 306.
*Dolerides* Konow, Gen. Insectorum, Hymen., Fam. Tenth., 1905, p. 68.
*Dolerinae* MacGillivray, Proc. U. S. Nat. Mus., Vol. XXIX, 1906, p. 628 and p. 631.
*Dolerinae* Rohwer, Proc. Ent. Soc. Wash., Vol. XIII, 1911, p. 221, and p. 222.
*Dolerini* Enslin, Tenth. Mitteleur., Deutch Ent. Zeits., 1912, Beiheft, p. 40.
*Dolerinae* MacGillivray, Bull. No. 22, Conn. Geol. Nat. Hist. Survey, 1916, p. 68.

Members of this subfamily are characterized by the venation of the front wings (Figure 70), in particular the contraction of the anal cell and the presence of only two closed submarginal cells, due to the loss of the middle transverse cubital vein, or $R_5$ of MacGillivray. The group is a compact one, with a distinct habitus. The body is stout, short in comparison to its width as compared with other groups, such as the Tenthredininae and Allantinae. The clypeus is slightly asymmetrical, the sinistral lobe being slightly smaller than the dextral. The greater area of the head and thorax is opaque and punctate, usually clad with whitish pile, which is especially conspicuous on the lower portion of the head.

Existing determinations in the group have been found so unreliable that only records that have been seen by the author are considered valid. Particularly misleading errors in the literature have been commented upon to bring them into conformity with the records in this paper.

In the subfamily and generic bibliography many references have been omitted which dealt only with exotic groups, and in the bibliography of each species references to faunal or local lists have been omitted. The subfamily consists of only the one genus, Dolerus, which is therefore defined by the characteristics of the subfamily.

### GENUS *DOLERUS* Jurine

Litt.-Zeitung Erlanger, Vol. I, Nro. 21, May 30, 1801, p. 163.

*Genotype.—Dolerus gonagra* Fabricius (Subsequent designation of Latrielle, 1810).

The date of the original description of the name *Dolerus*, in common with many other Hymenopterous generic names, is tied up with the "Erlangen List" of Panzer, published in the daily scientific journal of Erlangen, and forgotton by entomologists until it was again brought to light by the work of Morice and Durrant (1915). These two authors have shown that the name *Dolerus*, accompanied by two constituent species, *D. germanica* and *D. gonagra*, was first published in this work. Rohwer (Ent. News, 1911) accredits the genus to Panzer and gives the place of original description as "Fauna Insectorum Germaniae," Heft 82, Jahrgang 7. Morice and Dur-

rant (loc. cit.), however, state that this latter Volume bears the date "September 3, 1910," whereas the Erlangen List was published on May 30 of the same year. Latrielle (1810) set *D. gonager* Jur. as the type of *Dolerus*, and since this species was included under *Dolerus* in the original description, it is a valid designation. The type set by Rohwer in 1911, *viz.*, *Dolerus pedestris* Panz. (=*D. pratensis* L.), would be valid only if the second reference were the place of the original description. The author is in accord with the arguments and opinions of Morice and Durrant in accrediting the name *Dolerus* to Jurine and not to Panzer.

The genotype represents a member of the *unicolor* group as represented in this paper, which would therefore be considered as the genus in the very strictest sense should anyone elevate these groupings to subgeneric rank. Leach, in 1817, separated from Dolerus the genus Dosytheus, naming first in the latter *D. eglanteriae* Klug (=*D. pratensis* L.), which belongs to the *similis* group. These two genera have been considered synonymous by subsequent authors. A study of the Nearctic forms indicates clearly that these groups are worthy of only group names, and are not of generic or subgeneric rank. In 1890, Konow proposed the new genus Loderus for the species of Dolerus which had the inner margin of the eyes emarginate, but for reasons given in the treatment of phylogeny, Loderus is considered as a subgenus.

KEY FOR THE SEPARATION OF THE SUBGENERA

1. Eyes emarginate on their mesal margin; malar space shorter than the length of the first antennal segment (Figure 16); tarsal claws toothless or with a small tooth (Figures 11 and 12).....LODERUS KONOW
–. Eyes almost straight on their mesal margin, short, the malar space usually as long as the length of the first antennal segment (Figure 15); tarsal claws always toothed (Figures 13 and 14).....DOLERUS JURINE

## SUBGENUS *Dolerus* Jurine

*Dolerus* Jurine, in Panzer, Litt. Zeitung Erlanger, Vol. I, Nro. 21, May 30, 1801, p. 163.
*Dolerus* Panzer, Fauna Insect. German., VII, p. 82, T. 11, 1801.
*Dolerus* Panzer, Krit. Revis., Vol. 2, 1806, p. 40.
*Dolerus* Jurine, Nouv. Meth. Class. Hymen., 1807, p. 57; T. 2 F. 4.
*Dosytheus* Leach, Zool. Misc., Vol. III, 1817, pp. 127–128.
*Dolerus* Leach, *ibid.*
*Dolerus* Lepeletier, Monograph. Tenthred., 1823, p. 116.
*Dolerus* Cresson, Jour. Bost. Soc. Nat. Hist., Aug., 1861, p. 37.
*Dosytheus* Norton, Proc. Bost. Soc. Nat. Hist., Vol. VIII, 1862, p. 151.
*Dolerus* Norton, *ibid*, p. 154.
*Dolerus* Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 231.
*Dolerus*, Sectio II, Thomson, Hymen. Scandin., Tom. I, 1871, p. 278 and p. 281.
*Dolerus* Cresson, Trans. Amer. Ent. Soc., Vol. VIII, Feb., 1880, p. 58.
*Dolerus* Cameron, Monog. Brit. Phyt. Hymen., Vol. I, 1882, p. 157.
*Dolerus* Provancher, Faun. Entom. Can., Hymen., 1883, p. 195.
*Dolerus* Cresson, Trans. Amer. Ent. Soc., Supp. Vol. for 1887, p. 15, p. 161.
*Dolerus* Dalla Torre, Cat. Hymen., Vol. I., 1894, p. 1.

*nec Dolerus* Guillebeau, Ann. Soc. Ent. France, Vol. LVIII, 1894, p. 282 and p. 307. (Phalacridae, Coleop.).
*Dolerus* Ashmead, Can. Ent., Vol. XXX, No. 12, Dec., 1898, p. 306.
*Dolerus* Konow, Genera Insectorum, Hymen., Fam. Tenth., 1905, p. 110.
*Dolerus* MacGillivray, Bull. No. 22, Conn. Geol. Nat. Hist. Survey, 1916, p. 69.

Distinctive characters of the subgenus those given in the key. Eyes straight on their mesal margin and short in length; malar space variable, usually as long as the first antennal segment; clypeus coarsely punctate, sub-truncately cleft, the dextral lobe usually slightly longer than the sinistral; the area above the cleft transversely carinate; tarsal claws bearing a tooth which may be either small, as in Figure 15, or large and coarse as in Figure 14; antennae and punctuation of head and thorax variable; pleurae more or less coarsely punctate, pectus in comparison smooth and finely punctate; sheath well clad with setae, both sheath and saw extremely variable.

*Genotype.—Dolerus gonagra* Fabricius (Latrielle, 1810).

This subgenus lacks an abundance of good specific characters, and hence the species are often difficult to separate. In the *bicolor* group it is essential to base determinations on an examination of the saw. In the *similis* and *sericeus* groups the saw is of little value for separating closely allied forms, and an aggregate of other characters must be used. The differences in these two latter groups are largely relative, so that a worker has to familiarize himself with the group to make close and accurate comparisons. The males of many species can be readily separated, but there are some groups in which no characters have yet been found to distinguish between the species, even when the males are known and at hand. The genitalia are very helpful in separating out the groups, but do not show differences beyond that. It is therefore necessary, although regrettable, to key some species only to the group.

## KEY FOR THE SEPARATION OF THE NEARCTIC SPECIES

1. Females (abdomen with an apical sheath-like structure, Figure 1)....2
—. Males (abdomen with a flat and entire apical sternite, Figure 7)....46
2. Hind tibiae deeply, longitudinally grooved on both inner and outer sides; large black species, with post-tergite smooth and shining....*sericeus* Say
—. Hind tibiae distinctly grooved only on inner side if at all, sometimes very slightly on outer side, except occasionally *apriloides*, which has the abdomen rufous; color and post-tergite various....3
3. Head, pleurae, pectus and abdomen metallic blue in color, collar and mesonotum mostly yellow; sheath as in Figure 22, with the ventrocaudal margin emarginate, with a tuft of hairs at the apex....*unicolor* (Beauv.)
—. Body, except sometimes head, not metallic blue, but black or black and rufous; sheath various....4
4. Sheath long, emarginate on the ventro-caudal margin, the extreme apical portion with a distinct scopa; setae short, tufted at apex, giving the sheath a horned appearance (Figure 22); postocular area twice as long as eye, seen from above; size large, body black except sometimes part of thorax....5
—. Sheath various (not as in Figure 22), either short or without a tuft of setae at extreme tip; postocular area often long, but not twice length of eye....6
5. Body entirely black....*neocollaris* subsp. *narratus* MacG.
—. Anterior lobe rufous....*neocollaris* MacG.
6. Abdomen and most of thorax black, at most with indistinct fuscous area on disc, sides, or base of abdomen....7
—. Abdomen mostly rufous, at least with two terga rufous or a distinct rufous area on dorsum of abdomen, in the latter case the metapleurae often being in part rufous....19
7. Lateral lobes rufous, anterior lobe black....*borealis* MacG.
—. Lateral lobes either the same color or darker than anterior lobe....8
8. Postocular area long, flat and robust; sheath thin and blade-like; post-tergite smooth and shining, without a median carina; large species, at least 8.5 mm. in length....9
—. Not with the above combination of characters; either with the postocular area narrowed behind eyes, or the sheath thick and short, or the post-tergite carinate and more or less sharply striate....10
9. Body entirely black; sheath angled on ventral margin (Figure 17)....*tectus* MacG.
—. Usually with pronotum and anterior lobe rufous, sometimes with the lateral lobes also rufous, sometimes almost entirely black except for clouded rufous areas on the anterior lobe and pronotum; sheath rounded on ventral margin, not angled (Figure 23)....*illini* Ross
10. Sheath with a distinct scopa along the distal margin (Figures 28, 30, 31 and 32), with a number of setae near the middle of the distal margin much longer than the rest, pleurae usually finely, and always evenly, punctate, never depressed above the pectus; pectus often shagreened....11
—. Sheath without a scopa (Figures 33 to 40), the setae in an evenly graduated series; pleurae usually coarsely and unevenly punctate, often depressed above the pectus; pectus shining except sometimes in *neoaprilis*....16
11. Scopa narrow or indistinct, at most as wide as in Figure 28; saw without alae, sometimes with small, peg-like lateral teeth (Figures 49 and 50)....12
—. Scopa wider (Figures 30 to 32), rim of scopa often rounded; saws with lateral teeth and well developed alae (Figures 52 to 54)....14

12. Scopa indistinct, sheath long, as in Figure 26, cerci attaining only half length of sheath; saw as in Figure 51, the basal tooth of the lobes projecting as a finger-like process ..... *nortoni* var. *nigrella* Ross
—. Scopa distinct, sheath shorter and wider (Figure 27); saw as in Figure 50, without the basal tooth of the lobes conspicuous ..... 13
13. Body entirely black except sometimes for an indistinct rufous spot on collar ..... *collaris* var. *erebus* Ross
—. Collar and usually anterior lobe rufous ..... *collaris* Say
14. Saw with very wide lateral teeth (Figure 54); sheath thick and wide; body entirely black ..... *idahoensis* Ross
—. Saw narrow, without very wide lateral teeth (Figure 53); sheath thick, but narrower than in *idahoensis* ..... 15
15. Body entirely black, except sometimes for an indistinct rufous mark on collar ..... *bicolor* var. *nigrita* Ross
—. Collar and anterior lobe rufous, sometimes upper pleurae and part of lateral lobes rufous ..... *bicolor* var. *lesticus* MacG.
16. Sheath armed with short, stiff, black and bristle-like setae; upper and lower margins of sheath convex, sheath thick at base, pointed at apex (Figure 36) ..... *neoaprilis* subsp. *konowi* MacG.
—. Sheath armed with longer, finer, usually silky setae; upper margin straight, tip of sheath not bi-convexly pointed ..... 17
17. Postocular area rotund (Figure 7), evenly punctate, with at most a very shallow furrow before the posterior margin; size small, less than 8 mm. ..... *elderi* var. *melanus* Ross
—. Postocular area usually narrowed behind eye, either with a deep transverse furrow before posterior margin or densely and coarsely punctate; size larger, 8 mm. or more .... 18
18. Sheath wide, lateral carina diverging from dorsal margin towards apex (Figure 34), and distant from it; head black from all angles; postocular area rarely shining, usually opaque; saw as in Figure 59 ..... *nicaeus* MacG.
—. Sheath narrow, lateral carina approximate to and converging with, dorsal margin, meeting it at tip (Figure 35); inner orbits giving a bluish reflection in some positions; anterior part of postocular area shining, the punctures distinct from each other; saw as in Figure 57 ..... *nasutus* MacG.
19. Vertex and dorsum of thorax without punctures, or at most with one or two minute impressions; abdomen entirely rufous ..... *tejoniensis* Nort.
—. At least postocellar area and lateral margins of anterior lobe bearing several punctures. 20
20. Punctures on thorax very few, and indistinct; lateral areas of anterior lobe with only a few small punctures; postocular area impunctate, shining; size large, 11 mm.; abdomen entirely rufous ..... *coloradensis* Cress.
—. Punctures on thorax quite distinct, sides of anterior lobe densely punctured; postocular area punctate, although often shining; size and color variable ..... 21
21. Metapleurae and adjacent sutures of mesopleurae entirely or partly rufous; mesopleurae evenly punctate, often finely so; sheath with a number of setae on ventral margin much longer than the others; abdomen usually rufous, sometimes with venter black and part of dorsum also, but never with first four or five segments rufous and apex black ..... 22
—. Metapleurae and adjacent sutures black; mesopleurae usually roughly punctate, often indented just above pectus, with a number of larger punctures in the depressed portion; sheath, except in *D. interjectus*, with setae in a more or less evenly graduated series, not with a few very long ones on the ventral margin; abdomen sometimes entirely rufous, often with the first four or five segments rufous and the apex black .... 35
22. Anterior lobe black, lateral lobes rufous ..... 23

—. Anterior lobe either same color as lateral lobes, or rufous and the lateral lobes black..24
23. Anterior lobe very finely and evenly punctate, dull.....*piercei* Roh.
—. Anterior lobe shining, lateral punctures large and distinct, sparse posteriorly..*versa* Nort.
24. Wings checkered; apical portion hyaline, basal portion deeply purplish brown infuscate .....*eurybis* Ross
—. Wings almost uniformly hyaline or infuscate.....25
25. Thorax entirely black (paraptera sometimes rufous), abdomen entirely rufous.....26
—. Thorax in part rufous.....27
26. Sclerites forming base of sheath black; pleurae with fairly small punctures .....*agcistus* var. *maroa* Ross
—. Sclerites forming base of sheath rufous; pleurae with fairly large punctures .....*abdominalis* (Nort.)
27. Venter of abdomen mostly black, dorsum rufous.....28
—. Abdomen entirely rufous, sometimes with small areas washed with black.....29
28. Sheath very wide, scopa wide, angled laterally (Figure 32); saw as in Figure 54; size large, 10 mm.; Pacific Coast species.....*distinctus* Nort.
—. Sheath smaller, scopa narrower; size smaller, not exceeding 8.5 mm.; saw as in Figure 50 .....*collaris* var. *maculicollis* (Nort.)
29. Clypeus rufous; sheath triangular, scopa very narrow; saw as in Figure 49..*clypealis* Ross
—. Clypeus black.....30
30. Cerci not more than one-half dorsal length of sheath, sheath long (Figure 26); scopa lacking or very indistinct; saw with basal angle of lobes produced in a finger-like projection (Figure 51); small species, length 6 mm.....*nortoni* Ross
—. Cerci reaching almost to tip of sheath, sheath short or angular at apex; with a distinct, though sometimes narrow, scopa; ventral margin of saw not as in Figure 51.....31
31. Saw with only rudimentary alae (Figures 49 and 50); scopa narrow, no wider than in Figure 27.....32
—. Saw with alae distinct (Figures 52 to 54); scopa wider (Figures 30 to 32).....34
32. Saw sub-triangular, as in Figures 49 and 61; sheath angular at apex, ventral margin straight.....33
—. Saw ellipsoidal, as in Figure 50; sheath usually with ventral margin rounded .....*collaris* var. *icterus* MacG.
33. Spurettes and alar spurs of saw distinct and finger-like (Figure 61); wings dusky .....*piercei* Roh.
—. Spurettes more or less distinct, alar spurs very rudimentary (Figure 49); wings hyaline .....*clypealis* var. *nigrilabris* Ross
34. Scopa oblique (Figure 30), lateral margin angular; saw as in Figure 52; tarsal claws small .....*neoagcistus* MacG.
—. Scopa more squarely and roundly truncate, if oblique, then lateral margins rounded; saw not as in Figure 52.....35
35. Saw as in Figure 53; sheath small; tarsal claws with a small tooth; size small, 7 to 8.5 mm. .....*bicolor* (Beauv.)
—. Saw as in Figure 54; sheath larger (Figure 32); some of tarsal claws with a large, coarse tooth (Figure 13); size larger, 8.5 to 10 mm.....36
36. Wings only slightly brownish infuscate.....*agcistus* MacG.
—. Wings deep chocolate infuscate at base, shading to lighter at apex.....*moramus* Ross
37. Sheath truncate, with a wide scopa, with a few setae on the caudal margin much longer than the others (Figure 31); postocular area without distinct furrows; saw as in Figure 54.....*interjectus* Ross
—. Sheath without a scopa, with the setae in an evenly graduated series (Figures 33 to 40), without some setae on the ventral margin longer than the others; saw not as in Figure 54.....38

38. Small species, 6 mm. in length; dorsum of thorax black; if slightly larger, then postocular area rotund, laterally expanded (Figure 7), without deep furrows, polished and sparsely punctate....39
—. Larger, at least 8 mm. in length, or with anterior or lateral lobes rufous; postocular area either deeply transversely furrowed, or densely punctate, sometimes with a transverse shining ridge....39
39. Femora rufous, entirely or in great part....*elderi* var. *rubicanus* Ross
—. Femora black, except sometimes their apices....40
40. Abdomen entirely rufous, at most with a portion of the last two segments black; wings slightly infuscate....*elderi* var. *auraneus* Ross
—. Abdomen with three or four apical segments black; wings usually hyaline..*elderi* Kinc.
41. Sheath clothed with short, dense, black, bristle-like setae; sheath thick at base, tapering towards apex, the latter pointed (Figure 36); clypeus very deeply notched; pleurae with some very large punctures in a conspicuously depressed area over pectus ....*neoaprilis* MacG.
—. Sheath clothed with slender setae, not thick and bristle-like; sheath not as in Figure 36 ....42
42. Sheath long and rhomboidal, as in Figure 39, the black chitinized portion longer than wide....43
—. Sheath shorter and less truncate than in Figure 39, the black chitinized portion as wide as long....44
43. Thorax black....*aprilis* (Nort.)
—. Thorax in part rufous....*aprilis* var. *nocivus* MacG.
44. Meso-episternum very deeply rugose, the rugosities extending to the very edge of the pectus; meso-episternum depressed above the pectus, the edges of the depression obscured by the large pits; division between pleurae and pectus sudden and ridge-like; sheath as in Figure 35, with a distinct dorso-lateral corner; saw as in Figure 57 ....*apriloides* MacG.
—. Meso-episternum sometimes coarsely, but never deeply punctate, and never so rugose..45
45. Ventral portion of apical red tergites black, the black decreasing towards the base of the abdomen, forming a tapering black margin on the venter from apex to base; pleurae fairly smoothly punctate, merging into the pectus, the division not sharply defined; saw as in Figure 57....*yukonensis* Nort.
—. Red tergal plates entirely red, not black on venter; pleurae more or less coarsely punctate, the division between pleurae and pectus distinct and ridge-like; saw as in Figure 59 ....*similis* (Nort.)
46. Body mostly metallic blue in color....*unicolor* (Beauv.)
—. Body not metallic blue, except sometimes head; color black, or black and rufous ....47
47. Abdomen entirely rufous....48
—. Abdomen in part black....52
48. Vertex impunctate, polished, shining; dorsum of thorax and pectus shining, impunctate; dorsum of thorax rufous except sometimes anterior lobe....*tejoniensis* Nort.
—. Vertex, dorsum of thorax and pectus punctate, at least lateral areas of anterior lobe with distinct punctures....49
49. Mesonotum entirely black....50
—. Mesonotum in part rufous....51
50. Wings deeply chocolate-infuscate basally, clear at apex....*eurybis* Ross
—. Wings uniformly hyaline....*abdominalis* (Nort.)
51. Anterior lobe black, lateral lobes rufous....*versa* Nort.
—. Anterior lobe rufous, lateral lobes black....*moramus* Ross
52. Abdomen entirely black....53

—. Abdomen with at least two, usually with four to six, terga rufous.....63
53. Eighth tergite with a median, subtriangular, apical projection or procidentia; legs distinctly grooved on both inner and outer sides; body entirely black.....*sericeus* Say
—. Eighth tergite without a procidentia, although sometimes carinate on the meson; legs not groofed on outer side, rarely on inner; if grooved, then abdomen mostly rufous...54
54. Postocular area twice as long as eye, seen from dorsal aspect, latero-caudal corner much rounded.....53
—. Postocular area less than twice as long as eye, usually shorter or subequal in length; if nearly twice as long, then quadrate or robust on the corners.....56
55. Occurring in the Rocky Mountains and westward; pleurae usually with abnormally long pubescence.....*neocollaris* subsp. *narratus* MacG.
—. Occurring east of the Rocky Mountains; pubescence of pleurae of the usual length .....*neocollaris* MacG.
56. Anterior lobe rufous.....*illini* var. *rufilobus* Ross
—. Anterior lobe black.....57
57. Posterior margin of post-tergite round; surface highly polished and shining, without a median carina.....58
—. Posterior margin of post-tergite pointed; surface at least faintly striate, with a more or less distinct carina.....59
58. Posterior angle of anterior lobe with distinct, large punctures.....*tectus* MacG.
—. Posterior angle of anterior lobe smooth and striate, impunctate.....*illini* Ross
59. Clypeus deeply notched, at least halfway to base; post-tergite usually shining, striae granular and rounded; pleurae sharply indented above pectus, indented portion with large irregular punctures..... .....*neoaprilis* subsp. *konowi* MacG.
—. Clypeus notched only one third way to base; post-tergite usually distinctly striate, striae sharp; pleurae little if at all indented above pectus.....60
60. Pleurae evenly, more or less "velvety" punctate, punctures small, walls of punctures low, not sharp; sides of anterior lobe with distinct dot-like punctures; third to fifth abdominal sternites three to four times wider than long.....*nortoni* Ross
*collaris* Say
*neoagcistus* MacG.
*bicolor* (Beauv.)
*agcistus* MacG.
—. Pleurae with large crater-like punctures, walls of punctures sharp and high; sides of anterior lobe with uneven, rugose punctures; third to fifth abdominal sternites only twice as wide as long.....59
61. Size small, 7 mm. or less; postocular area robust and round, evenly, sparsely punctate, without ridges.....*elderi* var. *melanus* Ross
—. Size larger, 8 mm. or more; postocular area narrowed behind eyes, transversely ridged, unevenly or densely and coarsely punctate.....62
62. Head with an area lateral of ocelli with a bluish reflection; postocular area with a central shining area, only sparsely punctate.....*nasutus* MacG.
—. Head without an area with a bluish reflection; postocular area entirely opaque with punctures.....*nicaeus* MacG.
63. Postocular area impunctate, polished; mesonotum and pectus practically impunctate, polished; lateral portions of anterior lobe shining, with only faint, sub-obsolete punctures.....*coloradensis* Cress.
—. Postocular area with distinct, often dense, punctures; lateral portions of anterior lobe dull or rough, densely or coarsely punctured.....64
64. Pleurae finely punctured, punctures very small and equal, not crater-like with sharp walls .....65

—. Pleurae more coarsely punctured, punctures large and crater-like, with sharp, distinct walls; punctures around margin of meso-episternum smaller, those in centre larger..66

65. Wings hyaline, except for a slight tawny staining near base; size small, 7 mm. ..... *interjectus* Ross

—. Wings infuscate on basal half; size larger, 8.5 mm..... *nativus* MacG.

66. Size small, 6 mm.; postocular area robust and shining, sparsely punctate without a transverse ridge midway between eye and posterior margin of head; pleurae with large, round punctures, very distinct, shallow and saucer-like.....67

—. Size larger, 7 mm. or more; postocular area either densely punctate, or with a distinct transverse ridge; punctures of pleurae, if large, with sharp walls, crater-like.....69

67. Femora rufous, except sometimes basal third..... *elderi* var. *rubicanus* Ross

—. Femora mostly black.....68

68. Wings clear hyaline..... *elderi* Kinc.

—. Wings slightly infuscate; occurring in the southern Rocky Mountains ..... *elderi* var. *auraneus* Ross

69. Eighth tergite with a carinate procidentia extending the entire length of the segment, gradually ascending to a point at apex; meso-episternum depressed above pectus, with large rugosities in the depression..... *frisoni* Ross

—. Eighth tergite without a procidentia, sometimes slightly carinate on the meson.....70

70. Meso-episternum rugosely punctate, depressed above pectus, the wall of the depression high and sharp or obscured by large rugosities; the third and fourth antennal segments subequal; hypopygium long.....71

—. Meso-episternum not so coarsely punctate, at most feebly depressed above pectus; clypeus about one-third cleft; third antennal segment longer than fourth; hypopygium short, the corners often sharp.....72

71. Walls of depression of pleurae high and sharp, not obscured by rugosities; punctures of pleurae shallower; hypopygium more rounded at apex..... *neoaprilis* MacG.

—. Walls of depression of pleurae obscured by rugosities, more or less indefinite; punctures of pleurae deeper; hypopygium squarely truncate at apex..... *apriloides* MacG.

72. Ventral portion of apical red tergites in part black, the black decreasing towards the base, giving a striped appearance to the venter; pleurae and pectus merging imperceptibly, making an even, smooth bevel..... *yukonensis* Nort.

—. Red tergal plates red on venter also, or if black with the base of the wings fairly deeply infuscate; division between pleurae and pectus well defined, usually ridge-like ..... *similis* (Nort.)
*aprilis* (Nort.)

## UNICOLOR GROUP

*Females.*—Postocular area, except in *borealis*, usually long; clypeus notched only one-third its length; antennae fairly stout, third segment slightly longer than fourth, the remainder very gradually diminishing in length; pleurae smoothly and evenly punctate, sometimes with a few larger punctures near centre; hind tibiae not grooved on outer side, slightly grooved on inner; tarsal claws with a small, erect tooth; sheath long, blade-like, in some species with a narrow scopa at tip; cerci attaining only half dorsal length of sheath; saw simple, without lateral teeth.

*Males.*—Similar to females, except *unicolor*, which has a shorter postocular area; genitalia as in Figure 65; praeputium long, angular at base, apices rounded and only slightly diverging; gonocardo very narrow; pedes wide and truncate.

### *Dolerus neocollaris* MacGillivray

*Dolerus neocollaris* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 127; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 71; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242.

*Dolerus refugus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 127; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv.,16, p. 71; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Female.*—Length 8.5 to 10 mm. Body almost entirely black except collar, anterior lobe, most of pleurae above pectus, and minute ring at apex of femora, rufous. Tibiae sometimes slightly lighter than body. Wings hyaline.

Postocular area very long, seen from above twice as long as eye, the postero-lateral corners round; posterior margin of head very much sinuate; vertical furrows wide and trench-like, reaching posterior margin; postocellar area longer than wide, raised and distinct from postocular area; lateral ocelli closer to each other than to posterior margin of head; head entirely reticulately punctate, the punctures sparser and more distinct just behind eye; posterior margin of postocular area with a slight but distinct ridge, the furrow in front of it very densely punctate. Centre of anterior lobe very finely punctate, shining, lateral areas rough, coarsely punctate; lateral lobes closely punctate with minute pits; post-tergite triangular, smooth and shining, sometimes obscurely striate, subcarinate, slightly depressed transversely, the posterior margin angular, the extreme point smooth and rounded; pleurae evenly and finely, yet roughly, punctate; pectus shining, with distinct, fairly large punctures. Sheath as in Figure 22, long, the ventral portion thin, gradually increasing in thickness dorsally, the apex terminating in a distinct apical scopa on which is a thick tuft of short setae,

giving the sheath a horned appearance; dorsal margin slightly concave, ventral margin slightly convex, more or less distinctly shouldered at the ventro-caudal angle, slightly emarginate just below the tip; cerci at most attaining half dorsal length of sheath; setae on both sheath and cerci short and silky, except on "horn" of sheath. Saw as in Figures 41 and 42; lance with about 28 annuli; apex serrate, base very large; lancet with about 23 lobes, the lobes distinct and extremely minutely dentate; annuli represented by linear areas of minute spines.

*Male.*—Length 8 to 9.5 mm. Color entirely black; wings hyaline. Structure very similar to female. Head usually narrower behind eyes than through them, entirely coarsely reticulately punctate; third segment of antennae shorter than fourth, fourth and fifth subequal, last four almost subequal, but slightly shorter towards apex, last segment three-fourths as long as third. Punctures on anterior lobe larger than in female; central portion shining, lateral portion rough, posterior third with sparser large punctures; lateral lobes shining, with very small punctures; pleurae very finely punctate; pectus shining and minutely punctured; post-tergite triangular, more or less sharply carinate along meson, usually obscurely striate and transversely depressed, the posterior margin angular. Ninth tergite one-third as long as eighth, caudal and mesal portions white; hypopygium long, the apical half trowel-shaped, the sides converging and the tip rounded; ventral aspect of genital capsule as in Figure 65.

*Holotype.*—♀, Fulton, New York, April 27 (C. R. Crosby). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Lectoallotype.*—♂, Ithaca, New York, April 23, 1896. Deposited with holotype. (Frison, 1927).

*Distribution.*—A scarce species of which the following specimens have been examined: COLORADO: 1♀, Colo. (C. F. Baker). ILLINOIS: 1♂, Normal, Apr. 30, 1884; 2♀♀, Urbana, Apr. 30, 1892 (Marten); 3♀♀, Devil's Hole, Havana, Apr. 6, 1917; 1♂, Urbana, Mar. 27, 1928 (H.H. Ross); 2♂♂, 16♀♀, Savoy, April 9, 12♀♀, Champaign, April 10 and Gray Lake, April 23, 1930 (Frison and Ross). IOWA: 4♀♀, Ia.; 1♂, Mt. Pleasant, Apr. 11, 1928 (Purdy). MASSACHUSETTS: many specimens from Westfield, Amherst, Lexington, Salem and Tynsboro, April and May. MICHIGAN: 1♀, Detroit, Apr. 22, 1920 (S. Moore); 1♀, Ann Arbor, May 7, 1919 (T. H. Hubbell). MISSOURI: 1♀, Mo. (C. V. Riley). MONTANA: 1♂, 3♀♀, Bozeman, Apr. 26 to Jn. 26; 2♀♀, Gallatin Co., Apr. 25, 1926. NEBRASKA: 1♀, Roca, Apr. 13, 1918 (Brunner); 1♀, Loncoln, Apr. 23, 1916 (Dawson); 1♂, Neb. NEW YORK: many specimens from Richfield Springs, Ithaca, Syracuse, Onreda County, Coy Glen, Johnstown, Stephentown, and Albany, April, May, and August. OHIO: 1♀, Columbus, Apr. 9, 1925 (O. Cartwright); 1♀, Cedar Point, Jly. 7, 1915 (V. R. Haber). SOUTH DAKOTA: 1♂, Brookings, May 20, 1914.

WISCONSIN: 1♂, Madison, Apr. 30, 1920 (Gentner). ONTARIO: ♂♂ and ♀♀, Ottawa, May to August; 1♀, Vineland, Apr. 24, 1927 (W. G. Garlick). QUEBEC: 1 ♀, Montreal, Apr. 29, 1900 (A. F. Winn); 1 ♀, Montreal, Jn. 3, 1906; 1 ♀, Montreal, May 7, 1927 (J. W. Buckle); 1 ♀, Aylmer, May 1, 1921 (C. B. Hutchings); 1 ♀, Isle de Montreal, May 20, 1906.

The female of this species is most easily confused with *illini*, from which it is readily distinguished by the sheath. The male can be recognized by the great length of the postocular area, and the pointed post-tergite. The female has often been mistaken for similarly colored species of the *bicolor* group, but can easily be separated from them on the basis of group characters and the sheath.

A series of this species from Montana contains a female with only the anterior lobe rufous, which is midway between the typical form and race *narratus*. A male specimen associated with this series has the long pubescence found in males associated with *narratus*.

### *Dolerus neocollaris* subsp. *narratus* MacGillivray

*Dolerus narratus* MacGillivray, Can. Ent., Vol. LV, No. 3, Mar., 1923, p. 65; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242.

*Dolerus nocuus* MacGillivray, Ins. Insc. Mens., Vol. XL, Nos. 1–3, 1923, p. 34; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

*Female.*—Length 9 mm. Color entirely black.

Structure almost identical with *neocollaris*. Differs only in having the antennae more slender, and the anterior portion of the lateral lobes almost impunctate. Genitalia as in *neocollaris*.

*Male.*—Length 8 mm. Color entirely black.

Can not be readily separated from typical *neocollaris*. In some specimens the pubescence on the head and thorax is very much longer than in the typical form, but this is a common adaptation to higher altitudes.

*Holotype.*—♀, Mary's Peak, Corvallis, Oregon, May 14 (A. L. Lovett). Deposited in the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Lectoallotype.*—♂, Mary's Peak, Corvallis, Oregon, May 23 (Zwicker). Deposited with the holotype. (Frison, 1927).

*Distribution.*—IDAHO: 3♀♀, Moscow. OREGON: 1♂, 2♀♀, Mary's Peak, Corvallis; 1♂, Entermille; 1♂, 2♀♀, Corvallis. WASHINGTON: 3♂♂, 2♀♀, Pullman, Apr. 3 to 25. BRITISH COLUMBIA: 1♂, Vernon, Ap. 25, 1919 (N. W. Ruhmann); 1♀, Vernon, Apr. 6, 1915 (M. H. Ruhmann); 1♀, Glacier; 1♂, Victoria, Apr. 12, 1917 (A. E. Cameron).

### *Dolerus unicolor* (Beauvois)

*Tenthredo unicolor* Beauvois, Insect. Afr. and Amer., 1805, Hymen., p. 97, ♂.

*Tenthredo thoracinus* Beauvois, *ibid.*, ♀.

*Dolerus thoracinus* Lepeletier, Monog. Tenthred., 1823, p. 122; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 10.

*Dolerus thoracicus* Kirby, List Hymen. Brit. Mus., Vol. I, 1882, p. 230.

*Dolerus unicolor* Lepeletier, Monog. Tenthred., 1823, p. 122; Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 152; Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 234; Provancher, Nat. Canad., Vol. X, 1878, p. 70; Riley, Amer. Nat., Vol. XV, 1881, p. 574; Provancher, Faun. Entom. Can., Hymen., 1883, p. 196; Gillette, Ent. News, Vol. I, 1890, p. 94; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 10; MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 130; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 73.

*Dolerus arvensis* Say, Keatings Narrat. Exped. II, 1824, App., p. 319; Leconte, Writ. Thomas Say on Entom., Vol. II, 1859, p. 214; Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 152; Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 234; Provancher, Nat. Canad., Vol. X, 1878, p. 70; Thomas, 10th. Rep. State Ent. Ill., 1880, 1881, p. 67; Provancher, Faun. Entom. Can., Hymen., 1883, p. 196; Forbes, 14th Rep. St. Ent. Ill. f. 1884, 1885, p. 100; Packard, Rep. U. S. Ent. Comm., Vol. V, 1890, p. 587; Riley and Marlatt, Insect Life, Vol. IV, 1891, p. 171.

*Male.*—Length 8 to 9 mm. Body metallic blue, except mouthparts, labrum, clypeus, eyes, antennae, dorsum of meso- and metathorax except sides of anterior lobe, tegulae, pectus, legs, and genital capsule, which are black; wings almost hyaline, veins black.

Head uniformly reticulate; eyes prominent; postocular area very slightly longer than eye, seen from above, narrowed behind eye, almost flat, but with a moderately small, sharp transverse ridge, posterior margin raised and ridge-like; vertical furrows deep and trench-like, separated from posterior margin by a narrow partition; postocellar area also reticulate, flat, slightly raised above level of postocular area; antennae bilaterally compressed, third and fourth segments subequal, the remainder gradually and almost imperceptibly decreasing in length. Mesonotum, except sides of anterior lobe and most of post-tergite, shining, sparsely and more or less minutely punctate; sides of anterior lobe reticulate, like head and pleurae; post-tergite shining, usually shagreened, which gives a sparkling reflection, subtriangular, slightly to moderately transversely convex, without a median ridge; meso-episternum finely, smoothly and evenly reticulate; pectus very smooth and shining, slightly shagreened, fairly densely punctured, diagonal row visible but somewhat indistinct; tarsal claws sharply curved, with a small tooth. Eighth tergite with a very fine median carina for its entire length; hypopygium long and convex; sides of apex slightly concave, apex arcuately rounded. Genitalia as for group.

*Female.*—Length 9 to 10 mm. Body mostly metallic blue, with the following parts yellowish-rufous: prothorax, sides of anterior lobe and lateral lobes; with the following parts black: mouthparts, clypeus, antennae, middle of anterior lobe, scutum, post-tergite, metanotum, pectus, legs, ninth and tenth tergites and sheath. This is the color phase described and figured by Beauvois for *Tenthredo* (*Dolerus*) *thoracinus* (1805). Most specimens encountered have the anterior half of the lateral lobes black, while a

few have the mesonotum entirely black with the exception of several small rufous spots in the corners of the lobes. Wings brownish infuscate, slightly darker than in the male.

Body very robust. Head uniformly reticulate except sometimes postocellar area and transverse ridge of postocular area which may be more sparsely punctate and shining; postocular area distinctly longer than eye, seen from above, robust, not narrowed behind eye, with a low, wide, raised transverse area, posterior margin without a carina; vertical furrows very wide and trench-like, only two-thirds as long as postocellar area; postocellar area either flat and reticulate or convex, punctate and shining; third antennal segment slightly longer than fourth, fourth longer than fifth, remainder almost sub-equal. Mesonotum, except sides of lateral lobe and post-tergite, shining, sparsely punctured, but more heavily than in *neocollaris;* sides of anterior lobe evenly reticulate; post-tergite as in male, shagreened, dull shining, sub-triangular and convex, not carinate; meso-episternum, pectus and tarsal claws as in male; sheath and saw exactly as in *neocollaris.*

*Neotype.*—♂, Oakwood, Illinois, March 17, 1927, flying over grass where female was found (T. H. Frison). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Distribution.*—An early, common and widely distributed species throughout the eastern and central United States and south-eastern Canada. Over two thousand specimens of this species, including about equal numbers of both sexes, have been examined from the following states: Colorado, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, District of Columbia, Nebraska, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, South Dakota, Virginia, Wisconsin, Manitoba, Ontario and Quebec.

A large species, easily distinguished in both sexes by the brilliant metallic blue color of the greater part of the body. Alcoholic specimens lose the metallic coloration, in which case the female may be distinguished by the sheath and the pattern of the dorsum of the thorax, and the male by the very long antennae and the genitalia.

The amount of black on the mesonotum of the female varies considerably, from being a single mark on the anteror lobe to covering almost the entire area. The intermediate form is most frequently taken in collections. Apparently none of the color phases are associated with geographic distribution, for all of them have been taken together at the same localities. For this reason no varietal name is given to the color extreme opposite that illustrated by Beauvois.

The type of this species, together with the types of many other hymenopterous species of Beauvois, seems to be lost, Some of this author's

coleopterous types are in the British Museum, but no one has yet discovered the whereabouts of the others. It seems advisable, therefore, to erect neotypes for the two Nearctic species, *D. unicolor* and *D. bicolor*.

### *Dolerus borealis* MacGillivray

*Dolerus borealis* MacGillivray, Can. Ent., Vol. XXV, No. 10, Oct., 1893, p. 238; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 240.

*Dolerus nominatus* MacGillivray, Ins. Insc. Mens., Vol. XI, Nos. 1–3, 1923, p. 34; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 240. *New synonymy.*

*Female.*—Length 9 mm. Color black, with the lateral lobes rufous. Wings fuligino-hyaline.

Head reticulately punctate, with a small impunctate or shagreened area on postocular area near lateral ocellus; postocular area, seen from above, distinctly longer than eye, corners rounded; posterior margin of head almost transverse, with a small but distinct ridge; postocular area with a wide, rounded, transverse carina; vertical furrows distinct, wide near ocelli, narrowing to a line at posterior margin; postocellar area one and one-half times wider than long, shining, with large punctures; flagellum of antennae very slender, third and fourth antennal segments sub-equal, the others very gradually decreasing towards apex. Disk of anterior lobe shining, only obscurely punctate, lateral areas finely but roughly punctate, the lateral areas only half as wide as complementary portion of disk; lateral lobes shining, sparsely punctate; post-tergite triangular, only obscurely striate, meson round-carinate, posterior margin angular; pleurae and pectus as in *neocollaris*. Sheath thin and blade-like (Figure 24), setae short and slender, very slightly tufted at apex; saw very similar to *neocollaris* (Figure 43), but with only 17 lobes, each one slightly longer and with more numerous, finer teeth.

*Male.*—Unknown for certain, but perhaps *nativus* MacG., which occurs in the same region, and agrees very well in structure with *borealis*. There exists a great color diversity between the two, but that does not necessarily bar them from being the same species.

*Holotype.*— ♀, Olympia, Washington, May 22, 1892 (T. Kincaid). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—Known from only two specimens besides the type, namely, one female, Moscow, Idaho (J. M. Aldrich), and one female, Oregon, the type of *nominatus* MacG. This specimen differs from the typic specimen only in having the upper part of the pleurae rufous.

This rare and handsome species is easily recognized by its unique coloration.

### *Dolerus nativus* MacGillivray

*Dolerus nativus* MacGillivray, Ins. Insc. Mens., Vol. XI, Nos. 1–3, 1923, p. 32; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242.

*Dolerus nectareus* MacGillivray, Ins. Insc. Mens., Vol. XI, Nos. 1–3, 1923, p. 33; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242. *New synonymy.*

*Male.*—Length 8 mm. Head and thorax entirely black; abdomen rufous except segments 7 and 8 which are black. Wings brownish infuscate, fairly deeply so at base, but lighter towards apex.

Structurally similar to *borealis*. It also agrees quite closely with *interjectus* Ross, a member of the *bicolor* group, from which it differs as follows: pubescence less dense, postocular area with a fairly large shagreened area without punctures; lateral lobes very shining; pectus highly polished, minutely punctured; hypopygium with the apex more rounded, the posterior margin and sides meeting to form a rounded shoulder. Genitalia agreeing in proportion with Figure 67, but with the praeputium not sharply concave and with the gonocardo as in Figure 66.

*Female.*—See remarks under *borealis* regarding the male.

*Holotype.*—♂, Entermille, Oregon, April, 29, 1917 (Baker). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—As in the case of *borealis*, very rare: COLORADO: 1♂, "Col." (Coll. A. N. S. Phil.). OREGON: 1♂, Entermille, Apr. 29, 1917 (Baker). This latter specimen is the type of *nectareus* MacG. It differs from the type of *nativis* in having the postocular area, disk of anterior lobe and post-tergite more or less shagreened.

This species differs from *interjectus* by characters given in the description, and from many members of the *similis* group, which it greatly resembles and with which it is likely to be confused, by the finely punctured pleurae which merge so smoothly and imperceptibly with the pectus and by characters of the genitalia.

### *Dolerus illini* new species

Female.—Length 9 to 11 mm. Color mostly black, with the pronotum, anterior lobe and upper half of meso-episternum rufous. In most specimens the head has an indistinct bluish reflection, in some the lateral lobes are rufous, and a few have the thorax almost entirely black except for indistinct rufous areas at the corners of the pronotum and anterior lobe. Front wings slightly brownish-gray infuscate, hind wings almost hyaline.

Head rather smoothly, reticulately punctate, with a small shagreened area postero-laterad of lateral ocelli; clypeus more or less angularly notched for one-third its length; seen from above postocular area longer than eye, robust, very slightly expanded behind eye, the posterior margin lacking a carina, the caudo-lateral corners somewhat quadrate; posterior margin of head slightly immarginate; vertical furrows deep and trenchlike, but only reaching two-thirds of the distance to the posterior margin; postocellar area quadrate, raised above the level of the postocular area, which is uniformly flat; in most specimens of this species the median fovea is a minute shining spot in the bottom of a punctate depression, and the ocellar fovea is a small polished spot adjacent to and in front of the median ocellus; ocellar basin

obsolete; antennae moderately thick, third segment longer than fourth, the remainder gradually decreasing in length. Anterior lobe sub-inflated, disk shining, minutely punctate, lateral areas with even, more or less distinct punctures; lateral lobes shining, with moderately dense but small punctures; post-tergite polished, flat and triangular, at most only obscurely striate at base, mesal portion bevelled but not carinate, posterior margin very bluntly angled, scarsely crescentic; mesopleurae smoothly pitted, the walls of the punctures glossy and rounded; pectus polished, minutely punctured, with a diagonal linear strip of denser, larger punctures. Sheath as inFigure 23, blade-like, the apical portion with a very narrow, uniform scopa; sides of sheath shagreened; setae suggestive of the *bicolor* group, most of the setae being short, in a uniform series, but with a small number near the caudo-ventral angle about twice as long as the others; setae brown; cerci half dorsal length of sheath; saw as in Figure 45; lance with about 23 segments, the tip serrate; lancet with about 19 segments,, the annuli represented by oblique bands of minute spines, lobes with about eight fine, even teeth.

*Male.*—Length 9 to 10 mm. Color entirely black, except head, which usually has the dorsal portion bluish-black. Front wings very faintly tawny, hind wings hyaline.

Structure very similar to female. Differs as follows: first three segments of flagellum either subequal, or the second slightly the longest; pleurae more finely punctured. Ninth tergite one-third length of eighth; hypopygium long, sides of apex not so convergent as in *neocollaris*, the posterior margin sub-truncate. Genitalia as for group (Figure 65).

*Holotype.*— ♀, Seymour, Illinois, April 14, 1929 (Park and Ross). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Allotype.*— ♂, same data as holotype, and deposited with it.

*Paratypes.*—COLORADO: 1♂, Fort Collins, May 5, 1900; 1♂, Mineral County, June 20, 1919, 10,800 ft. alt. CONNECTICUT: 1♀. ILLINOIS: 62♂♂, 68♀♀, Seymour, Apr. 14, 1929 (Park and Ross); 10♂♂, 13♀♀, Seymour, Apr. 15, 1929 (Frison and Ross); 4♀♀, Bondville, Apr. 15, 1929 (Frison and Ross); 1♂, 2♀♀, Galton, Apr. 18, 1929 (Frison and Ross); 1♂, White Heath, Apr. 15, 1929 (Frison and Ross); 2♂♂, 6♀♀, Thomasboro, Apr. 24, 1929 (Frison and Ross); 1♂, 3♀♀, St. Joseph, Apr. 16, 1929 (Frison and Ross); 5♂♂, 3♀♀, Urbana, Apr. 16, 1929 (Frison and Ross); 2♂♂, 2♀♀, Ogden, Apr. 16, 1929 (Frison and Ross); 1♂, 2♀♀, Chebanse, Apr. 24, 1929 (Frison and Ross); 2♂♂, Paxton, Apr. 24, 1929 (Frison and Ross); 18♀♀, Ludlow, Apr. 24, 1929 (Frison and Ross); 1♀, Tolono, Apr. 18, 1929 (Frison and Ross); 6♀♀, Rantoul, Apr. 24, 1929 (Frison and Ross); 1♀, Seymour, Apr. 17, 1929 (H. H. Ross); 1♀, Algonquin, Apr. 25, 1894 (W. Nason); 10♂♂, 12♀♀, Snyder, April 16,

1930 (Frison and Ross). IOWA: 1 ♀, Ames, Apr. 26, 1926 (G. Hendrickson); 1 ♀, Ames, May 5, 1926 (G. Hendrickson). KANSAS: 1 ♀, Lawrence, Apr. 18, 1923 (W. G. Garlick); 1 ♂, Douglas County, 1920 (W. E. Hoffman); 4 ♂♂, Douglas County, April. MASSACHUSETTS: 1 ♀, Saugus, Apr. 29, 1920 (C. E. Hofer); 1 ♀, Stoneham, Jn. 1, 1920 (C. E. Hofer); 1 ♂, Chicopee, May 17, 1902; 1 ♀, Forest Hills, May 1, 1917 (A. M. Wilcox); 1 ♀, Longmeadow, May 14, 1905 (F.K. Knab); 1 ♀, Tynsboro, (F. Blanchard); 1 ♀, Bedford, May 4. MICHIGAN: 2 ♀ ♀, Ann Arbor, May 22, 1919 (T. H. Hubbell); 1 ♀, Ann Arbor, May 18, 1919 (T. H. Hubbell); 1 ♀, Ann Arbor, Apr. 18, 1917; 1 ♂, Ag. Coll. NEW HAMPSHIRE: 1 ♀, Franconia; 1 ♀, N. H., 1879. NEW JERSEY: 1 ♀, Ramsey, Apr. 30, 1911. NEW YORK: 1 ♀, Ithaca, Apr. 20, 1895; 1 ♀ Ithaca, May, 1893. SOUTH DAKOTA: 4 ♀ ♀, S. D.; 3 ♀ ♀, Brookings; 1 ♀, Brookings, Jn. 12, 1923 (H. C. Severin). ALBERTA: 1 ♂, Gull Lake, Ap. 4, 1929 E. H. Strickland); 1 ♀, Gull Lake, Jn. 8, 1929 (E. H. Strickland). MANITOBA: 1 ♀, Birtle, May 25, 1928 (R.D. Bird). Deposited in a large number of collections.

In the vicinity of Urbana, Ill., this species was taken in great abundance in the Equisetum, Eleocharis and Carex habitats similar to Figure 72. It was one of the earliest species to reach its greatest abundance in this habitat, attaining its peak at the same time as *aprilis* and *agcistus*.

The female of *illini* can be separated from other species of the same color by the long, thin sheath and the saw. Both sexes differ from *neocollaris* in the shorter and more robust postocular area, and from similarly colored members of the *bicolor* group by the more quadrate head, having the anterior lobe slightly wider and shorter with the disk polished, and the polished pectus and post-tergite. The female of *tectus* differs in having a shorter, shouldered saw (Figure 17), the male in having a crescentic, not triangular, post-tergite, and more sparsely punctured lateral areas of the anterior lobe.

### *Dolerus illini* var. *rufilobus* **new variety**

*Male.*—Color black, except for the collar, anterior lobe, and extreme upper corner of meso-pleurae, which are rufous. In other respects precisely as in the typical form of the species.

*Holotype.*—♂, Brookings, South Dakota. In the collection of the Illinois State Natural History Survey, Urbana, Ill.

Known only from the type. This variety can be separated from the males of all other species of the genus by its color. It is a male which apparently has assumed the same coloration as the female.

### *Dolerus tectus* MacGillivray

*Dolerus tectus* MacGillivray, Can. Ent., Vol. XLVI, No. 3, Mar., 1914, p. 104; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 70; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244.

*Female.*—Length 9 to 10 mm. Color entirely black. Wings uniformly faintly tawny.

Structurally extremely similar to *illini*, differing as follows: punctuation of head slightly coarser, postocular area a trifle more convex; post-tergite polished, crescentic, posterior margin circularly rounded, median length small, dorsal surface convex, but not approaching carinate; sheath (Figure 17) caudo-ventrally shouldered, not evenly rounded as in *illini*, setae similar to the latter, with a number of longer ones on the caudal margin; saw differs only in having more teeth on the lobes, averaging ten instead of eight.

*Male.*—Length 8.5 to 9.5 mm. Color entirely black, wings slightly tawny.

Structurally similar to male of *illini*, from which it differs as follows: post-tergite crescentic, not triangular, the posterior margin circular, not angular; anterior lobe with punctures on lateral areas more widely separated, and with more punctures on the posterior corner; anterior angles of lateral lobes a trifle shagreened; posterior margin of hypopygium circularly rounded.

*Holotype.*— ♀, New Haven, Connecticut, May 4, 1904, on *Salix* (H. L. Vierick). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Lectoallotype.*—♂, same data as holotype. Labeled as a paratype by MacGillivray but not mentioned in the original description (Frison, 1927). Present designation.

*Distribution.*—♂, ♀, New Haven, Conn., (types); 1 ♀, Chelsea, Mass., April 21; 1 ♀, Ann Arbor, Mich., May 13, 1919 (T. H. Hubbell); 1 ♀, Brookings, S. D.

A rare speces of scattered distribution. It is most closely allied to *illini*, but can be separated from it by characters listed in the description. The sheath, postocular area and pectus, together with the very rotund hind tibiae, will separate it from members of the *sericeus* group, with which it has usually been confused.

## SERICEUS GROUP

Usually large black species; clypeus only moderately cleft, less than one-half its length, the cleft V-shaped, the lobes angular; head below vertex closely reticulate; vertical furrows very deep and distinct, making the postocellar area extremely well set out; third antennal segment almost equal to fourth, but slightly longer, the following segments very gradually diminishing in length; flagellum setaceus, slightly narrowed towards tip. Punctuation of thorax variable; post-tergite usually shining, variable in shape; pectus very distincty set off from pleurae, usually shagreened and punctate, with a distinct diagonal row, pectus more or less concave between

diagonal row and pleurae; hind tibiae distinctly longitudinally grooved on both inner and outer sides; claws with a tooth. Females with a thin, blade-like sheath without a scopa, saws of all the forms very similar. Males with a distinct median procidentia on the posterior margin of the eighth tergite. Genitalia as in Figure 66; praeputium long, angular at base and with finger-like apices; gonocardo very narrow, constricted on the meson; pedes small.

*Dolerus sericeus* Say *sens. lat.*

This species complex presents a multitude of variations in the polish of the vertex, the relative size and numbers of the punctures of the anterior lobe, meso-episternum and pectus, the shape of the post-tergite, in the female the shape of the sheath, and in the male the shape of the procidentia. Some of these variations can be separated into groups which have been considered as species by some authors, but the differences are so variable and so essentially a matter of comparative degree that it is impossible to give a key for the satisfactory treatment of all specimens of the complex. It suggests very strongly a species in the active process of evolution. It is possible to delineate two or three groups, termed subspecies in this paper, which possess fairly constant characteristics, differing from each other in a comparative degree. It is not always possible to assign a specimen to a definite race. Whether these subspecies represent good species, or are all merely variations of the same species, is a matter of conjecture, which will probably be settled only by breeding experiments.

The following is a key to the subspecies of *Dolerus sericeus* Say:

1. Females.....2
–. Males.....5
2. Sheath relatively narrow and pointed, as in Figure 19, dorsal margin convex at tip; sides of anterior lobe with a few large, crater-like punctures; pectus usually with conspicuous scattered punctures..... *sericeus* subsp. *centralis* Ross
–. Sheath wider, dorsal margin straight or concave.....3
3. Sides of anterior lobe more or less uniformly reticulate, not with at least four or five large, crater-like punctures; lateral areas of pectus very opaque, densely shagreened, usually with only very minute punctures..... *sericeus* Say *s. st.*
–. Sides of anterior lobe with at least five or six large crater-like punctures conspicuously larger than the rest.....4
4. Punctures of meso-episternum of medium size; pectus inclined to shining, diagonal row of punctures not conspicuously large or rough, lateral portion not strongly concave, usually only slightly shagreened; smaller, 9 to 11 mm.
..... *sericeus* subsp. *parasericeus* MacG.
–. Punctures of meso-episternum very large and deeply impressed; pectus dull, diagonal row and median punctures conspicuously coarse, with rough walls, lateral portion strongly concave, very densely shagreened; larger, 11 to 12 mm.
..... *sericeus* subsp. *neosericeus* MacG.
5. Pectus dull, entirely shagreened, without any shining areas.....6
–. Pectus slightly shining, sometimes slightly shagreened, but always with a gloss on the lateral areas.....7

6. Sides of anterior lobe and meso-episternum with large, crater-like punctures; pectus with diagonal row of punctures conspicuously coarse, walls rough; procidentia low, round and knob-like, base sometimes carinate..... *sericeus* subsp. *neosericeus* MacG.
–. Sides of anterior lobe evenly reticulately punctured; meso-episternum only moderately coarsely punctured; pectus quite smoothly punctured, diagonal row moderately fine; procidentia inverted trough-like, fairly high, ridge-like for its entire length ..... *sericeus* Say *s. st.*
7. Procidentia one-half length of eighth tergite, carinate for its whole length, dorsal edge slightly depressed near middle..... *sericeus* subsp. *parasericeus* MacG.
–. Procidentia one-quarter length of eighth tergite, small, rounded and drop-like, with a faint indication of a carina at its base..... *sericeus* subsp. *centralis* Ross

### *Dolerus sericeus* Say *sens. st.*

*Dolerus sericeus* Say, Keatings Narrat. Exped. II, 1824, App., p. 320; Leconte, Writ. Thomas Say Entom., II, 1859, p. 214; Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 154; Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 235; Provancher, Nat. Canad., Vol. X, 1878, p. 71; Provancher, Faun. Ent. Can., Hymen., 1883, p. 197; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 17; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 69.

*Dolerus colosericeus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 125; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 70; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 240. *New synonymy.*

*Dolerus monosericeus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 126; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*

*Female.*—Length 10 to 11.5 mm. Color entirely black. Front wings uniformly dark brown, hind wings uniformly a lighter brown.

Head as for group; postocular area as long as eye, seen from above, dull, with reticulate punctures and shagreening on the unpunctured areas, with a low, narrow, transverse carina somewhat obscured by it dense punctuation, posterior margin with a coarse carina; postocellar area quadrate, raised above level of postocular area, more or less shining and punctate. Disk of anterior lobe shining and evenly punctured, sides fairly evenly reticulate with more or less elongate punctures, not round, smaller than in the other species, only occasionally with one or two punctures conspicuously larger than the rest; lateral lobes evenly punctured, shining or more or less shagreened; post-tergite smooth, with or without a rounded median carina, posterior margin more or less triangular; meso-episternum with irregular reticulate punctures, not very large, with a smooth appearance; pectus shagreened, finely and minutely punctured, diagonal row of sparse, small punctures; punctuation of legs very fine and minute. Sheath long and blade-like, much as in Figure 20, but narrower, the dorsal margin straight or very slightly convex (Figure 21), the ventral margin evenly arcuately rounded, scopa lacking; setae in an evenly graduated series, not very long or coarse; cerci short, only about a quarter of dorsal length of sheath.

*Male.*—In size, color and structure similar to female, with the following differences in structure: meso-episternum slightly less roughly reticulate;

hypopygium very convex, long, apex with sides straight and oblique, posterior margin truncate; procidentia tent-like, more or less half length of eighth segment, meson carinate, the top of the ridge straight not concave.

*Neotype.*— ♀, Philadelphia, Pennsylvania, May 10, 1887. In the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Distribution.*—DELAWARE: 1♂, Del. ILLINOIS: 1♂, 1♀, Palos Park, Apr. 24, 1930 (Frison and Ross). INDIANA: 1♀, LaFayette (F, M. Webster). MAINE: 1♂, Orono. MASSACHUSETTS: 5♂♂, 1♀. Chelsea Bay, April 21; 1♂, Amherst, April. 21, 1908. MINNESOTA: 1♀ St. Anthony Pk. MISSOURI: 1♀, "Mo." NEW JERSEY: 2♂♂, N. J. NEW YORK: 3♂♂, 4♀♀, Ithaca, Apr. to May 12; 1♀, Nassau, May 16, 1906; 1♀, Albany, Apr. 15, 1910; 1♂, Staten Island; 1♀, Syracuse, Apr. 20, 1924. PENNSYLVANIA: 3♀♀, Pa. RHODE ISLAND: 1♀, Kingston, Apr. 30, 1905. BRITISH COLUMBIA: 1♂, Vernon, Apr. 25, 1919 (N. W. Ruhmann). ONTARIO: 1♂, Ottawa, Apr. 27, 1921 (J. McDunnough); 1♂, Ottawa, May 17, 1914 (A. E. Kellett); 1♂, Hastings County; 1♀, Sudbury; 1♀, Jordan, Jly. 12, 1920 (W. A. Ross); 1♀, Jordan, Apr. 5, 1915. QUEBEC: 1♂, Lake Opasatika, Jn. 10, 1921 (H. S. Fleming); 1♂, Lake Opasatika, Jn. 1 (J. N. Knull); 1♀, cottage Beaulieu, Jn. 29, 1904.

Judging from its distribution, this is the form studied by Norton (1867). It is also the one referred to by MacGillivray (1916) as his identified specimens show. This is the form of *sericeus* most commonly taken in the eastern states. Its salient characters are: the sides of the anterior lobe fairly uniformly reticular-punctate with at most one or two larger punctures; the post-tergite usually fairly long, flattish and sub-triangular; the pectus dull, densely shagreened, the lateral areas only minutely punctured, the diagonal row not coarse or conspicuously large; the female with the sheath having the ventral margin evenly rounded, the dorsal margin straight or concave, the tip arc-shaped, never truncate (Figure 21), the sides shagreened; the male with the procidentia long and ridge-like, inverted trough-shaped.

### *Dolerus sericeus* subsp. *parasericeus* MacGillivray.

*Dolerus parasericeus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 125; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 69; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244.

*Dolerus polysericeus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 125; MacGillivray, Bull. Conn. Geol. Nat. Hist. Surv., 1916, p. 70; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Female.*—Similar in size and color to *sericeus s. st.* Differs in structure in having six to twelve round, crater-like punctures on sides of anterior lobe conspicuously larger than the rest; meso-episternum with larger, rounder punctures; pectus usually shining, sometimes partly shagreened, the diagonal row distinct, of somewhat scattered, large punctures; post-

tergite variable; sheath resembling the typical form, but slightly more truncate, with the dorsal margin always straight (Figure 20); saw as in *sericeus s. st.* (Figure 46), without annuli.

*Male.*—Similar in structure to female. Procidentia very similar to *sericeus s. st.*, but differs very slightly in having the dorsal ridge slightly depressed near the middle. It differs from the typical form chiefly in the lesser shagreening of the pectus.

*Holotype.*—♀, Ithaca, New York, June 17, 1897. In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, Victoria, British Columbia, April 23, 1919 (W. Downes). Deposited in the Canadian National Museum, Ottawa, Canada. Present designation.

*Distribution.*—NEW YORK: Holotype, Ithaca. BRITISH COLUMBIA: Allotype, Victoria; 1 ♀, Agassiz, Jn. 15, 1926 (H. H. Ross); 2 ♀ ♀, Agassiz, Apr. 26 and 28, 1927 (H. H. Ross); 1 ♀, Agassiz, May 8, 1927 (H. H. Ross).

This form is separated from *sericeus s. st.* and from subsp. *neosericeus* by its shining pectus, and from subsp. *centralis* by the sheath in the female and the procidentia in the male.

*Dolerus sericeus* subsp. *centralis* **new subspecies**

*Female.*—Length 9 to 11 mm. Color entirely black, wings brownish-infuscate.

Structure typical for the group. Head coarsely punctate, postocular area particularly so; postocular area shorter than eye, seen from above, narrowed behind eye, with a transverse carina almost obscured by the large coarse punctures, median portion shining, posterior margin with a carina; vertical furrows very wide and deep; postocellar area quadrate, convex and shining, sparsely punctured. Halves of anterior lobe only moderately convex; sides rugose, usually with a few large punctures, but not as regularly circular as in subsp. *parasericeus*, but much rougher than in the typical *sericeus*; disk and lateral lobes densely, evenly punctured; post-tergite sub-triangular, shining, sometimes faintly striate; meso-episternum rugose-reticulate, punctures uneven; pectus lightly shagreened, glossy but not polished, lateral areas and diagonal row comparatively densely punctate. Sheath narrow (Figure 19), dorsal margin more or less convex, especially at apex, apex biconvexly pointed.

*Male.*—Similar in size, color and structure to female. Procidentia small, round and knob-like, only one-quarter length of eighth tergite.

*Holotype.*—♀, Urbana, Illinois, April 22, 1929 (T. H. Frison). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Allotype.*—♂, Augerville Woods, Urbana, Illinois, April 21, 1920 (T. H. Frison). Deposited with the holotype.

*Paratypes.*—2 ♀ ♀, Augerville Woods, Urbana, Ill., Apr. 29, 1920 (T. H. Frison); 1 ♀, Urbana, Ill., sweeping, Apr. 24, 1924 (T. H. Frison); 1 ♂, Cottonwoods, Urbana, Ill., Apr. 18, 1918; 1 ♀, Oakwood, Ill., May 8, 1920 (T. H. Frison); 1 ♀, Champaign, Ill., May 3, 1912 (T. H. Frison); 1 ♀, White Heath, Ill., Apr. 23, 1917; 3 ♀ ♀, Urbana, Ill., Apr. 29, 1928 (A. R. Park); 1 ♂, Decatur, Ill., May, 1905, frequenting peony buds (Taylor) (34944); 1 ♀, Putnam, Ill., May 5, 1929 (T. H. Frison). Deposited in the collections of Dr. T. H. Frison, the Illinois State Natural History Survey, Mr. A. R. Park and the author.

This subspecies has so far been taken only in Illinois. It differs from *sericeus s. st.* and from subsp. *neosericeus* in the lighter shagreening of the pectus. The female can be distinguished by the narrower and more pointed sheath, and the male can be separated from *sericeus s. st.* and subsp. *parasericeus* by the round procidentia and from subsp. *neosericeus* by the shining pectus and smaller size.

### *Dolerus sericeus* subsp. *neosericeus* MacGillivray

*Dolerus neosericeus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 125; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 69; Frison, Bull. Ill. Nat. Hist. Surv., Vol XVI, Art. IV, Feb., 1927, p. 242.

*Dolerus necosericeus* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, Aug. 13, 1923, p. 13; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242. *New synonymy.*

*Female.*—Length 10.5 to 13 mm. Color black, wings brownish infuscate.

Differs from the typical *sericeus* as follows: postocular area more robust and shining; sides of anterior lobe with several very large, round punctures very conspicuously larger than the others; pleurae with very large, more or less equal punctures, deeply hollowed out; pectus densely shagreened, markedly depressed between the pleurae and the diagonal row, coarsely and unevenly punctured, the diagonal row consisting of large, closely-set punctures; sheath long (Figure 18), somewhat trunctate as in subsp. *parasericeus*, with the dorsal margin slightly convex, the sides shining, not shagreened; the saw almost as in the other forms, but with the teeth twice as large as those in *sericeus s. st.*, subsp. *parasericeus* or subsp. *centralis*.

*Male.*—Similar in size, color and structure to female. Procidentia low, rounded and knob-like at apex, with a low, carinate extension at base.

*Holotype.*—♀, Ithaca, New York. In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, Mt. Washington, Massachusetts, Deposited with the holotype. Present designation.

*Distribution.*—MAINE: 1 ♀, Orono, Jly. 3, 1913. (Type of necosericeus). MASSACHUSETTS: 1 ♂, Mt. Washington; 1 ♀, Green Lodge, Jn. 17, 1905; 1 ♀, Lexington, May. MICHIGAN: 1 ♀, South Haven, Jn. 1, 1891. NEW HAMPSHIRE: 3 ♀ ♀, Jefferson, Jn. 14, 1895; 1 ♀, Fran-

conia. NEW YORK: 1♂, 1♀, Utica; 1♀, Caatskill Mts., Jn. 25, 1904. WISCONSIN: 1♀, Cranmoor, Jn. 6, 1910 (C. W. Hooker). NEW BRUNSWICK: 3♀♀, Bathurst, Jly.6. ONTARIO: 1♀, Bondville, Jn. 26, 1913 (W. A. Ross).

This subspecies is the largest and most coarsely punctured in the group. It is easily recognized in both sexes by the combination of the large punctures on the anterior lobe and pleurae and the densely shagreened pectus with the heavy diagonal row.

## BICOLOR GROUP

Size and color various; mesopleurae usually finely, always evenly, punctate; pectus sparsely punctate, shining or shagreened; posterior tibiae not grooved on outer side, at most grooved very slightly on inner; sheath with a distinct scopa or thickened, truncate caudal margin (except in *nortoni*), the scopa being more definite in the species in which it is narrow, the edge often becoming rounded when it is wide, giving the sheath the appearance of a barrel; male genitalia short and wide (Figure 67); praeputium markedly transversely concave in most specimens, but sometimes scarcely concave at all; gonocardo wider than in *sericeus* or *unicolor*, distinctly clavate laterally; pedes various.

### *Dolerus versa* Norton

*Dolerus versa* Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 239; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 19; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 74; Cresson, Mem. Amer. Ent. Soc., No. 5, 1928, p. 10.

*Female.*—Length 11 to 12 mm. Color: head black; thorax black with the prothorax, tegulae, lateral lobes, upper and upper caudal portion of meso-episternum, dorsal sclerite of meso-epimeron, more or less of the ventral portion of the meso-epimeron, the metapleurae entirely or partly, and the basal plates, rufous; lateral margins of anterior lobe also sometimes rufous; abdomen rufous, except cerci sometimes, sheath and external basal portion of the gonapophyses, which are black. Wings uniformly deeply infuscate with brownish-violaceous, slightly deeper towards base.

Head quadrate seen from above, eyes prominent; corners square, posterior margin uniformly arcuately emarginate; length of postocular area subequal to length of eye, seen from above, with an indistinct carina on posterior margin visible only near mesal portion, and with a low, rounded transverse ridge across the dorsum; vertical furrows very deep and pit-like, separated by a thick wall from posterior margin of head; postocellar area subquadrate, raised slightly; lateral ocelli equidistant from each other and posterior margin of head; vertex shining, with large, sparse punctures; front and lower parts of head quite finely, reticulately punctate; third segment of antennae only slightly longer than fourth, remainder diminishing

very gradually. Mesonotum shining; anterior lobe uniformly convex, disk with shallow, fairly sparse punctures, sides with large, sparse punctures with rounded, polished sides; lateral lobes with sparse, shining punctures; post-tergite shallowly U-shaped, densely striate, opaque, with a sharp median carina ending before the apex, which is almost truncate; meso-episternum very coarsely, but evenly, punctate, the bottom of the punctures shining; pectus faintly shagreened, very sparsely punctate except for a diagonal row of denser punctures. Sheath as in Figure 25, triangular, blade-like and pointed, with a very narrow, distinct scopa; the longer setae pointing almost directly laterad; cerci attaining almost tip of sheath; saw simple, annuli distinct, lones plainly toothed, very rudimentary spurettes present on apical portion (Figure 48).

*Male.*—Length 9 to 10 mm. Color and structure identical with female. Ninth tergite scarcely visible, hypopygium short, apical lateral margins slightly concave, posterior margin sub-truncate.

*Lectotype.*—♀, Massachusetts. In the collection of the Philadelphia Academy of Natural Sciences, Philadelphia, Pa. (Cresson, 1928).

*Distribution.*—MARYLAND: 1♂, Prince George County, Jn. 28; 1♀, Prince George County, Apr., 1896. MISSOURI: 1♂, St. Louis, 1877; 1♀, Mo. NEW JERSEY: 1♂, Lakehurst, April 30, 1916; 1♂, N. J. NEW YORK: 1♀, New York City. OHIO: 1♀, Columbus, Apr. 21, 1920 (A. E. Miller); 4♀♀, Hocking County, May (C. H. Kennedy); 1♀, Jacko County, May, 1926. PENNSYLVANIA: 13♂♂, Highspire, Jn. 17, 1909 (W. S. Fisher); 1♀, Delaware County, Apr. 22, 1894 (C. W. Johnson). DISTRICT OF COLUMBIA: 1♀, D. C., May 5. VIRGINIA: 1♂, Vienna, May 9, 1911; 3♀♀, Falls Church, Apr. 25.

This large species may be confused with *piercei*, but can be readily separated by the darker wings and coarser punctuation of the anterior lobe.

### *Dolerus piercei* Rohwer

*Dolerus Piercei* Rohwer, Can. Ent., Vol. XLI, No. 1, Jan., 1909, p. 10.

*Female.*—Length 8 to 9.5 mm. Head black; thorax rufous with median half of anterior lobe, lateral lobes sometimes, scutellum and post-tergite, metanotum except basal plates, pectus and lower portion of meso-episternum, and legs, black; abdomen rufous wth sheath and cerci black. Wings uniformly light tawny infuscate.

Structure differing from *versa* only in the smaller punctures on the head and thorax, and in the slightly more rounded corners of the head. Punctuation of head almost uniform; punctures of postocular area little larger than those of front, but sparser; transverse ridge lacking. Anterior lobe opaque with punctures, those on disk minute and dense, those on sides rough and dense; pleurae finely and evenly punctate; pectus shining, finely punctate.

Sheath similar to *versa;* saw (Figure 61) similar in outline, but differing in having small, peg-like spurettes and alar spurs.

*Male.*—Unknown.

*Type.*—♀, Lincoln, Nebraska, April 19, 1902, "Immodelle" (W. D. Pierce). In the collection of the University of Nebraska Lincoln, Nebr.

*Distribution.*—KANSAS: 1♀, Douglas Co., Apr., 1923 (R. H. Beamer). NEW JERSEY: 1♀, South Seaville, May 25, 1923 (J. C. Bradley).

This rare species may be distinguished from *versa* by the finer punctuation of the anterior lobe and meso-episternum. The specimens with the lateral lobes rufous may be distinguished from *clypealis, collaris, etc.,* by the black mark on the anterior lobe; the specimens with the lateral lobes black can be distinguished from *clypealis, collaris, etc.,* by the triangular saw with the small, peg-like alar spurs and spurettes.

### *Dolerus clypealis* new species

*Female.*—Length 7.5 to 9.5 mm. Head black, with the clypeus entirely or with the apical half rufous; thorax rufous with the metanotum, except basal plates, pectus and legs except front knees, rufous; sometimes with a black spot on lateral lobes or with scutum black; abdomen rufous with sheath black. Wings almost hyaline, with a very slight yellowish staining.

Head uniformly, finely punctate, except ridge of postocular area which is partly impunctate and shagreened; postocular area robust, corners rounded, seen from above slightly longer than eye, possessing a low, transverse ridge, posterior margin not carinate; posterior margin of head shallowly evenly emarginate; vertical furrows elongate pit-like, reduced to a line at posterior margin; postocellar area one and one-half times as wide as long, slightly raised above level of postocular area; median and ocellar foveae obsolete; third segment of antennae slightly but distinctly constricted just above base, ventral side arcuate, fourth segment narrower at base, gradually widening towards apex, a fourth shorter than third, the remaining segments scarcely diminishing in length. Halves of anterior lobe uniformly convex, disk shining, moderately densely and finely punctate, lateral areas opaque with slightly coarser and much denser punctures; lateral lobes shining, sparsely punctured; post-tergite subtriangular, finely striate, appearing shining when rufous, mesally carinate, posterior margin angulate, extreme tip rounded; pleurae finely reticulately punctate, dull, pectus shining, with many fine punctures; tarsal claws with a small triangular tooth. Sheath as in Figure 25, thin and triangular, apex pointed, the longer setae very divergent; scopa narrowly ellipsoidal, as in *versa;* cerci attaining apex of sheath; saw subtriangular (Figure 49); lance with about 10 segments, the dorsal margin at apex scalloped or broadly serrate; lancet with about 11 segments, ventral margin concave, the lobes coarse and prominent, annuli distinct, with rudimentary spurettes, rudimentary alar spurs sometimes also present; annuli without spines.

*Male.*—Not recognized. Most likely similar to and difficult to separate from that of *collaris, etc.*

*Holotype.*— ♀, Gull Lake, Alberta, Canada, June 25, 1929 (E. H. Strickland). In the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Paratypes.*—Mon. COLORADO: 2 ♀ ♀, Garland; 1 ♀, Westcliff. MONTANA: 5 ♀ ♀, UTAH: 1 ♀, Park City, June 18. ALBERTA: 4 ♀ ♀, Gull Lake, June 8-28, 1929 (E. H. Strickland); 1 ♀, Chin, May 30, 1923 (Walter Carter). NORTHWEST TERR.: 1 ♀, McLeod, June 30, 1902. In the collections of the University of Alberta, the Academy of Natural Sciences of Philadelphia, the U. S. National Museum, the Canadian National Museum, the Illinois State Natural History Survey, and the author.

This species is the only one of its general color known to have a rufous clypeus. In the final analysis, however, the saw is the distinguishing character. It is most apt to be confused with *collaris icterus*, many specimens of which it resembles in the shape of the sheath, but it is easily separated from it and other members of the *bicolor* group by the saw, and from the darker winged forms by the light wings.

### *Dolerus clypealis* var. *nigrilabris* new variety

*Female.*—Structurally identical with the typical form of *clypealis*, differing in color in having the clypeus black, and both the anterior part of the lateral lobes and the mesoscutum black.

*Holotype.*— ♀, Waterton Lakes, Alberta, Canada, July 12, 1923 (J. McDunnough). Deposited in the Canadian National Museum, Ottawa, Can.

*Paratypes.*—2 ♀ ♀, Cheboygan, Cheboygan County, Michigan, May 23, 1923 (S. Moore). In the collections of the University of Michigan and the Illinois State Natural History Survey.

Distinguished from *collaris, piercei, neoagcistus*, etc., by its narrow, pointed sheath and the saw.

### *Dolerus nortoni* new species

*Female.*—Size small, length 7 mm. Head black; rest of body mostly yellow-rufous, except the following parts which are black: mesonotum except anterior lobe, usually anterior half of lateral lobes, posterior portion of lateral lobes and metanotum except basal plates, pectus and ventral portion of meso-episternum, legs and sheath. Tegulae pale. Wings uniformly clouded with deep brownish-black. Some specimens have the tip of the last tergum and the posterior margin of the abdominal segments lightly washed with black.

Head reticular-rugose; eyes prominent; postocular area contracted behind eye, subequal to length of eye seen from above, with a transverse

diagonal ridge, lateral margin without a carina; posterior margin of head circularly emarginate; vertical furrows deep and wedge-shaped, reaching two-thirds of distance to posterior margin; ocelli slightly closer to posterior margin than to each other, sometimes equidistant; postocellar area twice as wide as long, not raised above postocular area; third segment of antennae subequal to or only very slightly longer than fourth, the remainder gradually diminishing in length; the third segment only slightly constricted above base, the fourth almost columnar. Mesonotum shagreened, dull; anterior lobe flatly convex, disk punctured fairly strongly, sides quite roughly; lateral lobes finely punctuate in centre, sparsely with larger punctures on meson; post-tergite obtusely triangular, sharply striate, with a ridge-like median carina; meso-episternum reticulate with large, uniform punctures; pectus densely shagreened, extremely sparsely punctate; tarsal claws with a very small tooth. Sheath (Figure 26) not forming a distinct scopa, the ventral margin pod-like, narrowly pointed, dorsal margin straight, lower margin curved with a suggestion of a shoulder; five or six setae on each side very much longer than the rest, the setae not directed strongly laterad; cerci attaining about half of dorsal length of sheath; saw (Figure 51) similar in shape to that of collaris (Figure 50); alae very narrow, alar spur small, situated midway on annulus; ventral spines pronounced, nearly as long as spur; spurette small and finger-like, not coalescing with ventral margin; lobes fourteen in number, each with two to three teeth, the first one or two straight, the last one remote, finger-like and curved basad; lance with about fourteen annuli, the segments scalloped towards tip.

*Male.*—Length 6.5 mm. Color entirely black. Wings evenly gray infuscate.

Structure similar to female. Punctuation throughout slightly finer. Antennae slightly bi-laterally compressed, more hairy ("prickly") than in *collaris;* hypopygium with more converging sides than *collaris*, much as in *versa*, with the posterior margin slightly rounded. Genitalia as for group.

*Holotype.*—♀, Muncie, Illinois, April 3, 1916. Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Allotype.*—♂, Urbana, Cottonwoods, Illinois, April 6, 1915 (T. H. Frison). Deposited with the holotype.

*Paratypes.*—ILLINOIS: 10♂♂, 12♀♀, Urbana, Apr. 3 to 6, 1915 (T. H. Frison); 4♂♂, 6♀♀, Normal, Aug. 18, 1879 (23); 1♀, Urbana, Apr. 23, 1928 (H. H. Ross); 1♀, Urbana, Apr. 16, 1914; 1♀, Urbana, Apr. 16, 1914, feeding on sap of maples; 2♀♀, Muncie, Apr. 3, 1916; 1♀, Little Wabash R., Carmi, Apr. 15, 1914; 1♂, 4♀♀, Urbana, Apr. 4, 1908. MARYLAND: 1♀, Plummer's Id., April 7, 1915 (R. C. Shannon) MASSACHUSETTS: 1♀, Wollaston, July, 1895 (Sprague). MICHIGAN: 4♂♂, 5♀♀, Ann Arbor, Apr. 3, 1921 (T. H. Hubbell); 1♀, Oakland

County, Apr. 23, 1922 (S. Moore); 1 ♀, Ann Arbor, May 6, 1893. NEW YORK: 6 ♀ ♀, Ithaca, Apr. 12 to 26, 1890 to 1913; 1 ♀, Ithaca. ONTARIO: 1 ♀, Ottawa, Apr. 28, 1900. Deposited in a large number of collections.

Easily separated from most specimens of other species of the same color by its small size and the absence of a scopa. In some cases, however, specimens of *nortoni* possess a suggestion of a scopa, in which case it is necessary to exsert the saw, which is distinctly characterized by the finger-like teeth of the ventral lobes.

### *Dolerus nortoni* var. *nigritella* **new variety**

*Female.*—Size 7 mm. Head black, thorax black with the prothorax, anterior lobe and tegulae rufous, abdomen black. Wings brownish-black as in the typical form. Structurally identical with the typical *nortoni*.

*Holotype.*— ♀, Ithaca, New York, April 28, 1897. In the collection of Cornell University, Ithaca, N. Y.

Known only from the type. Distinguished from *collaris* and *bicolor lesticus*, with which it might be confused, by its small size, lack of a scopa at the apex of the sheath, and the finger-like projections on the ventral lobes of the saw.

### *Dolerus collaris* Say

*Dolerus collaris* Say, West. Quart. Rep. Cincinnati, Vol. II, 1823, p. 720; Leconte, Writ. Thomas Say Entom., Vol. II, 1859, p. 163; Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 152; Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 236; Provancher, Nat. Canad., Vol. X, 1878, p. 71; Provancher, Faun. Ent. Can., Hymen., 1883, p. 197; Riley and Marlatt, Insect Life, Vol. IV, 1891, p. 173; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 4; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 73.

*Female.*—Length 7 to 10 mm. Color entirely black, with the prothorax, tegulae, anterior lobe, and paraptera, rufous. Wings uniformly light brown infuscate.

Structure, except genitalia, almost identical with *clypealis*, with the following differences, due in most cases to individual variation: postocular area either rotund or shrunken behind eye; mesonotum either not at all, slightly or almost entirely dull and shagreened; pectus densely or lightly shagreened; tarsal claws with a small tooth, similar to *clypealis*.

Sheath as in Figures 27 and 28; wide, but not very thick, scopa wider than in *clypealis*, the ventro-caudal margin more convex; the series of long setae very numerous, projecting almost directly caudad; cerci almost attaining tip of sheath. Saw ovate-ellipsoid; lance with about 18 segments, dorsal margin only finely serrate; lancet with about 16 segments, ventral margin convex, lobes not so notch-like as in *clypealis*, annuli distinct, with short, sparse spines, spurettes small but distinct; no other lateral armature.

*Male.*—Length 6 to 7 mm. Color entirely black. Wings uniform light brown infuscate.

Punctuation of head as in female; postocular area subequal to or slightly longer than eye, seen from above, with a pronounced transverse ridge; third antennal segment a very little longer than fourth, fourth and fifth subequal, the remainder subequal but shorter than fourth, these proportions subject to slight variation; flagellum columnar, slightly bi-laterally compressed, especially at base. Halves of anterior lobe very convex, subglobose; punctuation of mesonotum as in female; pleurae finely, granularly punctate, pectus almost impunctate, entirely or mostly shagreened. Sternites three to six usually four times wider than long, taking curved width; ninth tergite minute, merely a narrow disk visible; hypopygium short, sides of apex almost straight, converging, apex truncate. Genitalia as for group.

*Typic locality.*—Missouri.

*Neotype.*—♀, Ames, Iowa, April 21, 1896. Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Allotype.*—♂, Sherman, Illinois, April 3, 1930 (Frison and Ross). Taken in copulation with female. Deposited with neotype.

*Distribution.*—COLORADO: 1♀, Westcliff; 1♀, Ft. Collins, Oct., 1900; 1♀, Col. CONNECTICUT: 1♀, Hartford; 1♀, Conn. IOWA: 2♀♀, Ames, April; 1♂, 2♀♀, Ames, Apr. and May, 1926 (G. Hendrickson). MAINE: 3♀♀, Orono, April and May. MASSACHUSETTS: 1♀, Wellesley, April; 1♀, Mass., 1♀, Amherst, May 6, 1918. ILLINOIS: 1♀, Mahomet, Apr. 3, 1929 (Frison and Park); 1♀, Normal, Apr. 18, 1879; many ♂♂, ♀♀, Sherman, Apr. 3, 3♀♀, Seymour, Apr. 10 and 1♀, Palos Park, Apr. 24, 1930 (Frison and Ross). MICHIGAN: 4♀♀, Washtenaw County, April, 1919 to 1921 (T. H. Hubbell). MINNESOTA: 1♀, Ft. Snelling, Jn. 6, 1922, flood plain woods (A. A. Nichol). MONTANA: 9♂♂, 14♀♀, Mon. NEBRASKA: 9♀♀, Lincoln, Holt County and West Point, April (Bruner, Dawson and Gabie). NEW JERSEY: 1♀, Manumuskin, May 2, 1909. NEW YORK: 1♀, Karner, Apr. 13, 1903; Clinton Hts., Apr. 9, 1903; 1♀, Ithaca, Apr. 18, 1896 (On Equisetum) 1♀, Fulton, 1♀, Ithaca, Apr. 26, 1896. PENNSYLVANIA: 1♀, Philadelphia, Apr. 14, 1897; 1♀, Castle Rock, Apr. 16, 1911. SOUTH DAKOTA: 2♀♀, S. D. ALBERTA: 2♀♀, Edmonton, Apr. 2, 1924 (O. Bryant). MANITOBA: 3♂♂, 3♀♀, Birtle, Apr. 24 to May 11 (R. D. Bird); 3♂♂, 2♀♀, Aweme, Apr. 24 to May 7 (E. and N. Criddle); 1♀, Winnepeg, Apr. 30, 1915 (J. B. Wallis). SASKATCHEWAN: 5♀♀, Oxbow.

This species is easily confused with *bicolor lesticus* from which it can usually be separated by the narrowed scopa of the sheath. The only safe criterion, however, is the shape of the saw.

The female varies in color from being entirely black to the extreme yellowish-rufous condition described in *collaris icterus*. The genitalia of the females remain constant throughout the series, and the males apparently are always black. From this series only four phases have been given varietal names. It would be possible to assign many more to intermediate stages between them but it seems too hair-splitting to do so. These remarks are also true of *bicolor*.

Some authors have considered a British species described by Donovan (1808) as *Tenthredo collaris* to belong to the genus Dolerus. Stephens (1829), Dalla Torre (1894) and Konow (1905) all express this view. If this were true, Say's name *collaris* would be preoccupied, and a new name for it would have to be chosen. An examination of the original description of *Tenthredo collaris* Donovan shows that it possesses three closed submarginal cells, which excludes it from Dolerus. A careful comparison suggests very strongly that Donovan's species is *Mesoneura opaca* (Fabricius), with which it agrees in wing venation and color, and which synonymy Donovan himself suggests in the original description of *collaris*. This treatment allows Say's *collaris* to stand undisputed in the genus Dolerus.

### *Dolerus collaris* var. *erebus* new variety

*Female.*—Structurally similar to the typical *collaris*. Differs in color in being entirely black, or with only faint spots of reddish on the median or ventro-lateral portions of the collar.

*Holotype.*— ♀, Sherman, Illinois, April 3, 1930 (Frison and Ross). In the collection of the Illinois State Natural History Survey, Urbana, Ill.

Paratypes.—ILLINOIS: 1 ♀, Algonquin, Apr. 26, 1894; 1 ♀, Leroy, Apr. 3, 1907 (Kelly) (38589); 1 ♀, Leroy, May 27, 1907 (Kelly) (38556); 1 ♀, Havana, sand ridges, Jn. 17, 1894 (Hart) (20212); 4 ♀ ♀, Rantoul, Mar. 23, 1930 (H. H. Ross); and 10 ♀ ♀, Seymour, 54 ♀ ♀, Lincoln and 230 ♀ ♀, Sherman, all collected on Apr. 3, 1930 by Frison and Ross. IOWA: 1 ♀, Ames, Apr. 26, 1926 (G. Hendrickson). MINNESOTA: 1 ♀, Ft. Snelling, Apr. 20, 1922 (A. A. Nichol) NEBRASKA: 1 ♀, West Point, Apr. 18 (L. Bruner). SOUTH DAKOTA: 1 ♀. In the collections of the Illinois State Natural History Survey, the University of Minnesota, the University of Nebraska, the South Dakota State College, and the author.

Distinguished from *bicolor*, *nigrita* and *idahoensis* by the shape of the saw and its lack of lateral armature.

### *Dolerus collaris* var. *maculicollis* (Norton)

*Dosytheus maculicollis* Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 153.
*Dolerus maculicollis* Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 238; Cresson, Mem. Amer. Ent. Soc., No. 5, 1928, p. 7.

*Female.*—Similar in size and structure to the typical form. Differs in color as follows: head black, thorax rufous with lateral lobes (except a posterior rufous spot), metanotum, including more or less of basal plates, pectus, more or less of lower portions of pleurae, and legs, black. Abdomen with venter black, and sides and most of tergum rufous. Wings brown infuscate.

*Holotype.*—♀, Brooklyn, New York. In the collection of the Philadelphia Academy of Natural Sciences, Philadelphia, Pa.

*Distribution.*—COLORADO: 2♀♀, Col. MONTANA: 33♀♀, Mon. WISCONSIN: 1♀, Cranmoor, Apr. 19, 1908. ALBERTA: 1♀, Calgary, Apr. 21, 1912 (N. Criddle). MANITOBA: 1♀, Aweme, May 10, 1912 (N. Criddle); 1♀, Birtle, May 15, 1928 (R. D. Bird). QUEBEC: 1♀, Opasatika, Jn. 1 (J. N. Knull). SASKATCHEWAN: 1♀, Ogema, Jn. 16, 1916 (N. Criddle); 3♀♀, Oxbow, Jn. 11, 1907 (F. K. Knab).

### *Dolerus collaris* var. *icterus* MacGillivray

*Dolerus icterus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 127; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 71; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241.

*Female.*—Similar in size and structure to the typical form, differing as follows: head black; thorax rufous with lateral lobes, pectus and legs black; abdomen entirely rufous except sheath, which is black. Wings brown infuscate.

*Holotype.*—♀, Saranac Inn., New York, June 26, 1900 (J. G. Needham). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—COLORADO: 1♀, Col. KANSAS: 1♀, Douglas County (Beamer). MASSACHUSETTS: 1♀, Amherst, May 21, 1904. MINNESOTA: 1♀, Hennepin County, June; 1♀, Ramsey County, May 9, 1920; 1♀, Newport, May 12, 1922 (C. E. Mickel); 1♀, Fort Snelling, Apr. 29, 1922, in low prarie grass (A. A. Nichol). NEBRASKA: 1♀, Holt County, 6♀♀, Lincoln, Apr. 11, 1908 (Gable and Dawson). NEW JERSEY: 1♀, Ramsey, May 4, 1917. NEW YORK: 1♀, Nassau, May 3, 1914; 1♀, Ithaca, Apr. 16, 1897. WISCONSIN: 1♀, Cranmoor, Jn. 15. 1908 (C. B. Hardenberg). BRITISH COLUMBIA: 1♀, Prince Rupert, Apr. 23, 1923 (W. B. Anderson). ONTARIO: 1♀, Ottawa, May 5, 1923 (C. H. Curran). QUEBEC: 1♀, Levis (T. W. Fyles); 1♀, Brome County, Jly. 25, 1916 (A. F. Winn). SASKATCHEWAN: 4♀♀, Oxbow, Jn. 17, 1907 (F. K. Knab).

These last two color phases are most likely to be confused with *clypealis nigrilabris* and *bicolor*, from which they may be told by the regular and simple condition of the saw.

### *Dolerus neoagcistus* MacGillivray

*Dolerus neoagcistus* MacGillivray, Bull. Brooklyn Ent. Soc., Vol. XVIII, No. 2, April, 1923, p. 55; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242.

*Dolerus neostugnus* MacGillivray, Bull. Brooklyn Ent. Soc., Vol. XVIII, No. 2, April, 1923, p. 55; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242. *New synonymy.*

*Female.*—Length 6 to 9 mm. Head black; remainder of body rufous except the following parts which are black: lateral lobes, meso-scutum, metanotum except basal plates, pectus, legs and sheath. Wings uniformly brown infuscate.

Structure, except genitalia, almost identical with *collaris*, with the following slight differences: head always narrower behind eyes; postocellar area slightly raised above level of postocular area, very slightly wider than in *collaris;* anterior lobe flatter, not so strongly convex; tooth of tarsal claws small.

Sheath (Figure 30) with a wide, diamond-shaped scopa, very truncate, margins sharply defined, oblique from lateral view; cerci attaining tip of sheath. Saw as in Figure 52, lance similar to Figure 55; lancet with distinct alae and alar spurs, small in size, situated distant from ventral margin; spurettes well developed, separate only on the four or five apical segments, then gradually fusing with the lobes, appearing at the base as another tooth of the lobe; lobes with from two to five teeth.

*Male.*—Not yet definitely associated, but undoubtedly a totally black form inseparable as yet from the male of *collaris*, *bicolor*, *etc.*

*Holotype.*—♀, Southfields, New York, May 3, 1914 (F. M. Schott). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—Specimens have been examined from the following localities: CONNECTICUT: Hartford. D. C.: Washington. "Del." "Ga." ILLINOIS: Urbana, Dubois, Normal, Danville, Mahomet, Champaign, Centralia, Clinton, Leroy, Bloomington, Chebanse and Thomasboro. INDIANA: Lafayette. KANSAS: Douglas County and Lawrence. MAINE: Orono. MASSACHUSETTS: Cab. John Br., West Springfield, Arlington and Taunton. MICHIGAN: Livingston County. "Min." MISSISSIPPI: Ag. Coll. MISSOURI: St. Louis and Mexico. NEBRASKA: Lincoln. NEW JERSEY: Westville. NEW YORK: Van Cortlandt, New York City, Ithaca, Poughkeepsie, Staten Island, Albany, Normanskill and Sea Cliff. OHIO: Columbus. PENNSYLVANIA: Castle Rock, Edge Hill, Tinicum Island and Ashbourne. VIRGINIA: Roslyn, Great Falls and Falls Church. ONTARIO: Ottawa and Jordan.

Under the 1929 conditions at Urbana, Ill., this species was taken in its greatest abundance towards the end of March when *unicolor* was also at its height, and was taken best in areas of dry grassland, the females of *neoagcistus* coming to the flowering trees at the edge of the meadows. It was also taken intermittently throughout the early spring season at the other habitats studied, but never in abundance. All the records from other localities have been taken in March, April and May, mostly during the latter part of March and the early part of April.

This species is most closely related to *collaris icterus* and *bicolor*, from which it can only be distinguished by the teeth of the saw and the shape of the lateral armature. In a large series the small tarsal claw and the more or less angular lateral edges of the sheath will serve to distinguish if from others of its color, but these characters do not always hold good. The saw is the only reliable character.

### *Dolerus bicolor* (Beauvois)

*Tenthredo bicolor* Beauvois, Insect. Afr. et Amer., 1805, p. 96.

*Dolerus bicolor* Lepeletier, Monogr. Tenthred., 1823, p. 122; Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 238; Provancher, Nat. Canad., Vol. X, 1878, p. 72; Provancher, Faun. Ent. Canad., Hymen., 1883, p. 198; Forbes, 14th. Rep. State Ent. f. 1884, 1885, p. 100; Packard, Rep. U. S. Ent. Commiss., No. V, 1890, p. 588; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 3; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 72.

*Dosytheus bicolor* Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 153.

*Female.*—Length 7 to 9 mm. Head black; thorax rufous with the following parts black: lateral lobes, sometimes scutum and metanotum in part, pectus and legs; abdomen rufous except sheath. Wings uniformly brown infuscate.

Structure, except genitalia, similar to and practically indistinguishable from *collaris*, differing only in having the punctures on the anterior lobe a trifle coarser.

Sheath as in Figures 29 and 31; margins often bevelled and rounded, scopa quite wide, limits more indistinct than in *neoagcistus*, sheath appearing more tube-like, narrower in side-view than *collaris*, with the dorsal margin more or less convex. Saw as in Figure 53, the alae and spurs wider and larger than in *neoagcistus*, closer to the ventral margin, the spurettes more completely fused with the lobes, which are usually less distinctly toothed.

*Male.*—What are tentatively considered as the males of this species, using coincidental collecting data as criteria of association, are inseparable, either by color or structure, from the males of *collaris*, *etc.*

*Typic Locality.*—"Etats-Unis d'Amerique."

*Neotype.*—♀, Riverton, New Jersey, May 1, 1898. In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—CONNECTICUT: 1♀, Lyme, May 6 (Greene). KANSAS: 1♀, Lawrence, Apr. 24, 1923 (W. G. Garlick). MICHIGAN: 1♀, Cavanah Lake, May 24, 1919 (T. H. Hubbell); 1♀, Battle Creek. NEBRASKA: 3♀♀, Holt County, Apr. 26, 1909 (L. Bruner). NEW YORK: 1♀, Nassau, May 16, 1906; 1♀, Poestenkill, May 6, 1927, 1♀, Stephentown, Apr. 3, 1927; 1♀, Ithaca, Apr. 26, 1896. VIRGINIA: 1♀, Vienna, Apr. 25, 1911 (R. A. Cushman). ILLINOIS: 2♀♀, "Ill.," April; 1♀, DeKalb, May 13, 1930 (Frison and Ross).

This species can be separated from others of the same color, such as

*collaris, neoagcistus* and *clypealis nigrilabris*, only on the basis of the saw, in particular the long and fairly wide alae.

### *Dolerus bicolor* var. *lesticus* MacGillivray

*Dolerus lesticus* MacGillivray, Can. Ent., Vol. XLVI, No. 3, Mar., 1914, p. 105; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241.

*Dolerus graenicheri* MacGillivray, Can. Ent., Vol. XLVI, No. 3, Mar., 1914, p. 107; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*

*Female.*—In size and structure identical with the typical form of the species. Differs only in color, being entirely black except for the collar and anterior lobe, which are rufous.

Type.—♀, Durham, New Hampshire, 2435 (Weed and Fiske). Hampton, New Hampshire, May 1, 1904 (S. A. Shaw). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Lectoallotype.*—♂, same data, (Frison, 1927).

*Distribution.*—MASSACHUSETTS: 1♀, Holyoke, Apr. 12, 1903; 1♀, Wellesley, April. MICHIGAN: 1♀, Ann Arbor, Apr. 11, 1917. MISSOURI: 1♀, C. Mo., (C. V. Riley). NEBRASKA: 1♀, Holt County; 4♀♀, West Pt., April 14 (L. Bruner). NEW YORK: 1♀, Ithaca, May. WISCONSIN: 2♀♀, Cranmoor, May 2, 1908. MANITOBA: 1♀, Birtle, May 11, 1928 (R. D. Bird). ONTARIO: 2♀♀, Ottawa, Apr. 27, 1921 (J. McDunnough); 1♀, Ottawa, Jly. 14. QUEBEC: 3♀♀, Montreal, Apr. 16 to May 14, (J. W. Buckle).

Separated from *collaris* by the shape of the alae, and from *nortoni nigritella* by the sheath and saw.

### *Dolerus bicolor* var. *nigrita* **new variety**

*Female.*—Similar in size and structure to the typical *bicolor*. Differs in color in having the body entirely black, except sometimes a small portion of the collar which may be reddish.

*Holotype.*—♀, Algonquin, Illinois (Nason). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Paratypes.*—1♀, same data as holotype; 1♀, Ames, Iowa, April 26, 1926 (G. Hendrickson); 1♀, Gray's Lake, Illinois, April 23, 1930 (Frison and Ross). In the collections of the Illinois State Natural History Survey and the author.

Most similar to *collaris erebus* and *idahoensis*, but is readily separated by the shape of the saw.

### *Dolerus agcistus* MacGillivray

*Dolerus agcistus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 129; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 73; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 240.

*Female.*—Length 8 to 10 mm. Head black; thorax rufous except the following parts which are usually black; lateral lobes, scutum, metanotum except basal plates, pectus and legs, sometimes also a median triangular area on anterior lobe, and sometimes all the pleurae except the sutures which are always rufous; abdomen rufous except sheath which is black, and cerci which are sometimes black. Scutum apparently always black. Wings light brown infuscate, lighter than in *collaris* or *bicolor.*

Structure, except genitalia, as in *collaris.* Postocular area always robust; pectus sometimes shining, not shagreened. Some of tarsal claws with a large tooth, sometimes almost as large as outer hook (Figure 13.)

Sheath large, truncate and barrel-like (Figure 32), scopa wide, margins usually rounded; cerci attaining apex of sheath; lance as in Figure 56, very little serrate; lancet as in Figure 54; alae very greatly developed, especially in the middle region, alar spurs blunt; spurettes also large, blunt and distinct; lobes coarsely toothed three or four times.

*Male.*—Length 7 to 8.5 mm. Color entirely black, wings very lightly brown infuscate.

Structure identical with the males of *collaris* and *bicolor;* usually with the pectus shining, not shagreened and with the hind femora more coarsely punctate. Genitalia typical for group.

*Type.*— ♀, Lake Forest, Illinois (J. G. Needham). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, Seymour, Illinois, April 14, 1929 (Park and Ross). In the collection of the Illinois State Natural History Survey, Urbana, Ill. Present designation.

*Distribution.*—COLORADO: 4 ♀ ♀, Col. CONNECTICUT: Millford. ILLINOIS: Lake Forest, Algonquin, Summit, Champaign, Onargo, Paxton, Rantoul, Ashkum, Ludlow, Thomasboro, Chebanse, Snyder, St. Joseph, Urbana, Woodyard, Seymour, White Heath, Chicago. INDIANA: East Gary. KANSAS: St. Johns, Grove County, Douglas County, Wallace County, Riley County, Manhattan, Lawrence. LONG IS.: 3 ♀ ♀, L. I. MAINE: Orono. MASSACHUSETTS: Cambridge, Chicopee, West Springfield. MICHIGAN: Douglas Lake. MINNESOTA: Wadena. MONTANA: 2 ♀ ♀, Mon. NEBRASKA: Ashland County, Holt County, West Point, Lincoln. NEW JERSEY: Snake Hill. NEW YORK: Utica, Richfield Springs, Lahaway Ocean County, Staten Island, Pike. OHIO: Columbus. VIRGINIA: Potomac Creek. WYOMING: Lander. MANITOBA: Husavick, Winnepeg.

In the 1929 collecting campaign around Urbana, this species was found to be at its greatest abundance in the Equisetum-Carex communities along the railroads (Figure 72) during April, appearing with *aprilis* and *illini* in the first peak of the abundance of members of this genus in this type of habitat. The dates accompanying the other distribution records are of

a more scattered nature, ranging from April to July, mostly April and May.

This species can usually be distinguished from *collaris icterus*, *bicolor* and *neoagcistus* by its larger size, coarser tooth of the tarsal claws, and wide barrel-shaped sheath. Small specimens, however, cannot be separated from these without the exertion of the saw, which is immediately characterized by the wide and spreading alae. The species can be separated from similarly colored specimens of *piercei* by the robust sheath.

### *Dolerus agcistus* var. *maroa* **new variety**

*Female.*—Structurally identical with the typical *agcistus*. Differs in color in having more black on the thorax. Head black; thorax black except first parapterum which is rufous; abdomen beyond basal plates rufous with sheath and its basal sclerites black. Wings lightly infuscate as in *agcistus*.

*Holotype.*— ♀, Elkhart, Illinois, May 3, 1930 (Frison and Ross). In the collection of the Illinois State Natural History Survey.

Known only from the holotype. This form most resembles *abdominalis*, but differs in having the sclerites at the base of the sheath black, in having the pleurae more finely punctured, and in the more opaque appearance of the head and thorax.

### *Dolerus distinctus* Norton

*Dolerus distinctus* Norton, Trans. Amer. Ent. Soc., Vol. IV, 1872, p. 82; Cresson, *ibid.*, Vol. VIII, 1880, p. 39; Cresson, Mem. Amer. Ent. Soc., No. 5, 1928, p. 5.

*Female.*—Length 10 mm. Head black; thorax black, with the prothorax, anterior lobe, metapleurae and sutures of mesopleurae, rufous; abdomen with dorsum rufous except first tergite and apex of other tergites which are black, and venter and sheath which are black. Wings brownish infuscate.

Structure identical with *agcistus*, but the scopa of the sheath is distinctly margined (Figure 32) and the spurettes are a little more distinct.

*Male.*—Unknown, but undoubtedly similar to that of *agcistus*.

*Type.*— ♀, San Francisco, California (H. Edwards). In the collection of the Philadephia Academy of Natural Sciences, Philadelphia, Pa.

*Distribution.*—Only one other specimen besides the type has been examined, namely, 1 ♀, Corvallis, Oregon, June 8, 1892.

This species is separated from others of the same color, *collaris maculicollis* and possibly some specimens of *bicolor*, by its large size and wide alae of the saw. It is separated from *atcistus* by the black venter and more distinctly margined sheath. It is quite possible that this species and *agcistus* are merely color phases of the same species, but a series of 130 females taken in the vicinity of Urbana, and another of 23 females taken

at Douglas Lake, Michigan, by C. H. Kennedy, shows no indication of *agcistus* having variants with a black venter, so that the two are kept distinct. Should they prove the same, *agcistus* will become a race or subspecies of *distinctus*.

### *Dolerus moramus* new species

*Male.*—Length 8 mm. Head black; thorax black with the prothorax, anterior lobe, tegulae, dorsal margin or all of meso-episternum, and all of meso-epimeron, and metapleurae, rufous; abdomen entirely rufous, except cerci which are black. Wings uniformly brownish infuscate.

Head densely punctate below vertex; postocular area slightly shorter than eye, seen from above, rubust but not extending as far laterad as the eye, the corner rounded, the posterior margin without a carina, shining and with larger but sparser punctures than other parts of head; posterior margin of head evenly concave, but not deeply so; vertical furrows deep and trench-like, separated from posterior margin by a thick wall; postocellar area subquadrate, elevated above level of rest of vertex; lateral ocelli equidistant from each other and posterior margin of head; flagellum subcylindrical, columnar, first segment slightly longer than second, rest gradually decreasing in length. Disk of anterior lobe shagreened, sparsely punctate, lateral areas closely but finely punctate; lateral lobes shining, sparsely punctured; post-tergite subtriangular, the apex rounded, the latero-basal portions striate, the remainder usually shining, median carina rounded and indistinct; meso-episternum reticulately, evenly punctured, punctures intermediate in size between *agcistus* and *eurybis;* pectus more or less shagreened, moderately closely punctured; tarsal claws with a small tooth. Hypopygium short and broad, sides of apex very oblique, apical margin truncate. Genitalia as for group.

*Female.*—Length 9 mm. Head black; thorax rufous except the following parts which are black: lateral lobes, scutum, metanotum, pectus, and legs; abdomen rufous except sheath and cerci which are black. Wings deep brownish-purple infuscate shading near apex to lighter brownish.

Structure, including sheath and saw, identical with *agcistus*.

*Holotype.*—♂, Algonquin, Illinois, May 28, 1909 (Nason). In the collection of the Illinois State Natural History Survey, Urbana, Illinois.

*Allotype.*—♀, Fox Lake, Illinois, May 15, 1930 (Frison and Ross). Deposited with holotype.

*Paratypes.*—ILLINOIS: 1♂, Algonquin, May 20, 1909 (Nason). COLORADO: 4♂♂, "Col.," Baker Collection (2181). MINNESOTA: 2♂♂, Hennepin County. NEW YORK: 1♂, Ithaca, April 26, 1896; 1♂, Ithaca, May 16, 1897. In the collections of the Illinois State Natural History Survey, Cornell University, the University of Minnesota, the U. S. National Museum and the author.

The male of this species can be distinguished from all other males of the genus by the color pattern of rufous and black on the mesonotum together with the entirely rufous abdomen. The female is closest to *D. agcistus* from which it can be separated by the darker wings. The association of these two sexes is made largely on conjecture and may prove to be erroneous.

### *Dolerus idahoensis* new species

*Female.*—Length 7.5 mm. Color entirely black. Wings very faintly brownish infuscate.

Structure, except genitalia, identical with *collaris* and *agcistus*, genitalia identical with the latter. Postocular area robust, with a very low transverse ridge, no carina along posterior margin, the median portion of the ridge practically impunctate, and shagreened; postocellar area subquadrate, slightly raised above level of postocular area; third antennal segment much longer than fourth, distinctly narrower in middle. Anterior lobe almost uniformly convex, disk shining, sides densely punctured; lateral lobes shining, sparsely punctate; post-tergite subtriangular, distinctly striate, with a sharp median carina; meso-episternum more or less smoothly reticulately punctate; pectus fairly densely punctate, shining.

Sheath with edges of scopa very rounded, stout as in *agcistus* (Figure 32), saw as for *agcistus* (Figures 54 and 56).

*Male.*—Unknown.

*Holotype.*— ♀, Moscow, Idaho, May 6, 1912 (J. M. Aldrich). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

Known only from the holotype. Distinguished from *collaris erebus* and *bicolor nigrita* by the saw, and from other species in the group by its black color. It is considered as a distinct species, rather than a color variety of *distinctus*, with which it agrees structurally, because of its small size and the small tooth of the tarsal claws, and because no intergrade has been found between *idahoensis* and *distinctus* or *agcistus*.

### *Dolerus interjectus* new species

*Female.*—Length 6 to 7 mm. Body black, except abdomen which is yellowish-rufous, with the two apical segments entirely or clouded with black. Wings hyaline.

In structure very similar to *collaris*. Head and thorax with white pubescence denser than any other member of group. Head densely punctate except centre of postocular area which is sparsely punctate and shagreened; postocular area as long as eye, seen from above, robust, with a

transverse ridge; scarcely narrowed behind, corners rounded, posterior area slightly wider than long, coarsely punctate, raised a little above postocular area; posterior margin of head evenly concave; lateral ocelli equidistant from each other and posterior margin of head; third segment of antennae distinctly longer than fourth, distinctly constricted just before middle, remaining segments columnar and more or less equal. Disk of anterior lobe shining, sparsely punctured, lateral areas rough, very densely punctured; lateral lobes shining, with sparse, moderately large punctures; post-tergite triangular, apex pointed, distinctly striate, with a sharp median ridge; meso-episternum smoothly but deeply reticulately punctured, the walls of the punctures rounded and smooth; pectus shining, sometimes indistinctly shagreened, finely and sparsely punctured, the diagonal row distinct; tarsal claws with a minute inner tooth. Sheath short and stout (Figure 31), scopa wide and very much rounded; setae abundant, with the usual number of long ones, pointing more caudad than laterad; cerci attaining apex of sheath. Saw as for *agcistus* (Figure 54).

*Male.*—Length 6.5 to 7 mm. Color entirely black except for the three or four basal segments of the abdomen which are rufous. Wings hyaline.

Structure similar to female, with the following differences: antennae columnar, third segment slightly longer than fourth, not constricted, the remaining segments gradually decreasing in length and thickness; pectus usually more or less shagreened; hypopygium and genitalia as for group.

*Holotype.*—♀, Potlatch, Idaho, June 20, 1907 (J. M. Aldrich). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Allotype.*—♂, same data as holotype, and deposited with it.

*Paratypes.*—CALIFORNIA: 3♂♂, Redwood Cañon, Marin County, May 17, 1908. IDAHO: 4♂♂, 1♀, same data as holotype; 1♀, Moscow, June 18, 1895. WASHINGTON: 1♀, Pullman, May 20, 1901; 1♀, Pullman, April; 1♀, Pullman, May 23, 1909 (W. M. Mann); 1♀, Pullman, May 30, 1908. In the collections of the University of Idaho, the State College of Washington, the Illinois State Natural History Survey, the Academy of Natural Sciences of Philadelphia and the author.

This species is readily distinguished from all other species of the *bicolor* group by having the metapleurae black and the abdomen entirely rufous except sometimes the apex. It differs from *abdominalis*, which it most closely resembles in color, by its small size and more finely punctured pleurae. It differs from the members of the *similis* group which it resembles in color by its finely and evenly punctate pleurae, its distinct sheath, typical of the *bicolor* group, and its saw. The male can be distinguished from *nativus* by its smaller size, lighter wings, even punctuation of the postocular area, and more truncate hypopygium. From other members of the *bicolor* group it may be separated by its color, and from the *similis* group

by its small size and very fine and even punctuation of the meso-episternum.

### *Dolerus eurybis* new species

*Female.*—Length 8 to 9 mm. Body yellow-orange, with the following parts black: head, lateral lobes, tegulae, pectus, legs and base of sheath. Front wings deeply chocolate-infuscate basad of stigma, apical half hyaline; hind wings similarly infuscate with apical fourth hyaline.

Head below vertex reticulate, vertex more or less shining; postocular area shorter than eye, seen from above, rarely robust, usually narrowed behind eye, corner nearly angular, posterior margin with a slight carina, a broad elevation extending from base of vertical furrow to behind eye, the elevation shining and smooth, sparsely punctate, rarely with a suggestion of shagreening, punctures in the depression behind elevation large; posterior margin of head arcuate, transverse behind postocellar area; the latter slightly wider than long, shining, with sparse punctures, only elevated a little above postocular area; third segment of antennae constricted before middle, distinctly longer than fourth, the remaining segments very gradually decreasing in length. Thorax shining; halves of anterior lobe subcarinate; disk of anterior lobe very minutely punctured; lateral areas more coarsely and densely punctured but nevertheless shining; lateral lobes polished, evenly and minutely punctured; post-tergite triangular, striate, with a sharp median carina; meso-episternum evenly reticulate with large, bowl-like punctures, much larger than in *collaris* or *agcistus*, but not appearing rough; pectus polished, with minute dense punctures, the diagonal row large and distinct; tarsal claw with a very small tooth. Abdomen shining; sheath blunt and barrel-like, with many short black setae at the base of the others, with the characteristic row of long ones; the scopa truncate and wide with rounded sides; cerci projecting beyond sheath; saw as for *agcistus* (Figure 54).

*Male.*—Length 7 to 8 mm. Head black; thorax black except for the meso-epimeron in part and the metapleurae entirely, which are rufous; abdomen entirely rufous. Wings as in female.

Structure similar to female, with the following differences: third segment of antennae cylindrical, not constricted, longer than fourth, the remainder diminishing in length and width; hypopygium squarely truncate, short; genitalia typical for group.

*Holotype.*— ♀, Cherryfield, Maine, August 8. In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, Ottawa, Canada, July 14. In the Canadian National Museum, Ottawa, Canada.

*Paratypes.*—COLORADO: 1 ♀, Col. (Pergande Collection). MICHIGAN: 1 ♀, "Mich." MINNESOTA: Wadena, Jly 4, 1922 (W. E. Hoff-

man). MANITOBA: 1♀, Teulon, Jly 10, 1923 (A. J. Hunter); 1♀, Rosebank, Jly. 14, 1924 (J. B. Wallis). QUEBEC: 6♀♀, Hull, Jly. 28, 1920 (J. McDunnough); 2♀♀, Hull, Jly. 19, 1914 (J. I. Beaulne); 1♀, St. Therese Isl., St. John's County, Jly. 3 (G. Chagnon); 2♀♀, Rigand, Jly. 10, 1899; 1♀, Montreal, Jn. 4, 1899. ONTARIO: 1♂, Ottawa, Aug. 14; 1♂, 2♀♀, Harrington Collection. 1♀, Peabody Academy. Deposited in the collections of the U. S. National Museum, the Canadian National Museum, the University of Minnesota, the Museum of Comparative Zoology, the Illinois State Natural History Survey and the author.

This beautiful species may be readily distinguished in both sexes by the color of the wings, the like of which has not yet been found in any other species of the genus. In addition, the female may be separated from *agcistus* by the rufous scutellum and from *abdominalis* by the rufous on the mesonotum.

### *Dolerus abdominalis* (Norton)

*Dosytheus abdominalis* Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 153.
*Dolerus abdominalis* Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 237; Provancher, Nat. Canad., Vol. X, 1878, p. 71; Provancher, Faun. Entom. Can., Hymen., 1883, p. 197; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 1; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 74.

*Female.*—Length 7.5 mm. Head black; thorax black except sutures of meso-epimeron and the metapleurae entirely, which are rufous; abdomen rufous except sheath which is black. Wings evenly lightly or moderately darkly infuscate.

Structure almost identical with *eurybis*. Differs as follows: punctures of pleurae very large, but not quite as large; scopa of sheath not so distinct, corners more rounded, halves of anterior lobe more flatly convex.

*Male.*—Length 6.5 to 7 mm. Color similar to female.

Structure identical with *collaris*, except some specimens which have the pleurae slightly more coarsely punctate. Hypopygium and genitalia as for group.

This antigeny is based upon color only, for no other criteria, not even of association, are available. What are taken as the two sexes of this species differ in the size of the punctures of the pleurae and the shagreening of the pectus, and the two may represent different species.

*Typic Locality.*—Maine.

*Neotype.*—♀, Mt. Tom, Massachusetts, May 30, 1896. Deposited in the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—GEORGIA: 1♂, Ga. ILLINOIS: 1♀, N. Ill.; 1♀, Algonquin, (Nason). KANSAS: 1♀, St. John's County, July; 1♂, Lawrence, May 5, 1923 (W. G. Garlick). MASSACHUSETTS: 3♂♂, Longmeadow, May 14, 1905; 2♀♀, Mass., May 14,1905; 1♀, Amherst, Jn. 2, 1905; 1♂, Mass. NEW YORK: 1♂, Richfield Springs, May 8, 1887; 1♂, Long

Is.; 4♂♂, Ithaca, Apr. 26, 1896. CONNECTICUT: 2♂♂, Hartford, Apr. 29, 1894. PENNSYLVANIA: 1♂, Delaware County, Apr. 22, 1894.

This species may be separated from all other members of the *bicolor* group by its combination of a red abdomen and a black thorax. From the members of the *similis* group with which it might be confused it differs in the sheath and saw, and in having the metapleurae rufous. The male differs from *eurybis* in having the wings uniformly infuscate, and the mesopleurae with larger punctures.

## SIMILIS GROUP

Posterior margin of postocular area with a distinct carina (except in *elderi*); pectus shining and punctate, often diagonal row of punctures indistinct; pleurae closely punctate; post-tergite mesally carinate, usually striate; sheath without a scopa, setae slender and silky, without a few which stand out conspicuously longer than the rest, as in the *bicolor* group, but with all of them in an evenly graduated series; lancet with highly developed lateral armature; alar spines, alar spur and ventral spines distinct, spurette differentiated at tip, coalescing with ventral margin basally, lobes well set out, dentation much reduced. Male genitalia as in Figure 68, relatively short and wide; praeputium almost truncate at the base, the apices short compared with *sericeus*; gonocardo wide; pedes broad and truncate.

### *Dolerus elderi* Kincaid

*Dolerus elderi* Kincaid, Proc. Wash. Acad. Sc., Vol. II, Nov. 24, 1900, p. 359, ♂, ♀.

*Dolerus cohaesus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 128, ♀; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 72; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 240. *New synonymy.*

*Dolerus nutricius* MacGillivray, Can. Ent., Vol. LV, No. 7, July, 1923, p. 159, ♂; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Loderus acriculus* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, Aug. 13, 1923, p. 20, ♀; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 249. *New synonymy.*

*Dolerus nyctelius* MacGillivray, Jour. N. Y. Ent. Soc., Vol. XXX, No. 4, Dec., 1923, p. 163, ♂; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Dolerus nemorosus* MacGillivray, Jour. N. Y. Ent. Soc., Vol. XXX, No. 4, Dec., 1923, p. 164, ♀; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242. *New synonymy.*

*Female.*—Length 5.5 to 6.5 mm. Head and thorax black: legs black except tibiae which may be almost entirely black or yellowish-rufous with the apices black, and the apices of the anterior femora which are also yellowish-rufous; abdomen rufous with the apical three or four segments black. Wings hyaline, veins light brown.

Head finely reticulate except postocellar area and transverse area of postocular area which are shining; postocular area rotund, with a transverse elevation occuppying almost its whole extent, the elevation shining

and only sparsely punctate, the posterior margin heavily punctured, with a carina on the mesal half, the length of the postocular area equal to eye, seen from above. Small specimens may have the postocular area obliquely narrowed behind eyes. Posterior margin of head arcuate, transverse behind ocelli; vertical furrows wide and deep, nearly reaching posterior margin; postocellar area slightly wider than long, convex, shining, sparsely punctate, scarcely raised above level of postocular area; ocellar basin scarcely distinct in some specimens, reticulate or partially striate, its lateral wall hardly raised, in others very distinct, striate and with linear, well-defined walls; flagellum of almost equal width throughout, third antennal segment distinctly longer than fourth, very slightly constricted near base, but not so much as in the *bicolor* group, remaining segments almost subequal. Mesonotum shining; meson of anterior lobe with fine punctures, edges of disk with large, sparse punctures, lateral areas with dense reticular punctures; lateral lobes polished, finely punctured; both anterior lobe and lateral lobes very convex; post-tergite triangular, striate, with a tent-like median carina, the surface not being excavate on each side of it; meso-episternum with large, round, equal, well separated punctures, the walls between them polished and smooth; pectus polished, almost impunctate, the diagonal row very faintly impressed; tarsal claws very little curved, with a very fine tooth about two-thirds distance from base. Sheath relatively thin, without a scopa (Figure 40), dorsal margin straight, ventro-caudal margin shouldered, setae fine and silky, longest in middle and gradually decreasing in size on either side; cerci almost attaining apex of sheath. Saw as in Figure 57, long and narrow; lance serrate above; lancet with lobes and spurrettes fused, the spurette appearing as the basal tooth of the lobe; lobes irregularly toothed with none to five teeth; alae narrow, with distinct spines; alar spur present; ventral spines present on remnant of annuli below alar spur.

*Male.*—Length 5 to 6.5 mm. Color similar to female, except that the tibiae are usually a little darker.

Structure similar to female, with the following differences: antennae thicker, slightly bilaterally compressed, finely and densely setose; hypopygium slightly longer than wide, apex with sides oblique and posterior margin almost truncate. Genitalia as for group.

*Type.*—♂, Popoff Island, Alaska, July 10, 1899 (T. Kincaid) (Harriman Alaska Expedition). In the U. S. National Museum, Washington, D. C.

*Allotype.*—♀, Kukak Bay, Alaska, July 4, 1899 (T. Kincaid) (Harriman Alaska Expedition). Deposited with holotype.

*Distribution.*—COLORADO; 1♀, Durango, Jly. 8, 1899; 1♂, 2♀♀, Ute. Cr., 9000 ft. Alt., Jly. 4 to 8 (Bruner and Smith); 5♂♂, 3♀♀, Florissant, Jly. 7, 1907; 1♂, 2♀♀, Florissant, Jn. 16, 1907, on *Salix brachycarpae*

(S. A. Rohwer). ILLINOIS: 1♂, 4♀♀, Chicago, Aug. 7 to 20, 1904; 1♂, 1♀, Ill.; 1♀, Osborn, Aug. 12, 1916 (C. S. Spooner); 3♀♀, Garden City, 3♂♂, Waukegan, May 14–15, 1930 (Frison and Ross). INDIANA: 1♂, 4♀♀, Hessville, Jly. 4 to 30, 1906. MICHIGAN: 9♂♂, 3♀♀, Onekama, Jly. 5, 1915; 2♂♂, 1♀, Douglas Lake, Aug. 1928 (C. H. Kennedy); 1♂, Huron County, May 17, 1922. MONTANA: 3♂♂, 1♀, Gallatin County, 6800 ft. alt., June to July; 1♀, Bozeman, Jly. 21, 1913. NEVADA: 1♂, Nev. NEW JERSEY: 1♂, Gt. Piece Midw., May 30, 1919. NEW YORK: many ♂♂ and ♀♀, Ithaca, McLean, Caroline, Albany, Poughkeepsie, Otto, Slingerlands, Yonkers, Keen Valley (Essex County), from May to August. OREGON: 2♀♀, Corvallis, May 13, 1917; 1♂, Union County, Jn. 25, 1922; 8♂♂, 8♀♀, Mt. Hood; 1♀, Hood River. PENNSYLVANIA: 1♂, 1♀, N. E. Pa., Jly. 18, 1916, on *Equisetum* (R. E. Cushman). SOUTH DAKOTA: 1♂, 1♀, Harney Peak, Jly 22, 1924 (H. C. Severin). WASHINGTON: 1♀, Olympia, Aug. 10, 1894 (T. Kincaid). WASHINGTON TERR: 2♀♀, W. T. BRITISH COLUMBIA: 2♂♂, 3♀♀, Revelstoke, Jly., 1905 (J. C. Bradley). ONTARIO: ♂♂ and ♀♀, Ottawa, Brockville, Jordan, Vineland, Pelham, Bonville,from July to September. NEWFOUNDLAND: 3♀♀, Bay of Islands, July to August. QUEBEC: ♂♂ and ♀♀, Montreal, Hull, Almer, St. Hilaire, Montfort, June to August. ALASKA: 1♂, 3♀♀, Popoff Islands, Jly. 9, 10 and 13, 1899 (T. Kincaid); 1♀, Kukak Bay, Jly 4, 1899 (T. Kincaid).

A widely distributed species, occurring throughout the Rocky Mountain region from Alaska southward, and stretching across the continent to the middle Atlantic coast. In the northern mountainous regions the species has more black on the legs, particularly in the males, and in the eastern portion of its range usually has the ocellar basin less punctate and more striate, but neither of these variations seem constant enough to warrant separate subspecific names. The species is characterized by its small size, the type of punctuation of the pleurae, the very convex and shining anterior and lateral lobes, and the sheath and saw. It may be separated from *interjectus*, with which it may be confused, by its coarse punctuation of the pleurae and slender, thin sheath; and from *yukonensis*, its nearest relation, in the type of punctuation of the pleurae and the more convex, less densely punctate postocular area and more convex thoracic lobes. Small specimens of *similis* will have very dense punctuation on the postocular area and anterior lobe, and a more irregular type of punctuation on the pleurae.

*Dolerus elderi* var. *auraneus* **new variety**

*Female.*—Similar in size and structure to the typical *elderi*. Differs in color, having the abdomen entirely rufous or with the last two segments more or less black. Hind tibiae black, middle and front tibiae black, yellow-infuscate on basal third. Wings slightly uniformly dusky.

*Male.*—Similar to the typical *elderi*, sometimes with the wings dusky.

*Holotype.*—♀, Boise, Idaho (J. M. Aldrich). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, same data as holotype. In the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Paratypes.*—IDAHO: 1♂, 6♀♀, Boise (J. M. Aldrich); 1♂, Moscow, July 1, 1909 (J. M. Aldrich); 1♀, Caldwell, July 9, 1926 (C. Wakeland). UTAH: 1♂, Emigrant Canyon, Wascatch Mts., 7000 ft. alt., July 8, 1911 (J. M. Aldrich). NEW MEXICO: 1♀, Fort Wingate, July 28, 1909 (John Woodgate). Deposited in the collections of the University of Idaho, Illinois State Natural History Survey and the author.

Apparently confined to the southern Rocky Mountain region. Differentiated on the same characters as *elderi*.

*Dolerus elderi* var. *rubicanus* **new variety**

*Male and female.*—In size and structure similar to the typical *elderi*. Differs in having all the femora and tibiae entirely reddish yellow. The males may have the base of the femora infuscate.

*Holotype.*—♀, Milaca, Minnesota, June 21, 1917. Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Allotype.*—♂, St. Cloud, Minnesota, June 21, 1917. Deposited with the holotype.

*Paratypes.*—MICHIGAN: 1♀, Gogebie County, July 22, 1919 (T. H. Hubbell). MINNESOTA: 1♂, Milaca, Jn. 21, 1917; 1♀, Rock County, Jn. 24, 1910; 1♂, Ashley, Aug. 28, 1911; 1♀, Calhoun, Jn. 12, 1921 (W. E. Hoffman); 1♀, Rv. nr. Henderson, Sibley County, Jly. 17, 1922 (W. E. Hoffman); 1♀ Rochester, Jn. 13, 1922 (C. E. Mickel). MONTANA: 1♂, Mon. NORTH DAKOTA: 1♀, Turtle Mts., Lake Upsilon, Jly. 14 1919 (C. Thompson). WISCONSIN: 2♀♀, Madison, Sept. 1, 1916 (H. K. Harley). ALBERTA: 1♂, Lethbridge, Aug. 12, 1922 (E. H. Stickland). MANITOBA: 2♀♀, Fork River, Jly. 14, 1926 (E. Criddle); 1♀, Treesbank, Jn. 26, 1926 (R. D. Bird); 2♀♀, Birtle, Jn. 14, 1928 (R. D. Bird); 1♂, Birtle, Jn. 26, 1928 (R. D. Bird). In the collections of the University of Michigan, University of Minnesota, U. S. National Museum, Canadian National Museum, University of Alberta, Illinois State Natural History Survey, Dr. R. D. Bird, and the author.

This interesting variety has so far been taken only in and around the Great Plains. It is distinct among the subgenus Dolerus in having the femora red.

*Dolerus elderi* var. *melanus* **new variety**

*Male and female.*—Similar in size and structure to the typical *elderi*. Differs in color in being entirely black, except sometimes as indistinct fuscous area on the dorsum or basal lateral margins of the abdomen.

*Holotype.*—♀, Saldovia, Alaska, July 21, 1899 (T. Kincaid) (Harriman Alaska Expedition). Deposited in the U. S. National Museum, Washington, D. C.

*Allotype.*—♂, Agassiz, British Columbia, May 8, 1927 (H. H. Ross). Deposited in the Canadian National Museum, Ottawa, Canada.

*Paratypes.*—1 ♀, Sitka, Alaska, June 16, 1899 (T. Kincaid, Harriman Alaska Expedition); 1 ♂, 3 ♀ ♀, Mt. Hood, Oregon; 3 ♀ ♀, Agassiz, B.C., May 8, 1927 (H. H. Ross); 1 ♀, Agassiz, B.C., July 15, 1926 (R. Glendenning); 1 ♀, Agassiz, B.C., May 27, 1917 (A. E. Cameron); 1 ♂, Friday Harbor, Washington, May 29, 1906 (J. M. Aldrich). Deposited in the collections of the U. S. National Museum, the University of Idaho, the Philadelphia Academy of Sciences, the Illinois State Natural History Survey, the Canadian National Museum and the author.

This is a melanic variety occurring in the more humid regions of the Pacific Coast. It may be distinguished from other black species by its small size, robust and shining postocular area (especially noticeable in larger specimens), type of punctuation of the pleurae, and the convex and shining anterior and lateral lobes.

### *Dolerus nasutus* MacGillivray

*Dolerus nasutus* MacGillivray, Can. Ent., Vol. LV, No. 3, Mar., 1923, p. 65; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242.

*Dolerus nugatorius* MacGillivray, Can. Ent., Vol. LV, No. 3, Mar., 1923, p. 66; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

*Dolerus novellus* MacGillivray, Can. Ent., Vol. LV, No. 3, Mar., 1923, p. 67; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

*Female.*—Length 8 to 10 mm. Color entirely black. Head with the area between ocelli and eyes having a bluish reflection. Wings hyaline.

Body with white pubescence longer than usual. Head rough and reticulate except postocellar area and transverse area of postocular area which are shining and sparsely punctured; postocular area subequal in length to eye, seen from above, distinctly narrowed behind eye, with a transverse ridge which is usually shining, the posterior margin rough and carinate; vertical furrows deep and pit-like, half length of postocellar area; the latter wider than long; lateral ocelli equidistant from each other and posterior margin of head; antennae as in *elderi*. Mesonotum shining; halves of anterior lobe sharply convex; disk with sparse punctures, sides with large punctures, sparser posteriorly; lateral lobes and post-tergite as in *elderi*; meso-episternum with large, crater-like punctures, reticulate; borderline between pleurae and pectus definitely marked, sharp; pectus flat and shining, fairly densely punctured, diagonal row indistinct; tarsal claws with a moderately large tooth. Sheath as in Figure 35, shaped as in *elderi*, with a fine carina along the dorso-lateral angle a trifle removed from the dorsal edge at base, but converging into it at apex, as is also true of

*elderi*; setae as in *elderi;* cerci attaining one-half to three-quarters length of sheath. Saw almost identical with that of *elderi*, differing only in having more prominent spurettes (Figure 58).

*Male.*—Similar in size, color and structure to female. Genitalia as for group.

*Type.*—♀, Corvallis, Oregon (Laura Hill). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Lectoallotype.*—♂, Corvallis, Oregon, April 20, 1908 (Laura Hill). Deposited with the type. (Frison, 1927).

*Distribution.*—COLORADO: 1♀, Veta Pass, June 21. IDAHO: 1♀, Kendrick; 1♀, Moscow; 1♂, Moscow Mt., June 3, 1911. MONTANA: 3♀♀, Gallatin County, Apr. 5 to June 11, 1904. NEW MEXICO: 3♂♂, Jemez Springs, May 17 to 31, 1913 (J. Woodgate); 3♂♂, 1♀, Fort Wingate, May 7 to 14, 1908 (J. Woodgate). OREGON: 2♂♂, 1♀, Corvallis, Apr. 20 to June 8; 1♀, Forest Grove, May 12, 1918; 1♀, Springfield; 1♀, Albany. WASHINGTON: 2♂♂, 3♀♀, Pullman, May 20 to 31. BRITISH COLUMBIA: 1♂, Agassiz, May 22, 1922 (R. Glendenning) 1♀, Agassiz, May 27, 1921 (R. Glendenning); 1♂, Hazelton, May 18, 192– (W. B. Anderson); 1♂, Vancouver; 1♂, Vernon, May 2, 1903; 1♂, Chilliwack, May 10, 1927. ALBERTA: 1♀, Banff, June 5, 1922 (C. B. Garrett).

A rare species, distributed through the middle Pacific slope and the southern Rocky Mountains. This species is often confused with *nicaeus* and *elderi melanus*. From *nicaeus* it may be distinguished in the female by the narrower sheath with the lateral carina almost confluent with the dorsal margin, the saw, the meso-episternum having circular and almost equal punctures, the sharper angle of the pectus and pleurae, and the postocular area being flat and lacking a transverse ridge; in the male by the polished pectus, practically impunctate adjacent to the pleurae, the evener and more rugose punctures of the meso-episternum reaching to the very edge of the pectus and forming a marked division between pleurae and pectus, and the more shining lobes of the thorax. Both sexes possess a bluish reflection on the area of the head between the eyes and ocelli, if seen from certain angles and this serves as a very useful guide to the two species after one becomes accustomed to the character. From *elderi melanus* this species may be immediately separated by the contracted and constricted postocular area, and, usually, the larger size. Nasutus, also, lacks grooves on the hind tibiae and can be separated from members of the *sericeus* group on the basis of that character.

### *Dolerus apriloides* MacGillivray

*Dolerus apriloides* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 126; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 240.

*Female.*—Length 10 to 11 mm. Head and thorax black, legs sometimes with front tibiae rufous, abdomen rufous with the last three segments black. Wings tawny infuscate, with the basal fifth of the front wing and basal third of the hind wing hyaline.

Body very robust. Head roughly reticulate, except for the mesal portion of the postocular ridge which is shining; head wider behind eyes than through them; postocular area robust, equal to length of eye seen from above, with a transverse ridge, the posterior margin rough and subcarinate; vertical furrows relatively shallow and cuneiform; postocellar area subquadrate; lateral ocelli equidistant from each other and posterior margin of head; median fovea large, saucer-shaped and shining; antennae as in *elderi*. Disk of anterior lobe closely punctured, opaque, lateral areas with large and small punctures, reticulate; the halves gently convex; lateral lobes very closely punctured except small central disk which is almost smooth; post-tergite very stout and thick, triangular and smooth, with low, granular striations, and with a rounded median carina; meso-episternum slightly depressed just above pectus, with very large, more or less irregular rugosities, presenting a rough appearance; pectus well set off from pleurae, very densely punctate except for postero-mesal corners which are shining; hind tibiae more or less distinctly longitudinally grooved, as in the *sericeus* group; tarsal claws with a medium sized tooth. Sheath resembling Figure 35, but shorter, the carina forming a sharp upper and outer angle; cerci almost attaining tip; saw as for *nasutus* (Figure 58).

*Male.*—Similar in size, color and structure to female, with the hypopygium and genitalia characteristic of the group.

*Type.*—♀, Ithaca, New York, June 19, 1897. In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, Montreal, Canada, June 25, ——. (6689). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Distribution.*—CONNECTICUT: 1♂, Cornwall, May 28, 1920 (Chamberlain). ILLINOIS: 1♀, Fourth Lake, June 16, 1892 (Hart and Shiga); 1♀, Chicago, June 3, 1906 (W. J. Gerhard). INDIANA: 1♀, Hessville, June 18, 1911. MICHIGAN: 1♀, Douglas Lake, July 23, 1924. MINNESOTA: 1♀, Moore Lake, June 25, 1917. MANITOBA: 1♀, Winnepeg, July 10, 1911 (J. B. Wallis).

This is a rare species taken from the central and eastern part of the continent. Because of its large size this species is most likely to be confused with *neoaprilis*, from which it differs in the female in the sheath and saw and in the male by the larger rugosities around the region of the depression of the pectus, which obscure the sharp margin present in *neoaprilis*. From all other species of the same color it differs in the rugose pleurae and robust head.

### *Dolerus yukonensis* Norton

*Dolerus similis* var. *yukonensis* Norton, Trans. Amer. Ent. Soc., Vol. IV, 1872, p. 141; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 17; Cresson, Mem. Amer. Ent. Soc., No. 5, 1928, p. 10.

*Dolerus nuntius* MacGillivray, Can. Ent., Vol. LV, No. 7, July, 1923, p. 158; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Dolerus nundinus* MacGillivray, Can. Ent., Vol. LV, No. 7, July, 1923, p. 159; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Female.*—Length 7 to 8 mm. Head and thorax black except bases of tibiae which are more or less rufous; abdomen rufous at base, black at apex, segments 6 to 10 almost entirely black, and the ventral corners of the basal terga black, forming a checkered line on the ventro-lateral aspect. Wings hyaline, barely stained with tawny.

Head evenly, finely reticulate, with at most a small area on postocular area less densely reticulate; eyes prominent, head reduced in width behind eyes; postocular area slightly shorter than length of eye seen from above, with a narrow ridge, not very high, and a posterior carina; vertical furrows small, shallow and elliptical; postocellar area flat, scarcely convex, punctured the same as the head, wider than long, not raised above level of postocular area. Mesonotum densely punctured, lateral areas of anterior lobe with large, rugged punctures; disk and lateral lobes shining but with dense punctures; post-tergite triangular, densely striate, with a sharp median carina; meso-episternum depressed just above pectus, the depression with a rugged, circular posterior carina, the entire area with large, but very shallow, punctures, giving it a rough appearance; pectus shining, very densely punctate, diagonal row distinct; pectus and pleurae merging into each other gently, without a separating ridge; tarsal claws with a small tooth. Genitalia identical with *nasutus* (Figures 35 and 58).

*Male.*—Length 7 mm. Color and structure similar to female; in some specimens the black is reduced on the ventral corners of the rufous sternites; hypopygium with the apical margin slightly rounded; genitalia as for group.

*Lectoallotype.*—♀, Alaska. In the collection of the Philadelphia Academy of Natural Sciences, Philadelphia, Pa.

*Distribution.*—ALBERTA: 3♂♂, 18♀♀, Banff, June 1 to 26, 1922 (C. B. Garrett); 1♀, Shovel Pass, Jasper Park, July 1, 1915; 1♂, 1♀, Edmonton, June 6, 1917 and May 21, 1915 (F. S. Carr). ALASKA: 1♀, Yakutat, June 21, 1899 (T. Kincaid); 1♀, St. Paul Island, Bering Sea (E. A. Preble) (Summer, 1914).

Confined to the northern Rocky Mountains and Alaska. The female differs from *interjectus*, which it resembles in many particulars, in the saw and sheath, from *elderi* in having the head evenly and finely punctate, and from *similis* in the sheath and saw, its smaller size, more finely punctate

and flatter head, and the lateral black bars on the red basal portion of the venter. The male differs from *interjectus* in the roughness of the pleurae, from *elderi* and *similis* in the same characters as the female.

*Dolerus similis* (Norton) *sens. lat.*

Considered in its widest sense, this species is remarkably variable in size and color, but very constant in structure, with the exception of the sheath. Two extreme forms of the sheath occur, a very short one, represented by Figures 33 and 37, and a long one represented by Figures 34 and 38. In the central and eastern parts of the continent these two extremes occur in the same series, and in the Illinois collections the extremes and many intermediates were taken many times at the same time and place. In the Rocky Mountain region all large series showed a great constancy of this character, the extremes never yet having been taken together. In addition to this, many series exhibited variations in color, especially of the legs and wings, which were encountered from only the one locality. The punctuation of the head and thorax, the shape of the saw, and the male genitalia were constant throughout the entire series of variations. It suggests that the isolation and habitats of different physiological conditions afforded by the mountainous area have allowed local strains or races of this species to become established, which do not yet seem distinct enough, or far enough along in the scale of evolution, to be considered valid species.

The following key will separate the known varieties and races of *Dolerus similis:*

Females.....1
Males.....10
1. Wings uniformly infuscate, especially at base, sometimes paler at apex.....2
—. Wings never infuscate at base, sometimes tawny in the middle or towards apex.....6
2. Tibiae rufous, hind pair sometimes darker at apex.....*similis* var. *tibialis* Cress.
—. Tibiae mostly black.....3
3. Thorax mostly black, sometimes clouded with rufous.....4
—. Anterior and lateral lobes rufous, anterior lobe sometimes with a median black triangle..5
4. Sheath shorter, as in Figure 33, the lateral carina indistinct, the setae longer and more divergent, without a visible shining area between setae and lateral portion of dorsal plates.....*similis* var. *conjectus* Ross
—. Sheath longer, as in Figure 34, lateral carina distinct and straight, setae shorter, with a distinct shining area between setae and lateral portion of dorsal plates .....*similis* subsp. *fumatus* Ross
5. Length 7.5 to 9.0 mm.; postocular area usually finely punctate, dull; anterior lobe sometimes with a black median triangle which in extreme cases migrates on to the meson of the lateral lobes; abdomen often with the apical segments black, more often entirely rufous; tibiae entirely black.....*similis* subsp. *simulans* Roh.
—. Length 9.5 to 10.5 mm.; postocular area shining, sparsely punctate; anterior and lateral lobes and abdomen always entirely rufous; front tibiae sometimes entirely or partly rufous.....*similis* subsp. *nescius* MacG.

6. Both anterior and lateral lobes rufous, anterior lobe sometimes with a black median triangle.....7
—. At most anterior lobe and indefinite areas on posterior corners of lateral lobes rufous..8
7. Tibiae entirely black; anterior lobe sometimes with a black median triangle .....*similis* subsp. *simulans* Roh.
—. Front tibiae mostly rufous, middle tibiae sometimes rufous at base; anterior lobe entirely rufous.....*similis* var. *novicius* MacG.
8. Thorax entirely black, except sometimes fore tibiae at base.....9
—. Thorax with at least a great part of prothorax, usually with collar and anterior lobe rufous.....*similis* (Nort.) *sens. st.*
9. Sheath short, as in Figure 33, lateral carina indistinct, without a shining area between the apical area of setae and the lateral portion of dorsal plates ..... .....*similis* var. *nummarius* MacG.
—. Sheath longer, as in Figure 34, lateral carina distinct, and with a shining area between the apical area of setae and the lateral portion of dorsal plates..... .....*similis* subsp. *nordanus* Ross
10. Tibiae rufous, except sometimes hind pair at apex; wings infuscate..... .....*similis* var. *tibialis* Cress.
—. Tibiae black, except sometimes front and middle pair at base.....11
11. Wings fairly deeply infuscate at base, sometimes paler at apex.....12
—. Wings hyaline at base, sometimes infuscate in middle or at apex..*similis* (Nort.) *sens. st.*
*similis* var. *nummarius* MacG.
*similis* subsp. *nordanus* Ross
*similis* subsp. *simulans* Roh. in pt.
12. Size large, 9.5 to 10 mm.; transverse ridge of postocular area shining, sparsely punctate.....*similis* subsp. *nescius* MacG.
—. Size smaller, 8 to 9 mm.; postocular area usually fairly densely punctate, dull.....
*similis* var. *conjectus* Ross.
*similis* subsp. *fumatus* Ross
*similis* subsp. *simulans* Roh. in pt.

The light winged forms of this species resemble *elderi*, *yukonensis*, *aprilis*, *apriloides* and *neoaprilis* in color. In the female *aprilis* and *neoaprilis* are easily distinguished by the sheath; *apriloides* differs in its rugose pleurae; *elderi* and *yukonensis* differ in the saw, slightly in the sheath, *elderi* in its much smaller size, the robust and shining postocular area, the convex and shining anterior and lateral lobes, and the circular, smooth type of punctuation of the meso-episternum, *yukonensis* in its evenly punctured head, flat and densely punctured postocular area, and evenly confluent pectus and pleurae. The males of *apriloides* and *neoaprilis* can be separated on the basis of the stocky and shining post-tergite, more robust and longer postocular area, rugose and depressed pleurae and longer hypopygium; those of *elderi* by the smaller size, robust and shining postocular area and thoracic lobes, and the type of punctuation of the meso-episternum; and those of *yukonensis* on the flatter and densely punctate postocular area lacking a transverse ridge, and more confluent pectus and pleurae. No satisfactory difference has yet been found between the males of *similis* and *aprilis*.

The dark winged forms are usually distinct by their color and are seldom confused with any other species. The one or two exceptions are noted under the individual forms.

### *Dolerus similis* (Norton) *sens. st.*

*Dosytheus similis* Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 153.

*Dolerus similis* Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 238; Provancher, Nat. Canad., Vol. X, 1878, p. 72; Provancher, Faun. Ent. Can., Hymen., 1883, p. 198; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 17; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 74.

*Dolerus conjugatus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 128; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 73. Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*

*Dolerus plesius* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 129; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 73; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Dolerus inspectus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 128; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 72; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*

*Dolerus stugnus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 129; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 74; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Dolerus acritus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 130; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 74; Frison, Bull. Ill Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 240. *New synonymy.*

*Dolerus inspiratus* MacGillivray, Can. Ent., Vol. XLVI, No. 3, March, 1914, p. 105; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv, 1916, p. 72; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*

*Dolerus nefastus* MacGillivray, Can. Ent., Vol. LV, No. 3, March, 1923, p. 66; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242. *New synonymy.*

*Dolerus nummatus* MacGillivray, Can. Ent., Vol. LV, No. 7, July, 1923, p. 159; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 244. *New synonymy.*

*Female.*—Length 7 to 9 mm. Head black: thorax black with the prothorax, anterior lobe and tegulae rufous, legs black with the anterior knees and tibiae more or less rufous; abdomen with segments 1 to 6 rufous, apex black. The thorax may have only the prothorax rufous, or may have the lateral lobes also partly rufous. Wings almost hyaline, with a larger or smaller tawny area below stigma.

Body well clothed with white pubescence. Head somewhat variable in contour, the vertex being robust or shrunken, usually intermediate; area below vertex roughly reticulate; postocular area same length as eye, seem from above, with a distinct transverse ridge, more or less sparsely punctate and shining, and with a distinct posterior carina; vertical furrows variable, usually shallowly formed and linear, sometimes deeper; postocellar area rectangular, nearly twice as wide as long, very gently convex, only slightly raised above level of postocular area. Halves of anterior lobe moderately carinate, disk shining, densely punctured, lateral areas rough

with small punctures; lateral lobes densely punctate, shining; post-tergite triangular, densely striate, with a sharp median carina; meso-episternum more or less slightly depressed above pectus, rough with fairly large, uneven, reticulate punctures, largest in the centre of the area; pectus shining, densely punctured, diagonal row distinct; tarsal claws with a moderate tooth. Sheath usually as in Figure 33, rarely as in Figure 37, cerci three-quarters or entire dorsal length of sheath. Saw as in Figure 59; lance serrate (Figure 57); lancet with well developed lateral armature; alae, alar spines, and ventral spines prominent, spurettes large and distinct, lobes more or less anvil-shaped, without teeth.

*Male.*—Size 7 to 8 mm. Head and thorax black with more or less of the tegulae and front knees and tibiae rufous, abdomen with the basal six segments rufous, the remainder black. Wings as in female.

Structurally like female, except that the postocellar area is distinctly raised and the post-tergite is often smoother. Hypopygium short, wide, and almost squarely truncate. Genitalia as for group.

*Lectotype.*— ♀, Connecticut (No. 1796). Designated in manuscript by Rohwer, October 23, 1920. In the collection of the Yale University, New Haven, Conn.

*Distribution.*—This form is very numerous and widespread in the following states: Connecticut, Illinois, Iowa, Massachusetts, Michigan, Minnesota, Nebraska, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, South Dakota, Wisconsin, Manitoba, Ontario and Quebec. In addition the following more or less scattered records have been assembled: COLORADO: 1♂, Col.; 1♂, Boulder, May 18, 1901; 1♀, Westcliff. INDIANA: 1♀, Ind.; 1♀, E. Chicago, May 3. KANSAS: 2♀♀, Douglas County. KENTUCKY: 1♀, Russel, Sept. 7, 1928 (R. P. Johnson and C. H. Kennedy). MAINE: 1♀, Me. MISSOURI: 1♀, St. Louis. MONTANA: 1♀, Summit Station. NORTH DAKOTA: 1♀, University, June, 1896. TEXAS: 1♀, Tex. VERMONT: 1♀, Rutland, Aug. 1–5, 1916. ALBERTA: 1♀, Lethbridge, May 20, 1913 (H. L. Seamans); 1♀, Lethbridge, Aug. 5, 1923 (Gray).

In Illinois this species is found in great numbers along the railroad where the banks and right-of-way have a thick and well-established growth of grasses and horsetail (Equisetum arvense), breeding upon the latter. It begins to appear when *aprilis* is at the height of its numbers, and when *similis* is at its peak, *aprilis* is decidely on the wane. Around Urbana this is usually during the latter part of April and the beginning of May. *Similis* is the only Nearctic species of this genus to be reared from the larvae (Yuasa, 1922).

### *Dolerus similis* var. *novicius* MacGillivray

*Dolerus novicius* MacGillivray, Can. Ent., Vol. LV, No. 3, Mar., 1923, p. 67; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243.

*Female.*—Structurally like the typical form of *similis*. Differs in color in having the lateral lobes entirely rufous and more rufous on the forelegs, often with the base of the middle tibiae rufous.

*Type.*— ♀, Hood River, Oregon, July 28, 1914 (Childs). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—This variety of the female is occasionally found among series of typical *similis* in its southern range. The following records have been examined: IDAHO: 1 ♀, Troy, May 31, 1908. ILLINOIS: 1 ♀, Algonquin, Jn. 16, 1909 (Nason); 2 ♀, Ogden, May 26, 1928 (Ross). MASSACHUSETTS: 1 ♀, Mass.; 1 ♀, Hampshire County. MINNESOTA: 1 ♀, Lake Vaduais, Jly. 31, 1917. MONTANA: 1 ♀, Beaver Creek. NEBRASKA: 1 ♀, Glen Sioux County, 4000 ft. alt., Jly. 13, 1910 (L. Bruner). NEW JERSEY: 1 ♀, Ramsey, Jn. 23, 1917; 1 ♀, Englishtown, Jly, 1923; 1 ♀, Matawan (N. Beutenmuller). NEW YORK: 1 ♀, N. Y.; 1 ♀, Van Cortlandt Park, Jn. 20, 1894. PENNSYLVANIA: 1 ♀, Lehigh Gap, Jly. 11, 1900. SOUTH DAKOTA: 2 ♀ ♀, Cutler, Jly. 18, 1924. ALBERTA: 1 ♀, Lethbridge, Jn. 1, 1922 (H. L. Seamans); 1 ♀, Lethbridge, May 20, 1923.

### *Dolerus similis* var. *nummarius* MacGillivray

*Dolerus nummarius* MacGillivray, Can. Ent., Vol. LV, No. 7, July, 1923, p. 159; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., p. 243.

*Female.*—Structurally identical with the typical *similis*. Differs in color in having the thorax entirely black except for the front knees and sometimes an indistinct rufous spot on collar. Wings with a larger sub-stigmal area infuscate.

*Type.*— ♀, Edmonton, Alberta, June 2, 1917 (F. S. Carr). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—This dark variety is correlated with high altitudes or northern latitudes. In the middle latitudes of the species' range it is mixed in almost equal numbers with typical *similis*, but in the northern latitudes it is present in greater numbers than any other color phase. It is common mixed with the typical form in Massachusetts, Michigan, Minnesota, New York, Manitoba, Ontario and Quebec. In addition it has been taken in the following localities: COLORADO: Ouray, 10,000 ft. alt., Walden, 8300 ft. alt., and Dolores. NEW HAMPSHIRE: Franconia. VERMONT: E. Putney, Jly. 4, 1916. WYOMING: 1 ♀, Yellowstone Park, Jly. 20, 1925 (A. A. Nichol). ALBERTA: Edmonton and Banff, in June. BRITISH COLUMBIA: Lillooett and Blue River, in June and July. MANITOBA: Winnepeg, Aweme and Birtle,from May to July. NEW BRUNSWICK: Bathurst, Jly. 6 (J. N. Knull). N. W. TERRITORY: 1 ♀, Salt River, Jn. 6–15, 1926 (J. Russell); 1 ♀, Fort Simpson, Mackenzie River, June 25, 1922 (C. H. Crickmay). SASKATCHEWAN: 1 ♀, Fort a la Corne, Jly. 17, 1925 (K. M. King).

*Dolerus similis* var. *tibialis* Cresson

*Dolerus tibialis* Cresson, Trans. Amer. Ent. Soc., Vol. VIII, 1880, p. 52; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 18.

*Dolerus nervosus* MacGillivray, Ins. Insc. Mens., Vol. XI, Nos. 1 to 3, 1923, p. 31; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

*Female.*—Length 9 to 10.5 mm. Head black; thorax black with the tibiae almost entirely, tegulae, and sometimes indefinite areas on mesonotum, rufous; six basal segments of abdomen rufous, apex black. Wings wholly infuscate, but only moderately so, deeper at base and slightly lighter towards apex.

Structure, including genitalia, identical with *similis*, except that the halves of the anterior lobe are scarcely carinate, more nearly gently convex; and the vertical furrows are always deep and trench-like, making the postocellar area more quadrate.

*Male.*—Length 8.5 to 9 mm. Color and structure similar to female Some males tend towards a melanic variety and have only the bases of the tibiae and two or three terga rufous.

*Holotype.*—♂, Washington Territory. In the collection of the Philadelphia Academy of Natural Sciences, Philadelphia, Pa.

*Allotype.*—♀, same data. Apparently from the same series from which the male was described. Deposited with the holotype. Present designation.

*Distribution.*—A western form, known from about 70♂♂ and 10♀♀ from the typic locality and 1♀, Colorado Lake, Oregon, May 29 (E. V. Storm), the type of *nervosus*.

*Dolerus similis* var. *conjectus* **new variety**

*Female.*—In size, color and structure for the most part like *tibialis* but differing in color in having the tibiae entirely black instead of rufous.

*Holotype.*—♀, Creston, British Columbia, May 28, 1926 (A. A. Dennys). Deposited in the Canadian National Museum, Ottawa, Canada.

*Paratypes.*—BRITISH COLUMBIA: 6♀♀, Creston, May 18, 1923 (C. B. Twigg); 5♀♀, Creston, Jly. 29, 1926 (A. A. Dennys); 1♀, Oliver, May 16, 1923 (C. B. Garrett); 1♀, Vernon, June 2, 1926 (E. R. Buckell); 1♀, Revelstoke, July 13, 1929 (H. H. Ross). Deposited in the collections of the Canadian National Museum, the Illinois State Natural History Survey, and the author.

Known only from the Okanagan and Kootenay River valleys in the dry belt of southern British Columbia. This variety differs from typical *similis* only in its larger size and infuscate wings.

*Dolerus similis* subsp. *nordanus* **new subspecies**

*Female.*—Differs in color from the typical *similis* in having the head and thorax entirely black, resembling *similis nummarius*. The abdomen

has the first five segments rufous, the apex black. Wings hyaline. The head is slightly more robust behind the eyes than in the typical form, otherwise it is structurally identical with it. The sheath is of the longer (*plesius*) type (Figure 38), and is midway between the short-sheathed *nummarius* and the typical form of *aprilis* in this regard.

*Male.*—Similar to the typical form, and inseparable from it.

*Holotype.*—♀, Lethbridge, Alberta, May 20, 1923 (E. H. Strickland). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Allotype.*—♂, Lethbridge, Alberta, May 6, 1923 (E. H. Strickland). Deposited with holotype.

*Paratypes.*—ALBERTA: 1♂, 6♀♀, Lethbridge, May 6 to 24, 1923 (E. H. Strickland); 6♀♀, Lethbridge, May 2 to 20, 1922 and 1923 (H. L. Seamans); 1♀, Lethbridge, May 10, 1923 (Walter Carter); 1♀, Banff, May 26, 1922 (C. B. Garrett). BRITISH COLUMBIA: 1♀, Oliver, May 8, 1923 (B. C. Garrett). WASHINGTON: 1♀, Pullman, May 15, 1901 (C. V. Piper); 1♀, Pullman (C. V. Piper). NEVADA: 1♀, Nev. In the collections of the U. S. National Museum, the Canadian National Museum, the University of Alberta, the Illinois State Natural History Survey, and the author.

This form, taken in the west and northwest, resembles *similis nummarius* and *aprilis* in color, and is separated from them only on the proportions of the sheath. The females of *similis* with the black thorax from these regions possess the longer sheath with great constancy.

### *Dolerus similis* subsp. *fumatus* **new subspecies**

*Female.*—Differs from *similis nordanus* only in having the wings uniformly brown infuscate.

*Male.*—Similar to female. Indistinguishable from the males of *similis conjectus* and dark-winged forms of *similis simulans*.

*Holotype.*—♀, Starbuck, Washington, April 10, 1923 (M. C. Lane). In the U. S. National Museum, Washington, D. C.

*Allotype.*—♂, same data as holotype. Deposited with it.

*Paratypes.*—WASHINGTON: 5♂♂, 5♀♀, same data as holotype; 1♀, Walla Walla, May. CALIFORNIA: 3♀♀, Portola, June 5, 1915 (M. C. Van Duzee). UTAH: 1♀, Utah L. In the MacGillivray Collection, and the collections of the U. S. National Museum, the Illinois State Natural History Survey, and the author.

This form has been taken only on the Pacific Coast. Like *similis nordanus*, the sheath is of the long form upon which character it may be separated from *similis conjectus*.

### *Dolerus similis* subsp. *simulans* Rohwer

*Dolerus simulans* Rohwer, Can. Ent., Vol. XLI, No. 1, Jan., 1909, p. 10.

*Female.*—Length 7.5 to 9 mm. Head black, thorax black with the prothorax, anterior and lateral lobes and tegulae rufous, legs black, abdomen rufous except more or less of apical two or three segments which may be black. Anterior lobe sometimes with a median triangular black area, variable in size and extent. Wings uniformly tawny infuscate, sometimes very lightly, sometimes darkly so.

Structure almost identical with typical *similis*, with the following differences: halves of anterior lobe not so carinate, but slightly so; lateral lobes a trifle less densely punctate. Genitalia identical with the typical form.

*Male.*—7. to 7.5 mm. in length. Color entirely black except the six basal segments which are rufous. Tegulae black, legs black except a minute light ring at the apices of the front femora. Wings hyaline or lightly, evenly infuscate.

Structure as in female. Differs slightly from the typical *similis* in usually having the postocular area more densely punctate.

*Lectotype.*—♀, Florissant, Colorado, June 2, 1907. Labelled by the describer as type at the time of preparation of the original description. Deposited in the U. S. National Museum, Washington, D. C.

*Allotype.*—♂, Ute Creek, Colorado, 9000 ft. alt., June 24, (L. Bruner.) In the collection of the University of Nebraska, Lincoln, Neb. Present designation.

*Distribution.*—COLORADO: Ute Creek, 9000 ft. alt., Florissant, Westcliff, Black Lake, Bondad (6100 ft. alt.), Monte Vista (7650 ft. alt.), Durango, Colden and Electra Lake (8400 ft. alt.), from May to July. IDAHO: 1♂, 1♀, Bovil, Jn. 17, 1911; 1♂, Moscow Mt., June 3, 1911; 1♂, Giveout (8700 ft. alt.), July 7, 1920. MONTANA: ♂♂ and ♀♀, Helen, Gallatin County, Missoula County, and Florence, June and July. NEVADA: 1♂, 1♀, Nev. NEW MEXICO: 1♂, 2♀♀, Jemez Springs, 8500 ft. alt., June 19, 1916 (J. Woodgate); 3♂, Fort Wingate, May 14, 1908 (J. Woodgate); 1♂, San Ignacio, June (Cockerell). UTAH: 1♀, Riverdale (Weber River), June, 1926 (C. J. D. Brown); 1♀, Farr West, (V. M. Tanner). WASHINGTON: 2♂♂, 7♀♀, Pullman, May 12 to June 14. WYOMING: 1♀, Fort Bridger, June, 1926.

This form is essentially western in distribution. The combination of the rufous lateral lobes and black, or almost black, knees, the occurrence of a black area on the anterior lobe and the slightly smaller size, separate this form from other forms of *similis*. In the absence of constant structural differences, however, and from the appearance of blackish forms which merge into *similis nummarius*, it does not seem well enough differentiated to be called a distinct species.

### *Dolerus similis* subsp. *nescius* MacGillivray

*Dolerus nescius* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, Aug. 13, 1923, p. 12; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243.

*Female.*—Length 9.5 to 10.5 mm. Head black; thorax black, with the prothorax, anterior and lateral lobes, tegulae and sometimes front tibiae, rufous; abdomen rufous with the sheath black. Wings lightly infuscate, deeper along the veins and at base of wing.

Structurally almost identical with *similis*, with the following differences: transverse ridge of postocular area very sparsely punctate, polished; vertical furrows deep; disk of anterior lobe, lateral lobes and pectus only sparsely punctate; post-tergite sometimes nearly smooth, but usually closely striate; sheath as in Figure 37, saw as in *similis* (Figure 59).

*Male.*—Length 8.5 to 9 mm. Body entirely black except terga 2 to 6 and sterna 1 to 7, which are rufous. Wings moderately tawny infuscate, darker at base.

Structure similar to female, genitalia as for group.

*Type.*—♀, Kendrick, Idaho, April 14, 1900 (J. M. Aldrich). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, Oliver, British Columbia, May 11, 1923 (C. B. Garrett). Deposited in the Canadian National Museum, Ottawa, Canada. Present designation.

*Distribution.*—NEVADA: 1♂, 8♀♀, Elko. WASHINGTON: 1♀, Spangle, May 24, 1898. BRITISH COLUMBIA: 3♂♂, 4♀♀, Oliver, May 2 to Aug. 10, 1923 (C. B. Garrett); 1♂, Vernon, May 3, 1903; 1♀, Fairview, Apr. 28, 1919 (E. R. Buckell) 1♀, Fairview, May 18, 1919 (E. R. Buckell); 1♀, Penticton, May 20, 1919 (E. R. Buckell).

This subspecies occurs on the western Rocky Mountain slope. It is separated from other forms of *similis* by its large size, entirely rufous abdomen and thoracic lobes, and fuscous wings. It may be confused with *coloradensis*, but can be readily separated from it by the densely punctate sides of the anterior lobe, and in the female by the black meso-episternum.

### *Dolerus nicaeus* MacGillivray

*Dolerus nicaeus* MacGillivray, Can. Ent., Vol. LV, No. 3, Mar., 1923, p. 68; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243.

*Dolerus nimbosus* MacGillivray, Ins. Insc. Mens., Vol. XI, Nos. 1 to 3, 1923, p. 33; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

*Dolerus necessarius* MacGillivray, Ins. Insc. Mens., Vol. XI, Nos. 1 to 3, 1923, p. 35; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242. *New synonymy.*

*Female.*—Length 7.5 to 9 mm. Color entirely black. Wings hyaline.

Structure identical with *similis*, with the following differences: postocular area usually slightly shrunken, not robust, the transverse ridge either shining or punctate; post-tergite usually distinctly striate, but sometimes indistinctly so. Genitalia as in Figures 34 or 38, and 59.

*Male.*—Length 7 to 8 mm. Color and structure similar to female, but with postocular area usually densely punctate with only a small shining area. Genitalia as for group.

*Type.*—♀, Chilliwack, Cultus Lake, British Columbia, May 31,—(F. C. Ewing). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, Corvallis, Oregon, April 8, 1928 (H. A. Scullen). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill. Present designation.

*Distribution.*—IDAHO: 1♀, Moscow. OREGON: ♂♂ and ♀♀, Corvallis, Oregon City, Marion, King's Valley, Eugene, from April to August. WASHINGTON: 4♂♂, 3♀♀, Pullman, April and May. BRITISH COLUMBIA: ♂♂ and ♀♀, Vancouver, Agassiz, Chilliwack, Victoria, Huntingdon, Penticton, Post Hammond, Cranbrook, Okanagan, from May to July. ALASKA: 1♂, Berg Bay, June 10, 1899 (T. Kincaid).

This is the commonest species of Dolerus in the humid wet belt of the Pacific Coast. It is separated from members of the *sericeus* group by its rotund hind tibiae, from *elderi melanus* by its larger size, rougher postocular area and different type of punctuation of the pleurae, and from *nasutus*, which it closely resembles, by the rougher and punctate postocular area, having no bluish tinge to the area between the eyes and ocelli, the meso-episternum having rough and more or less unequal punctures, the pectus being densely but finely punctate adjacent to the pleurae, and in the female by the wider sheath with the distinct lateral carina. *Neoaprilis konowi* differs in the very deeply depressed pleurae and longer hypopygium, and *neocollaris narratus* in the long postocular area.

### *Dolerus aprilis* (Norton)

*Dosytheus aprilis* Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 152; Cresson, Proc. Ent. Soc. Philadelphia, Vol. IV, 1865, p. 243.

*Dolerus aprilis* Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 236; Provancher, Nat. Canad., Vol. X, 1878, p. 71; Provancher, Faun. Ent. Can., Hymen., 1883, p. 197; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 3; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 74.

*Dolerus dysporus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 128; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*

*Female.*—Length 8 to 9 mm. Head and thorax, including legs, black, abdomen rufous with apical three segments black. Wings hyaline, sometimes with an infuscate area in centre or at apex of wing.

Structurally almost identical with *similis*, differing slightly as follows: transverse ridge of postocular area usually densely punctate; meso-episternum with more linear and slightly larger punctures. Sheath long and rhomboidal (Figure 39), very black, posterior margin oblique, forming an angle with ventral margin; cerci never attaining more than one-half length of sheath; saw similar to *similis*, usually having the alae a little larger in the central region of the saw.

*Male.*—Averages a millimetre longer than *similis;* practically identical with *similis*, usually differing as follows: postocular area flatter, dull and punctate, without a shining transverse ridge; anterior lobe more densely punctate on disk, more coarsely on sides. These differences frequently break down, and it is often impossible to separate the males of these two species.

*Neotype.*— ♀, Seymour, Illinois, April 15, 1929 (Frison and Ross). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Ill.

*Distribution.*—Specimens of this species have been examined from the following localities: COLORADO: Florissant. CONNECTICUT: Cornwall. ILLINOIS: Algonquin, Urbana, Seymour, Savoy, Chebanse, Loda, Ashkum, White Heath, St. Joseph, Ogden, Adair, Macomb, Bryant and Pleasant Plains. IOWA: Mt. Pleasant. MASSACHUSETTS; Beverly, Chicopee, Amherst, Lawrence, Arlington. MICHIGAN: Douglas Lake, Ann Arbor. MINNESOTA: St. Paul. NEW HAMPSHIRE: Franconia. NEW JERSEY: Clementon, Snake Hill. NEW YORK: Ithaca Palisades, Richfield Springs, Albany, Potsdam, Bethlehem, New York City, Utica, Flushing and White Plains. OHIO: Ohio. PENNSYLVANIA: Conawego. VIRGINIA: Fort Monroe. ONTARIO: Ottawa. QUEBEC: Montreal, St. Hilaire.

This species occurs in its greatest abundance in April and May, with occasional records in June and August. It is usually a fairly rare species in collections, but in the Dolerus habitats around Urbana was taken in great numbers during the last two weeks of April. It came into the picture earlier than *similis*, which took its place later in the season after *aprilis* had declined in numbers. It occurs throughout the eastern and central part of the continent, and probably is as numerous as *similis* in most habitats, but has not yet been taken in large numbers because of a lack of early collecting.

In the female the color of the body and shape of the sheath are easily recognizable features of this species. The male runs down with *similis*, and, as stated in the description, is not easy to separate from it.

### *Dolerus aprilis* var. *nocivus* MacGillivray

*Dolerus nocivus* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, Aug. 13, 1923, p. 12; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243.

*Female.*—Structurally identical with the typical form. Differs in color as follows: thorax with the prothorax, anterior lobe, tegulae, upper portion of meso-episternum, front knees and sometimes a posterior spot on the lateral lobes, rufous. Wings as in the typical form.

*Type.*— ♀, Ames, Iowa, May 12, 1918 (H. A. Scullen). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Distribution.*—Only the following records have been assembled from material other than that taken in Illinois: IOWA; 1 ♀, Mt. Pleasant, May 5, 1926. NEW YORK: 2 ♀, Ithaca, April and May; 1 ♀, Richfield Springs. SASKATCHEWAN: 1 ♀, Oxbow, June 18, 1907 (F. K. Knab). Several hundred specimens have been taken in Illinois from the following localities: Danville, Muncie, White Heath, Algonquin, Seymour, St. Joseph, Ogden, Savoy, Loda, Chebanse, Ashkum, Urbana, Canton, Adair, Macomb, Pleasant Plains, Sparland and Woodford. In Illinois this variety has slightly outnumbered the typical form, the two being taken together at almost all the localities without respect to advance of season. This form has usually been identified as *similis*, but may be easily separated from it by the long, rhomboidal sheath and the short cerci.

### *Dolerus coloradensis* Cresson

*Dolerus coloradensis* Cresson, Trans. Amer. Ent. Soc., Vol. VIII, 1880, p. 11; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 4; Rohwer, Can. Ent., Vol. XLI, No. 1, Jan., 1909, p. 11; Cresson, Mem. Amer. Ent. Soc., No. 1, 1916, p. 4.
*Dolerus tejoniensis* Weldon, Can. Ent., Vol. XXXIX, No. 4, Sept., 1907, p. 303.

*Female.*—Length 9.5 to 11.5 mm. Head black, sometimes with the clypeus entirely or partly rufous; thorax mostly rufous with the scutum, post-tergite, part of posterior margin of metathorax, all or the median half of pectus, sometimes margins of meso-episternum, meso-epimeron entirely, most of metapleurae, and legs entirely, black; abdomen rufous except sheath which is black. Wings moderately to deeply infuscate.

Proportions of head and antennae as for *similis*. Structurally very similar, but with a greatly reduced punctuation; postocular area shining, almost imperceptibly punctate, posterior margin with a rounded, distinct carina; postocellar area shining, fairly densely punctate; both anterior and lateral lobes polished, evenly minutely punctate; post-tergite triangular, striate and sharply carinate; pleurae and pectus shining, pleurae with large, smooth punctures, pectus polished, very minutely punctate. Genitalia as for *similis*.

*Male.*—Length 9 to 10 mm. Head and thorax entirely black, abdomen rufous except apical segment which is black.

Structure as in female, genitalia as for group.

*Type.*—♀, Colorado. In the collection of the Academy of Natural Sciences, Philadelphia, Pa.

*Distribution*—COLORADO: 6♂♂, 14♀♀, Col.; 3♂♂, 2♀♀, Ute Creek, Jly. 11 to Aug. 1 (R. W. Dawson); 1♀, Fort Collins; 1♂, 2♀♀, Westcliff; 1♀, Monte Vista, 7650 ft. alt., Jn. 16, 1919; 2♂♂, 1♀, Fort Collins, Jn. 13, 1901; 1♂, Livermore; 2♀♀, Estes Park. MONTANA: 5♂♂, 4♀♀, Mon.; 1♂, East Flathead, 5700 ft. alt., Jly. 25, 1902; 1♀, Bozeman, 4400 ft. alt., Jn. 13, 1903; 1♀, Gallatin County, Jn. 17, 1904;

1 ♀, Jefferson County, May 22, 1926. NEW MEXICO: 1 ♀, Las Vegas, Mar. 3 (Barber and Schwarz); 1 ♀, Peco, Jly. 13 (T. D. A. Cockerell). WYOMING: 1 ♂, Cheyenne (C. V. Riley).

This species may be separated from *similis nescius* by having the sides of the anterior lobe impunctate, polished, and from *tejoniensis*, with which it has often been confused, by the punctate postocular area, the punctate scutum, punctures of the meso-episternum being rough, close and reticulate, with sharp walls, the shape of the saw in the female, and the black thorax and the apex of the abdomen in the male.

### *Dolerus tejoniensis* (Norton)

*Dosytheus tejoniensis* Norton, Proc. Boston Soc. Nat. Hist., Vol. VIII, 1861, p. 154.
*Dolerus tejoniensis* Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 239; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 17; Rohwer, Can. Ent., Vol. XLI, No. 1, Jan., 1909, p. 11.
*Dolerus coccinifera* Norton, Trans. Amer. Ent. Soc., Vol. IV, 1872, p. 82; Cresson, *ibid*, Vol. VIII, 1880, p. 34; Cresson, Mem. Amer. Ent. Soc., No. 5, 1928, p. 5. *New synonymy.*
*Dolerus coccinifer* Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 4.

*Female.*—Length 10.5 to 12 mm. Head black; thorax rufous, except pectus, legs, and usually meso-episternum entirely, but sometimes only the lower portion, and sometimes a small median area on anterior lobe, black; abdomen rufous except sheath which is black. Wings deeply infuscate, violaceous.

Head below vertex roughly reticulate, vertex polished, minutely and sparsely punctured; postocular area length of eye, seen from above, with a small transverse ridge, and a posterior carina; vertical furrows very wide, deep; postocellar area quadrate, very convex and prominent; antenal lengths as in *similis*, but each segment slightly narrower at the base, giving a more or less doubly serrate appearance. Anterior and lateral lobes and pectus very highly polished, impunctate except for one or two very minute pits; tarsal claws with a medium-sized tooth. Sheath as in Figure 37; saw after the same fashion as *similis*, but differs as follows: lance scalloped, not serrate; alae large, alar spurs very large, somewhat blunt, ventral spines reduced; spurettes distinct; lobes with several rounded teeth (Figure 60).

*Male.*—Length 11 to 12 mm. Head black; dorsum of thorax entirely rufous or with anterior lobe and scutum black; pectus, pleurae and legs black; abdomen rufous. Wings violaceous.

Structure similar to female. Clypeus usually normal but sometimes almost truncate, or slightly sinuate. Hypopygium with sides of apex slightly convex, apical margin slightly concave. Genitalia differing from the group type in having the apices of the praeputium widely spreading, and the gonocardo a thin band of equal width for its entire length. The base of the praeputium is even less pointed than in Figure 68.

*Lectotype.*— ♀, Fort Tejon, California. In the collection of the Academy of Natural Sciences, Philadelphia, Pa. This old specimen was found in the undetermined duplicates in the collection of the Academy at Philadelphia, and bore a small hand-printed label "Ft. Tejon, Cal.", and beneath it a larger label with a red ink border with the handwriting "*Dolerus tejoniensis* Norton." Since the specimens from which he drew up the description of this species, and which he stated belonged to the Smithsonian Institute, can not be found in that institution, it has been assumed that this specimen is one of the two originally examined by Norton, and it has been remounted on a modern pin and designated as the lectotype.

*Distribution.*—Restricted to the southwestern corner of the United States. Specimens have been examined from the following localities: CALIFORNIA: ♂♂ and ♀♀, Alameda County, Los Angeles County, San Jacinto Mts., Soda Springs, Lundy (8000 ft. alt.), Shasta, Redlands, Ventura County, Fort Tejon, Woyden, San Diego, Sacremento, Topico, from March to October. NEVADA: 10♂♂, 2♀♀, Nev.; 1♂, Reno. NEW MEXICO: 1♀, Alamogordo, May 12, 1902. UTAH: 1♀, Ut.

The only species with which this is likely to be confused is *coloradensis*, from which it may be separated in the female by the very convex and shining postocellar area and anterior lobes, the polished and practically impunctate scutum, the punctures of the meso-episternum being separated by wide and polished walls, the meso-episternum merging smoothly into the pectus, and the saw; and in the male by the rufous on the dorsum of the thorax and by the entirely rufous abdomen.

The male genitalia of this species are almost intermediate in proportion between the *similis* and *neoaprilis* groups, but the saw shows very decided affinities with the *similis* group, so the species is placed with the latter.

## NEOAPRILIS GROUP

This group was erected for the single species *neoaprilis*, the genital characters of which separate the group from other members of the genus.

### *Dolerus neoaprilis* MacGillivray

*Dolerus neoaprilis* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 126; MacGillivray Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 70; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242.

*Dolerus nivatus* MacGillivray, Jour. N. Y. Ent. Soc., Vol. XXXI, No. 4, Dec., 1923, p. 164; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

*Female.*—Length 9 to 12 mm. Body black, with the front knees and from two to six abdominal segments rufous. Wings hyaline, faintly stained below stigma and towards apex.

Head below vertex very rough; clypeus very deeply notched, cleft one-half its length; postocular area length of eye, seen from above, robust,

but narrower than width of head through eyes; with a low transverse ridge and a distinct posterior carina; the transverse ridge shining and sparsely punctured, and the region near the lateral ocelli shagreened; vertical furrows linear and indistinct or shallow and trough-shaped; postocellar area quadrate, only slightly convex, and but a little raised above level of postocular area, shining, with fairly large punctures; antennae filiform, slightly bilaterally compressed near base, third segment a little longer than fourth, remainder almost equal. Mesonotum densely punctured; disk of anterior lobe shining, with fairly large punctures, sides with large, rugose punctures; halves of anterior lobe convex, not carinate; lateral lobes dull, disk more sparsely punctate than remainder; posttergite stocky in outline, shining, unstriate or granularly so, striations rounded, not sharp, median carina only on basal (=anterior) half, posterior margin rounded; meso-episternum deeply depressed above pectus, very coarsely and roughly rugose, rugosities maintaining their size to margin of pectus; pectus very sharply set off from pleurae, slightly concave laterally, dull, shagreened and closely punctured, sometimes slightly glossy; diagonal row wanting; tarsal claws with a fairly large tooth. Sheath stocky in appearance (Figure 36), ventral margin uniformly convex, dorsal margin convex or appearing nearly straight, lateral face with a strong carina at base, usually fading before reaching apical half of sheath but sometimes suggested for the entire length by the contour; sheath clothed with short, black, stiff setae, tufted at apex, a few lateral ones slightly longer and curved; cerci attaining one-half to three-quarters length of sheath. Saw as in Figure 3; lance scalloped, not serrate; lancet with alae and alar spurs large and distinct, lacking alar spines but with ventral spines, spurettes large and separate, lobes step-like, minutely dentate.

*Male.*—Length 7.5 to 10 mm. Color and structure as in female, with the following differences in structure: third and fourth antennal segments equal, flagellum regularly setaceous; halves of anterior lobe more sharply convex, lateral portions more finely punctured; hypopygium very long and large, very convex ventrally, sides of apex concave, apex almost truncate, fairly narrow.

*Type.*—♀, Nebraska (F. Rauterberger). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Allotype.*—♂, Seymour, Illinois, April 15, 1929 (Frison and Ross). Deposited in the collecton of the Illinois State Natural History Survey, Urbana, Ill. Present designation.

*Distribution.*—COLORADO: 1♀, Garland; 1♀, Veta Pass. ILLINOIS: 1♀, Seymour, Apr. 14, 1929 (Park and Ross); 2♂♂, Seymour, Apr. 15, 1929 (Frison and Ross); 1♂, Muncie, Apr. 16, 1929 (Frison and Ross); 1♂, 2♀♀, Adair, May 4, 1929 (T. H. Frison); 1♂, Pleasant Plains,

May 2, 1929 (T. H. Frison); many ♂♂, ♀♀, Sherman, April 2, and Dixon, Garden City and Grand Detour, May 15–16, 1930 (Frison and Ross). IOWA: 1♀, Mt. Pleasant, May 5, 1926. MASSACHUSETTS: 1♀, Springfield, May 4, 1903 (F. K. Knab). MICHIGAN: 2♀♀, Cheboygan County, June, 1928 (C. H. Kennedy). MINNESOTA: 1♀, St. Paul, June 7, 1911. NEW HAMPSHIRE: 1♀, N. H.; 1♂, 1♀, Franconia; 1♀, Mt. Washington. NEW YORK: 1♀, Utica; 2♀♀, Newport, June 26, 1902; 1♀, Albany, May 23, 1903. SOUTH DAKOTA: 2♀♀, Brookings; 1♀, Englewood, June 18, 1925. ALBERTA: 3♀♀, Banff, June 1, 1922 (C. B. Garrett). BRITISH COLUMBIA: 1♀, Blue River, Jly-Aug., 1926 (W. F. McCullough). MANITOBA: 3♀♀, Aweme, June and July, (Criddle and Bird); 1♀, Treesbank, June 26, 1926 (R. D. Bird); 1♂, Birtle, May 30, 1928 (R. D. Bird). N. W. TERRITORY: 1♀, Ft. Providence, Mackenzie River, Jly. 8, 1903 (Mack); 1♀, Ft. Simpson, Mackenzie River, June 25, 1922 (C. H. Crickmay). NOVA SCOTIA: 1♀, Bridgetown, June 11, 1913 (G. E. Saunders); 1♀, Truro, Jly. 4, 1913 (R. Matheson). ONTARIO: 1♀, Nipigon, June 19, 1913 (F. M. Walker); 2♂♂, 1♀, Sudbury; 1♀, Hillier, Nov. 10, 1911 (Evans). QUEBEC: 2♀♀, Megantic, June 2, 1923 (C. H. Curran); 1♀, Ft. Coulonge, June 11, 1918 (J. L. Beaulne); 1♀, Lanoraie, June 18, 1915 (Beaulne); 1♀, Shawbridge, May 28, 1922 (J. W. Buckle). ALASKA: 2♀♀, Kukak Bay, Jly. 4, 1899 (T. Kincaid); 2♀♀, Orea, June 27, 1899 (T. Kincaid); 2♂♂, 1♀, Yakutat, May 26 to July 4, 1899 (T. Kincaid); 1♂, Katmai, Jly. 19, 1919 (A. E. Miller).

Apparently a wide-spread northern species which has also been taken in large numbers in certain localities along the railroads in Illinois.

The female of this species is at once separated from all others in the genus by the peculiar sheath with the black, bristly setae, and by the saw. It is also characterized by the deeply emarginate clypeus and the depressed pleurae with the ridge-like boundaries. The male can be separated from the members of the *similis* group which it resembles in color by the deeply cleft clypeus, the rugose and depressed pleurae with the sharp walls around the depression, and the longer and more convex hypopygium. It is separated from *frisoni* by lacking a procidentia and from *apriloides* by having the walls of the depression of the pleurae sharp and not obscured by large rugosities.

### *Dolerus neoaprilis* subsp. *konowi* MacGillivray

*Dolerus konowi* MacGillivray, Can. Ent., Vol. XLVI, No. 3, Mar., 1914, p. 106; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241.

*Dolerus numerosus* MacGillivray, Can. Ent., Vol. LV, No. 3, Mar., 1923, p. 67; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

*Dolerus nidulus* MacGillivray, Ins. Insc. Mens., Vol. XI, Nos. 1 to 3, 1923, p. 31; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

Both sexes structurally identical with typical *neoaprilis*, differing only in being entirely black.

*Type.*—♀, Olympia, Washington, June 20, 1893 (T.Kincaid). In the MacGillivray Collection, University of Illinois, Urbana, Ill.

*Lectoallotype.*—♂, Olympia, Washington, April 20, 1894 (T. Kincaid). In the MacGillivray Collection, University of Illinois, Urbana, Ill. (Frison, 1927).

*Distribution.*—CALIFORNIA: 1 ♀, Strawberry, Jly. 6, 1919. IDAHO: 1 ♀, Kendrick, Apr. 4, 1908; 3 ♀ ♀, Moore's Lake, Jly. 10, 1907. OREGON: 1 ♀, Ore.; 1 ♀, Forest Grove; 3 ♀ ♀, Waldport, Apr. 23, 1926 (J. E. Davis); 2 ♀ ♀, Corvallis. BRITISH COLUMBIA: ♂♂ and ♀ ♀, Agassiz, Port Hammond, Chilliwack, Hedley, Vancouver, Royal Oak, Metlakatla, Victoria, Prince Rupert, taken in April and May.

A melanic race of *neoaprilis* occurring solely on the Pacific slope. It is usually taken with *nicaeus* and *nasutus*, with which it agrees in color. From these and all other black species, however, it can be distinguished in the female by the sheath and saw, in the male by the long, convex hypopygium, and in both sexes by the depressed and rugose pleurae and the deeply cleft clypeus.

## FRISONI GROUP

Erected to accommodate the single species *frisoni.*

### *Dolerus frisoni* new species

*Male.*—Length 11 mm. Head and thorax black, except tegulae and front tibiae and basitarsus and middle tibiae, which are rufous; abdomen rufous with apex of segment six and the remaining apical segments black. Wings hyaline.

Structure somewhat similar to *apriloides* and *neoaprilis*. Head, except vertex, closely reticulate; robust, but narrowed behind eye; postocular area slightly shorter than eye, seen from above, with a rounded, transverse ridge, posterior margin feebly carinate; the median portion flat, sparsely punctate and dull, the posterior portion closely punctate; vertical furrows moderately deep, narrow and linear; postocellar area quadrate, scarcely convex, sparsely punctate and dull; clypeus notched about half its length; flagellum of antenna thick, slightly compressed at base, first three segments subequal, remainder very gradually decreasing towards apex. Disk of anterior lobe densely punctate and dull, sides densely punctate with two or three large rugosities on the lateral corner; lateral lobes moderately densely punctured, dull; post-tergite subcrescentic, stout, shining, with a few polished striations, rounded on the meson, but not carinate; meso-episternum with extremely large, irregular rugosities, very rough in appearance, fairly deeply depressed above pectus, posterior

wall of depression ridge-like and distinct, ventral and anterior walls indefinite, obscured by the large rugosities; pectus very sharply defined, densely punctate and shagreened; diagonal row fairly distinct, linear; hind tibiae not longitudinally grooved; tarsal claws with a moderate tooth two-thirds distance from base. Eighth tergite with a median procidentia extending the whole length of the segment, gradually ascending from the base, sharply carinate, with a small elevation at apex; hypopygium long, wide and convex, lateral margins concave, apical margin concave, angles rounded. Genitalia as in Figure 69; praeputium with a narrow apical cleft, apices large, wide and long; gonocardo fairly wide, narrowed on the meson; pedes narrow, sides parallel, apices rounded.

*Holotype.*— ♀, Cook County, Illinois (E. B. Chope). In the collection of the Field Museum for Natural History, Chicago, Ill.

Known only from the holotype. It may be readily separated from all other species of the genus by the combination of a rufous abdomen with a procidentia on the eighth tergite, and by the depressed pleurae, with the largest rugosities that are found in the nearctic members of the genus. The relationship of this species is not clear, for the procidentia suggests the *sericeus* group, and the punctuation, clypeus and genitalia show distinct affinities to the *neoaprilis* group. Until the female is discovered and the saw characters are known, it seems best to place this group close to the *neoaprilis* group, following chiefly the evidence of punctuation and the genitalia.

This unique species is named in honor of Dr. T. H. Frison who has contributed such a great deal to the completion of this paper.

### Subgenus *Loderus* Konow

*Dosytheus* Cresson, Proc. Ent. Soc. Phil., Vol. 1, Aug., 1861, p. 37.
*Dolerus* Sectio I (*Dosytheus*) Thomson, Hymen. Scandin., Tom. I, 1871, p. 279.
*Loderus* Konow, Deut. Ent. Zeits., Vol. 34, 1890, p. 240.
*Loderus* Ashmead, Can. Ent., Vol. XXX, No. 12, Dec., 1898, p. 306.
*Loderus* Konow, Gen. Insectorum, Hymen., Fam. Tenth., 1905, p. 110 and 115.
*Loderus* Enslin, Deut. Ent. Zeits., Beiheft, 1913, p. 157.
*Loderus* MacGillivray, Bull. No. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 76.

Eyes long, distinctly emarginate on their mesal margin; malar space short, usually less than half the length of first antennal segment, but in *L. acidus* MacG. sometimes nearly as long as first segment. Face clad with dense, fine pile, clypeus partly piceous or whitish in the nearctic species which are partly rufous; vertex shining, at most sparsely punctate. Tarsal claws either without a tooth or with a small one, in the female never as large as in Dolerus *s. st.*

*Genotype.—Tenthredo pratorum* Fallen (original designation by Konow, 1890.).

KEY FOR THE SEPARATION OF THE NEARCTIC SPECIES

1. Body entirely black.....*napaeus* MacG.
–. Abdomen and legs partly rufous.....2
2. Pleurae coarsely pitted, punctures round and distinct; vertical furrows trough-like and distinct.....3
–. Pleurae finely cribrately punctured; vertical furrows line-like, almost obsolete.....4
3. Middle femora rufous.....*apricus* (Nort.)
–. Middle femora black.....*apricus* var. *alticinctus* MacG.
4. Females (abdomen with an apical sheath-like structure, Figure 1).....5
–. Males (abdomen with a flat and entire apical sternite, Figure 7).....7
5. Sheath small, evenly rounded on the ventral margin, as wide as long....*albifrons* (Nort.)
–. Sheath large and projecting, straight on ventral margin, longer than wide, with a distinct small hook at the ventro-apical angle.....*acidus* MacG.
6. Third and fourth antennal segments almost equal; white spot below bases of antennae, clypeus white.....*albifrons* (Nort.)
–. Third segment about one-quarter longer than fourth; white spot below antennae lacking, clypeus black in middle at base, white appearing as lateral marks.....*acidus* MacG.

## *Dolerus apricus* (Norton)

*Dolerus apricus* Say, Harris Catalogue, *nomen nudum*; Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 236; Provancher, Nat. Canad., Vol. X, 1887, p. 71; Provancher, Faun. Ent. Can., Hymen., 1883, p. 197; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 3; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 72.

*Dosytheus apricus* Norton, Proc. Boston Soc. Nat. Hist., Vol. XIII, 1861, p. 152.

*Dolerus luctatus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 127; MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 71; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*

*Dolerus femur-rubrum* Rohwer, Can. Ent., Vol. XLI, No. 1, Jan., 1909, p. 9. *New synonymy.*

*Loderus albifrons* MacGillivray, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916, p. 76.

*Loderus acerbus* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, August 13, 1923, p. 19; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 249. *New synonymy.*

*Female.*—Length 6.5–8 mm. Head black with the clypeus entirely or partly testaceous, sometimes whitish; thorax mostly black, with the tegulae white, prothorax more or less stained with rufous, femora rufous except extreme apex which is black, base of tibiae sometimes rufescent, abdomen rufous except seventh segment and beyond. Wings hyaline, nervures brown.

Body moderately densely hairy. Head very finely punctured, clothed with conspicuous whitish pubescence below ocelli, vertex minutely punctured, shining and robust; eyes quite deeply emarginate, malar space scarcely one-half length of first antennal segment; postocular area shorter than eye, seen from above, almost as wide, robust and shining, transversely convex, with a minute posterior carina; vertical furrows very deep and wide, two-thirds length of postocellar area; postocellar area quadrate, shining and convex, scarcely raised above level of postocular area; third segment of antenna distinctly longer than fourth, remainder gradually diminishing. Mesonotum very finely and granularly punctured; halves of

anterior lobe gently convex, equally punctured, the lateral areas with a few large distinct pits; lateral lobes minutely punctured; post-tergite triangular or sub-crescentic, smooth, with or without a median carina; mesoepisternum with many large smooth punctures, mostly not touching each other but well separated; pectus shining, minutely punctured, diagonal row represented by scattered large pits; claws with a small tooth (Figure 12). Sheath (Figure 8) nearly twice as long as wide; dorsal margin straight or slightly convex, ventral margin evenly rounded; angle sharp; setae fairly long, fine and thick, the longest occurring just below tip; cerci not attaining half length of sheath. Saw as in Figure 5, long and slender, somewhat suggestive of *elderi*; lance serrate; lancet with distinct lobes, minutely toothed, spurette the last pimple-like tooth of lobe; alae reduced to alar spines and a conspicuous alar spur which might be confused with the spurette, alar spur distinct and separate from the reduced alae.

*Male.*—Similar in size, color and structure to female, differing as follows: clypeus and face below antennae whitish-rufous; hypopygium fairly long, slender, sides of apex distinctly concave near tip, posterior margin narrow, roundly truncate. Genitalia as for subgenus (Figure 64).

*Neotype.*— ♀, Seymour, Illinois, May 1, 1929 (H. H. Ross). Deposited in the collection of the Illinois State Natural History Survey, Urbana, Illinois.

*Distribution.*—COLORADO: 1 ♀, Colo. CONNECTICUT: Quilford, Hartford, Durham. June. ILLINOIS: Urbana, White Heath, Seymour, St. Joseph, Champaign, Chicago, Algonquin, Elizabeth, Savanna, Rock Island, Ogden, Glencoe, Muncie, Waukegan, Garden City, Grand Detour and Springfield, April to July. INDIANA: Hessville. April and May. IOWA: Ames, Mt. Pleasant. May and June. MAINE: Eagle Bend, Orono. July. MARYLAND: 1 ♀, Md. MASSACHUSETTS: Springfield, Boston, Chicopee. May. MICHIGAN: Douglas Lake, Ann Arbor, Charlevoix. July. MINNESOTA: Foley, Northfield, St. Cloud, Milaca, Moore Lake, Fairbuilt County, Hennepin County. June to August. MONTANA: 1 ♂, Mon. NEBRASKA: Ashland, Sowbelly Cañon (Sioux County). June. NEW HAMPSHIRE: Franconia. NEW JERSEY: Bargen County, Caldwell, Ramsey, Elizabeth. June and July. NEW YORK: Ithaca, Plattsburg, Rouses Point, Utica, Richfield Springs, White Plains, Brooklyn, Niagara Falls, Staten Island, New York City, Carolina, Dryden Lake, Albany, Newport, Karner, Speculator, Cedar Hills, Meadowlake, Axton, McLean, Victor. May to July. OHIO: Columbus, Norwalk, Sandusky, Salineville. May and June. PENNSYLVANIA: Edge Hill, Harrisburg, Montgomery County. June. SOUTH DAKOTA: Brookings, Elk's Point. June. TEXAS: 1 ♂, Tex. VIRGINIA: Great Falls. WASHINGTON: 1 ♀, Olympia, June 6, 1892. WISCONSIN: 1 ♀, Madison. July. MONTANA: Aweme, Treesbank, Birtle. June. NEW

BRUNSWICK: Bathurst. July. ONTARIO: Ottawa, Bonville, Vineland. May and June. QUEBEC: St. John's County, Montreal, Hull, Hemmingford, Megantic, Lanoraie, Fairy Lake, Rouville, St. Hilaire, Chamby County, Shawbridge. May to July.

A widely distributed species, apparently common in the northern, eastern and central United States and southeastern Canada.

In the vicinity of Urbana this species appears later in the season than any other member of the genus, occurring very abundantly in late May and during June in the Equisetum—Carex communities along the railroads. Its peak comes some two or three weeks after *similis* is on the wane, and forms the last of a well marked series of abundance peaks of different species in the genus.

This species can be readily distinguished from *acidus* and *albifrons* by the circular punctures of the pleurae, and from *napeus* by the red color of the femora, abdomen, *etc.*

### *Dolerus apricus* var. *alticinctus* MacGillivray

*Loderus alticinctus* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, Aug. 13, 1923, p. 20; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 249.

*Loderus ancisus* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, Aug. 13, 1923, p. 21; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 250. *New synonymy.*

This variety differs from the typical form in having the middle femora almost black, and by being slightly smaller in size. Specimens belonging to this variety are found in small numbers scattered throughout collections of the species from all localities. Every gradation exists between the two forms, hence the variation has held no significance in the present study, and has not been recognized in determinations. It is thought best, however, to retain the name.

*Holotype.*— ♀, Orono, Maine, June 30, 1913. In the MacGillivray Collection, University of Illinois, Urbana, Illinois.

### *Dolerus napaeus* MacGillivray

*Loderus niger* Rohwer, Can. Ent., Vol. XLII, No. 2, Feb., 1910, p. 49. ♂, ♀.

*Dolerus napaeus* MacGillivray, Can. Ent., Vol. LV, No. 3, March, 1923, p. 65. ♀; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*

*Dolerus nepotulus* MacGillivray, Can. Ent., Vol. LV, No. 3, March, 1923, p. 68. ♂; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 243. *New synonymy.*

*Dolerus nauticus* MacGillivray, Ins. Insc. Mens., Vol. XI, Nos. 1–3, 1923, p. 35. ♀; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 242. *New synonymy.*

*Female.*—Length 7–8 mm. Color entirely black. Wings hyaline.

Structure almost identical with *apricus*, with the following differences: vertex less robust, obliquely narrowed behind eye, not or extremely sparsely punctured, polished; carina along posterior margin small but sharp; post-tergite always with a sharp median carina; claws with small tooth; genitalia identical with *apricus*.

*Male.*—Same as female except for sexual differences.

*Holotype.*—♀, Mts. near Claremont, California. In the U. S. National Museum, Washington, D. C.

*Allotype.*—♂, same data. Deposited with holotype.

*Distribution.*—CALIFORNIA: many males and females, Mts. near Claremont, Stanford University, Corte Madero Creek Cañon, Redwood Canyon, Sierro Nevada, Felton, St. Cruz Mts., Berkeley. Taken from March to May. OREGON: Ore., Corvallis, Drift Creek. April and May. WASHINGTON: Pullman. April.

A species confined to the states of the Pacific Coast, quite rare in collections. It is distinguished from all other members of the subgenus by its black color.

The placing of Loderus as a subgenus of Dolerus brings the name *niger* Rohwer (1910) into competition with *Dolerus niger* (Linn.) (1767). The name proposed by Rohwer must therefore fall. MacGillivray in 1923 described a species of Dolerus giving it the name *napaeus*. Since this is a synonym of *Loderus niger* Rohwer, the name *napaeus* is herin substituted for *niger* (Rohwer), now a preoccuppied name.

### *Dolerus albifrons* (Norton)

*Dosytheus apricus* var. *albifrons* Norton, Proc. Bost. Soc. Nat. Hist., Vol. VIII, 1861, p. 152.
*Dolerus albifrons* Norton, Trans. Amer. Ent. Soc., Vol. I, 1867, p. 237; Provancher, Addit. Faun. Can., Hym., 1885, p. 7; Dalla Torre, Cat. Hymen., Vol. I, 1894, p. 2.
*Dolerus minusculus* MacGillivray, Can. Ent., Vol. XL, No. 4, April, 1908, p. 127; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 241. *New synonymy.*
*Loderus accuratus* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, Aug. 13, 1923, p. 19; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 249. *New synonymy.*

*Female.*—Length 6 mm. Head mostly black, with the labrum white, clypeus, base of mandibles, and extreme base of first antennal segment rufous; thorax black with the tegulae and base of tibiae white, trochanters and legs otherwise rufous except black ring at apex of posterior femora, and tibiae and tarsi which are more or less brownish-infuscate; abdomen rufous with the seventh segment and beyond black. Wings hyaline.

Head below vertex minutely densely reticulate; vertex more or less shining, minutely punctured; eyes not so long as in *apricus*, but evenly emarginate, malar space slightly longer than half basal segment of antenna; postocular area robust and shining, not as long as eye, seen from above, with the posterior carina barely indicated; vertical furrows short, comma-like; postocellar area flat, nearly twice as wide as long, reticular-punctate; third antennal segment subequal to fourth. Halves of anterior lobe uniformly convex; anterior lobe finely reticularly punctured, less roughly on disk than on sides; lateral lobes dull, closely, finely punctured; post-tergite sharply triangular, polished, with a tent-shaped median carina; meso-episternum very slightly depressed above pectus, extremely finely and

roughly reticulate; pectus shining, but with very dense small punctures; tarsal claws without a tooth (Figure 11). Sheath as in Figure 10, very little longer than wide, dorsal margin straight, ventral margin arcuately rounded, lateral surface slightly bulbous near tip, with a distinct carina adjacent to dorsal margin, nearly reaching tip; setae fine, in an evenly graded series; cerci short, attaining only half dorsal length of sheath. Saw very long and slender, slightly upturned at tip (Figure 6); lance almost without serrations; lancet with very faintly indicated armature, lobes barely indicated, minutely toothed, spurettes unrecognizable, undoubtedly fused with lobes, alae represented by a row of minute spines, alar spurs very small and triangular, distinctly connected with the row of alar spines; ventral spines obsolete.

*Male.*—Similar in size, color and structure to female, with the following differences: labrum, clypeus and spot below bases of antennae, white; hypopygium narrow at apex, sides almost straight, posterior margin truncate; genitalia as for *apricus*, differing only in having the apices of the praeputium slightly more prolonged and narrower.

*Lectotype.*—♀, Connecticut. Designated in manuscript by Rohwer, October, 1920. Deposited in the collection of the Yale University Museum, New Haven, Connecticut.

*Lectoallotype.*—♂, Connecticut. Designated by Rohwer at the same time and place, and deposited with lectotype.

*Distribution.*—CALIFORNIA: 1♂, 3♀♀, Redwood Canyon, Marin County, May 17, 1908. CONNECTICUT: 2♂♂, 1♀, Conn.; ILLINOIS: 1♂, Algonquin (Nason), 1♂, Ill.; 46♂♂, 68♀♀, Fox Lake, May 15, 1930 (Frison and Ross). IOWA: 1♀, Mt. Pleasant, May 23, 1928 (W. Lee). MAINE: 1♀, Orono, June 12, 1913. NEBRASKA: 1♀, Ashland; NEW YORK: 1♂, McLean, May 31, 1898; 1♀, Ithaca, May 31, 1891. ONTARIO: 1♀, Hull, June 9, 1884; 1♀, Bonville, June 24, 1913 (W. A. Ross). QUEBEC: 1♀, Shawbridge, May 28, 1922 (J. W. Buckle).

A rare species of wide distribution. Easily distinguished from *apricus* in lacking a tooth on the tarsal claws and in having the pleurae finely reticulate; and from *acidus* by the small rounded sheath (Figure 10).

### *Dolerus acidus* (MacGillivray)

*Loderus acidus* MacGillivray, Univ. Ill. Bull., Vol. XX, No. 50, Aug. 13, 1923, p. 20; Frison, Bull. Ill. Nat. Hist. Surv., Vol. XVI, Art. IV, Feb., 1927, p. 249.

*Female.*—Length 7–7.5 mm. Head black with the labrum and vague lateral areas on the clypeus rufous; thorax black with the tegulae white, the prothorax, sides of anterior lobe and sometimes faint spots on the lateral lobes and pleurae, rufous; apices of coxae, femora entirely and base of tibiae rufous, rest of tibiae and tarsi blackish-brown; abdomen rufous with more or less of seventh or eighth and following segment, and sheath

black. Front and middle femora sometimes with basal half black or blackish, shading into rufous towards apex. Wings hyaline.

Punctuation of head and thorax much as in *albifrons*. Head below vertex finely and densely reticulate; postocular area only half length of eye, seen from above, narrowed behind eye, densely punctate, dull, with a distinct posterior carina; vertical furrows obsolete, represented by a faint line; postocellar area confluent with postocular area, reticulate; third segment of antenna about a fourth longer than fourth, remainder practically subequal. Anterior lobe very gently convex, dull with dense punctures; lateral lobes densely punctate but with moderately large punctures; posttergite triangular, distinctly striate, with a gentle median carina; mesoepisternum densely and finely reticulate as in *albifrons*; pectus with dense punctures; tarsal claws with or without a small tooth. Sheath very large, as in Figure 9, the ventral margin straight, the dorsal margin arcuately rounded, the two forming a distinct small hook on the caudo-ventral corner; setae fine, almost equal in length; cerci very small, about one-fourth dorsal length of sheath. Saw extremely aberrant in appearance, short and stocky, curved downward (Figure 4); lance regular, not serrate; lancet well armed, lobes distinct, minutely toothed, spurettes small but distinct and separate just within ventral margin, alae almost entirely cut into somewhat irregular alar and ventral spines, and with a long, slightly-upcurved, finger-like alar spur, situated within the dorsal half of the lancet.

*Male.*—Similar in size, color and structure to female, differing as follows: clypeus less vaguely marked with white, the white showing as two distinct spots one on each side of the meson; entire dorsum of thorax black except rufous posterior margin of pronotum; tibiae not blackish-infuscate but more rufous-brown on basal half; hypopygium wider than in *albifrons*, the posterior margin slightly convex; genitalia as for *albifrons*.

*Holotype.*—♀, Orono, Maine, June 12, 1913. In the MacGilllvray Collection, University of Illinois, Urbana, Illinois.

*Allotype.*—♂, Canada (C. F. Baker). Also in the MacGillivray Collection. (Present Designation).

*Distribution.*—ILLINOIS: 5♀♀, Algonquin, May 4 to 21, 1895 (Nason); 1♀, Starved Rock, 16♂♂, 5♀♀, Waukegan, 2♀♀, Dixon, 1♂, 4♀♀, Garden City and 2♂♂, 18♀♀, Grand, Detour May 13–16, 1930 (Frison and Ross). MAINE: 1♀, Orono, June 12, 1913. NEW YORK: 2♀♀, Ithaca; 3♀♀, Albany, May 22, 1903; 3♂♂, Newport, May 26, 1902; 1♂, Lancaster, May, 1886; 1♂, Chatham, August 19, 1904. PENNSYLVANIA: 2♀♀, Edge Hill, May 20, 1900. QUEBEC: 3♀♀, Lanoraie, June 18, 1915 (Beaulieu).

Another rare species, like the preceding. Easily recognized by the finely reticulate pleurae and the curious, large sheath with the "hook" (Figure 9).

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PLATE I

## EXPLANATION OF PLATE I

FIG. 1. Lateral view of abdomen of *D. illini.*
FIG. 2. Lateral view of hypothetical saw.
FIG. 3. Lateral view of saw of *D. neoaprilis.*
FIG. 4. Lateral view of saw of *D. acidus.*
FIG. 5. Lateral view of saw of *D. apricus.*
FIG. 6. Lateral view of saw of *D. albifrons.*
FIG. 7. Ventral view of abdomen of *D. similis.*
FIG. 8. Lateral view of sheath of *D. apricus.*
FIG. 9. Lateral view of sheath of *D. acidus.*
FIG. 10. Lateral view of sheath of *D. albifrons.*
FIG. 11. Tarsal claw of *D. albifrons.*
FIG. 12. Tarsal claw of *D. acidus.*
FIG. 13. Tarsal claw of *D. agcistus.*
FIG. 14. Tarsal claw of *D. bicolor.*
FIG. 15. Cephalic view of eye of subgenus *Dolerus* Jur.
FIG. 16. Cephalic view of eye of subgenus *Loderus* Kon.

ABBREVIATIONS USED

| | |
|---|---|
| *a*=ala | *lb*=lobe |
| *ac*=alar spines | *ln*=lance |
| *ad*=alar spur | *lt*=lancet |
| *b*=annuli | *s*=sternite |
| *c*=cercus | *sh*=sheath |
| *d*=tooth or *dens* | *sp*=spiracle |
| *hy*=hypopygium | *sr*=spurette |
| *j*=base of sheath | *t*=tergite |
| *x*=ventral spines | |

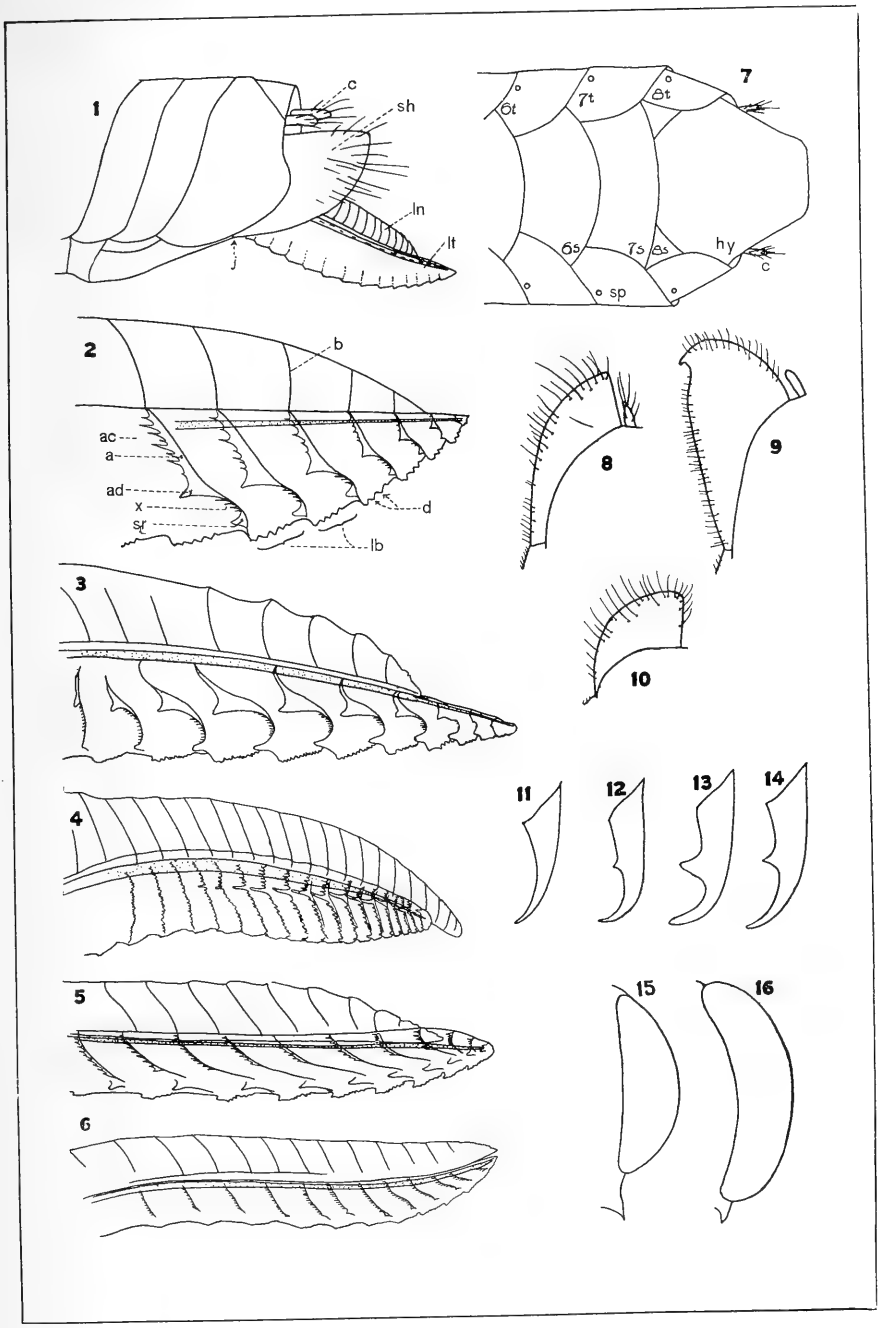
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PLATE II

## EXPLANATION OF PLATE II

FIG. 17. Lateral view of sheath of *D. tectus*.
FIG. 18. Lateral view of sheath of *D. sericeus* sub. *neosericeus*.
FIG. 19. Lateral view of sheath of *D. sericeus* subsp. *centralis*.
FIG. 20. Lateral view of sheath of *D. sericeus* subsp. *parasericeus*.
FIG. 21. Lateral view of sheath of *D. sericeus*.
FIG. 22. Lateral view of sheath of *D. unicolor*.
FIG. 23. Lateral view of sheath of *D. illini*.
FIG. 24. Lateral view of sheath of *D. borealis*.
FIG. 25. Lateral view of sheath of *D. versa*.
FIG. 26. Lateral view of sheath of *D. nortoni*.
FIG. 27. Lateral view of sheath of *D. collaris*.
FIG. 28. Posterior-lateral view of sheath of *D. collaris*.
FIG. 29. Lateral view of sheath of *D. bicolor*.
FIG. 30. Posterior-lateral view of sheath of *D. neogcistus*.
FIG. 31. Posterior-lateral view of sheath of *D. interjectus*.
FIG. 32. Posterior-lateral view of sheath of *D. distinctus*.
FIG. 33. Lateral view of sheath of *D. similis* (short type).
FIG. 34. Lateral view of sheath of *D. nicaeus*.
FIG. 35. Lateral view of sheath of *D. nasutus*.
FIG. 36. Lateral view of sheath of *D. neoaprilis*.
FIG. 37. Lateral view of sheath of *D. similis* subsp. *nescius*.
FIG. 38. Lateral view of sheath of *D. similis* (*plesius*, or long, type).
FIG. 39. Lateral view of sheath of *D. aprilis*.
FIG. 40. Lateral view of sheath of *D. elderi*.

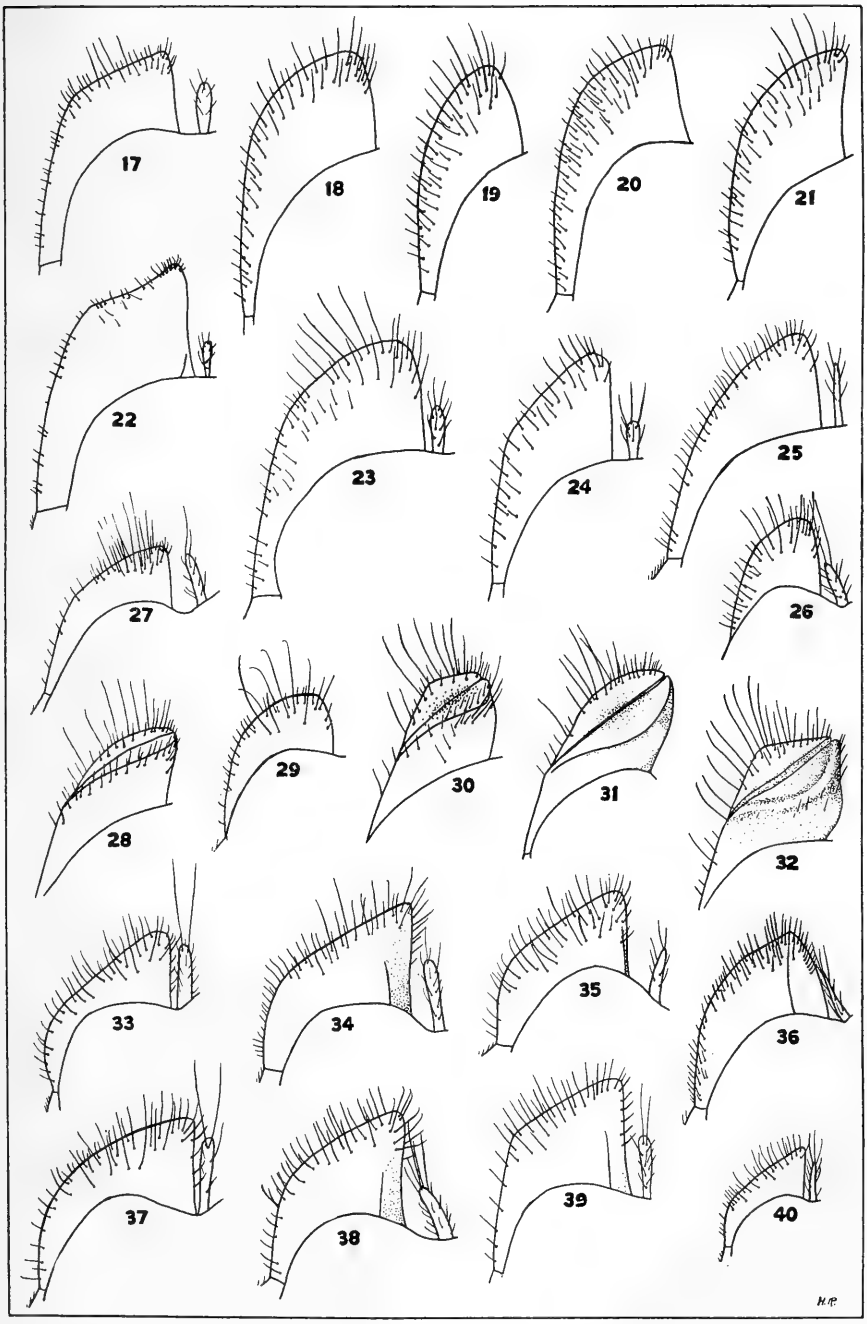
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PLATE III

## EXPLANATION OF PLATE III

FIG. 41. Apical portion of saw of *D. unicolor.*
FIG. 42. Ventral margin of saw of *D. unicolor.*
FIG. 43. Ventral margin of saw of *D. borealis.*
FIG. 44. Saw of *D. illini.*
FIG. 45. Ventral margin of saw of *D. illini.*
FIG. 46. Ventral margin of saw of *D. parasericeus.*
FIG. 47. Lancet of *D. neosericeus.*
FIG. 48. Lancet of *D. versa.*
FIG. 49. Saw of *D. clypealis.*
FIG. 50. Lancet of *D. collaris.*
FIG. 51. Ventral margin of saw of *D. nortoni.*
FIG. 52. Lancet of *D. neoagcistus.*
FIG. 53. Lancet of *D. bicolor.*
FIG. 54. Lancet of *D. agcistus.*
FIG. 55. Lance of *D. abdominalis.*
FIG. 56. Lance of *D. interjectus.*
FIG. 57. Saw of *D. elderi.*
FIG. 58. Lancet of *D. nasutus.*
FIG. 59. Lancet of *D. similis.*
FIG. 60. Lancet of *D. tejoniensis.*
FIG. 61. Saw of *D. piercei.*

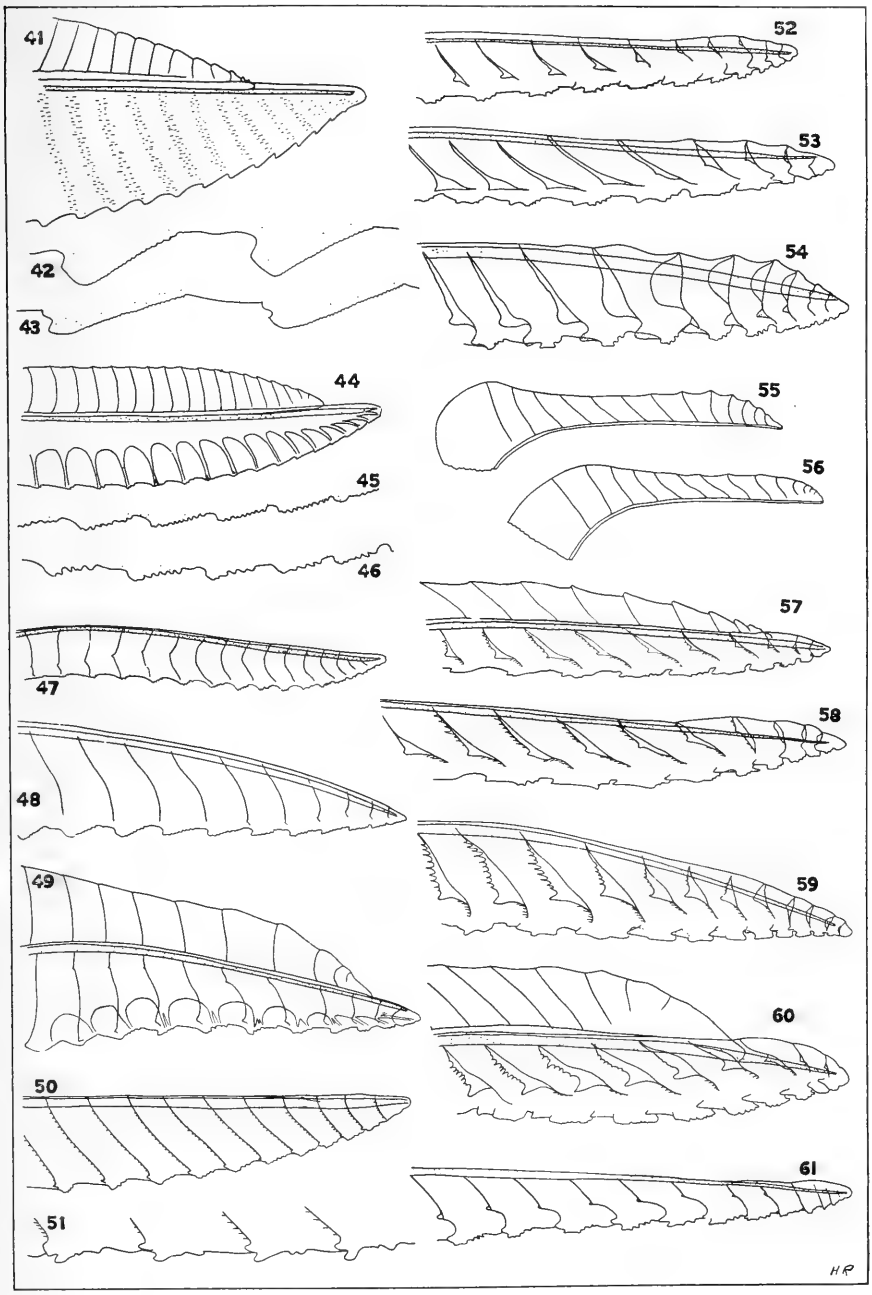
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PLATE IV

## EXPLANATION OF PLATE IV

FIG. 62. Dorsal view of head of *D. elderi.*
FIG. 63. Dorsal view of thorax of *D. elderi.*
FIG. 64. Ventral view of male genitalia of *D. acidus.*
FIG. 65. Ventral view of male genitalia of *D. unicolor.*
FIG. 66. Ventral view of male genitalia of *D. sericeus* race *centralis.*
FIG. 67. Ventral view of male genitalia of *D. agcistus.*
FIG. 68. Ventral view of male genitalia of *D. similis.*
FIG. 69. Ventral view of male genitalia of *D. frisoni.*

ABBREVIATIONS USED

*al*=anterior lobe, dextral half
*cl*=clypeux
*f*=vertical furrows
*g*=gonocardo
*h*=harpes
*ll*=lateral lobe
*m*=membrane of wing
*oc*=ocellar basin
*p*=penis rods
*pc*=postocular area
*po*=postocellar area
*pp*=praeputium
*pr*=pronotum
*px*=post-tergite
*sc*=scutellum
*st*=gonostipes
*v*=penis valves

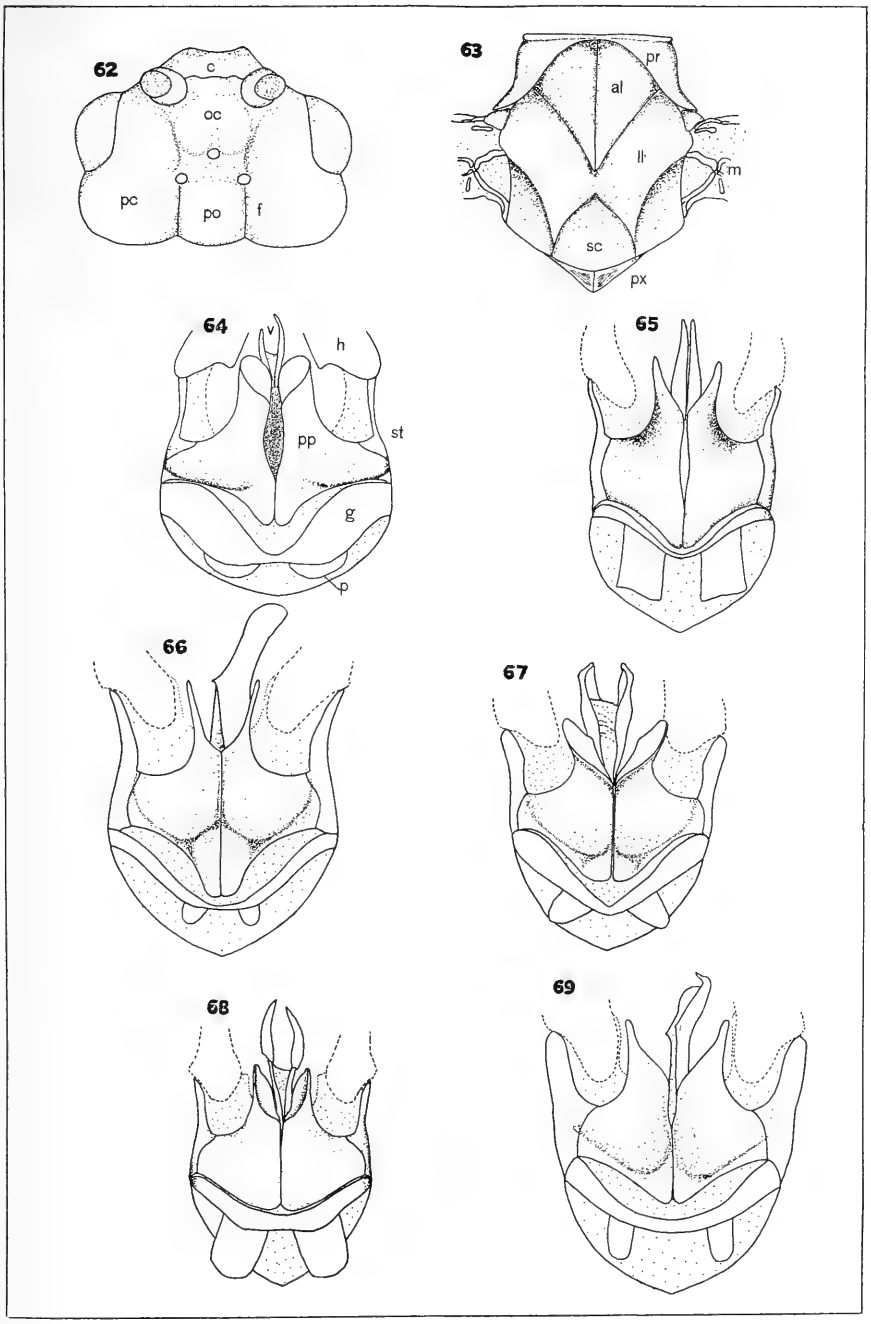
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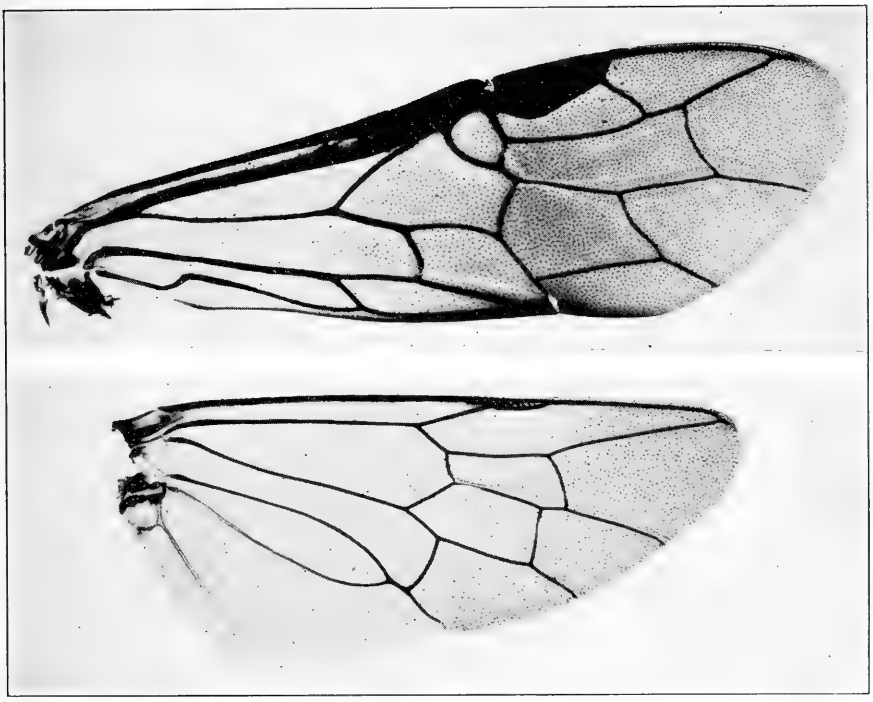
PLATE V

EXPLANATION OF PLATE V

FIG. 70. Front and hind wings of *Dolerus similis* (Nort.).

FIG. 71. Seasonal abundance of the commoner species of *Dolerus* at the Seymour habitat in 1929: 1, *D. agcistus;* 2, *D. illini;* 3, *D. aprilis;* 4, *D. similis;* 5, *D. apricus.*



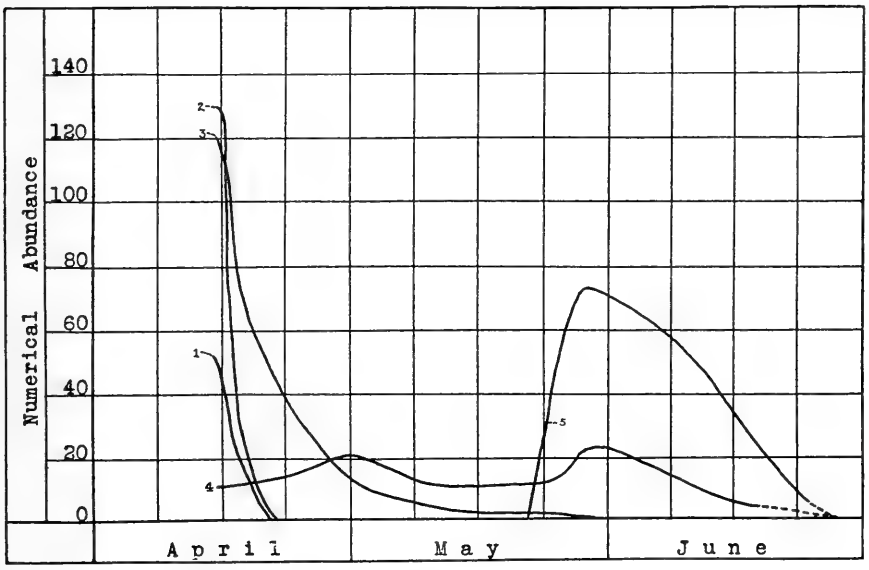

Numerical Abundance
140
120
100
80
60
40
20
0
1
2
3
4
5
April
May
June

PLATE VI

EXPLANATION OF PLATE VI

FIG. 72. Dolerus habitat along railroad tracks, Seymour, Illinois, April 20, 1929. Equisetum-Carex community.

FIG. 73. Dolerus habitat along railroad tracks, Savoy, Illinois, April 20, 1929. Equisetum community.

# INDEX

The names of all species, sub-species, and varieties are here listed under the four generic names, Dolerus, Dosytheus, Loderus, and Tenthredo. Those reduced to synonymy are indicated by *italic* type, and new names by **bold-face** type.