BULLETIN 341 FEBRUARY, 1929

ANTS AND THEIR RELATION TO APHIDS

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Table of Contents

	Page
Introduction	5
Acknowledgements	6
Historical Review	6
Life history and habits of the ant	8
Life history and habits of the aphid	9
Aphid enemies	10
Aphid protection and dissemination	11
Origin of honey-dew	12
Symbiosis	16
Intelligence of ants	20
Ants, aphids and plant diseases	22
Mixed ants	24
Records of definite aphids on one host plant with the number of different ant attendants	26
Records of the same ant attending the same aphid on different host plants	27
General relationship between ants and aphids	27
List of Colorado ants and records of aphids attended	30
A list of Colorado ants with the number of genera and species of aphids they attended	56
List of aphids with ant attendants	58
Aphid list with number of genera and species of ant attendants	71
A list of ants associating together in aphid colonies	74
A list of mixed ants with genera and species associating together in aphid colonies	79
Summary	80
Bibliography	81

ANTS AND THEIR RELATION TO APHIDS*

By CHARLES R. JONES

During the early spring of 1919, while conducting a class in life-history study of insects, I found that a certain aphid, (*Aphis poae* Hardy.) on the roots of *Poa* was a suitable subject for this early life-history work. Upon searching for and collecting these aphids I noticed that they were almost invariably associated with ants. This interesting fact caused me to look into the literature relative to this subject and, altho many references were found, it was almost invariably the case that only a mention of the interrelation was made and no definite accounts were found as to the real interrelationship of ants and aphids. Many conflicting statements were found and statements that seemed absurd. It was, therefore, decided to study these two insects in spare time, to determine some of the real facts concerning their symbiotic relation.

Statements were found to the effect that when a species of ants attends a colony of aphids the ants impart an odor to the aphids and no other species of ant will molest that particular aphid colony; that the ants actually induce the aphids to discharge the honey-dew, and great stress was laid on the intelligence displayed by the ants in their actions toward aphids; that a certain species of aphid on one kind of plant would be attended by a definite ant partial to that plant, and that when the same aphid was found on another host plant it was invariably attended by another species of ant.

Since Colorado contains both Boreal and Austral zones, it was deemed advisable to make large and numerous collections of ants and aphids in order to work up the ant fauna of the state which has only been partially studied and collected. The Aphididae have been previously and very diligently studied by Dr. C. P. Gillette and his colleagues.

The information contained in the following pages is based upon the study of ants that were actually noted attending aphids in their natural wild state. Observations were made wherever ants and aphids were found together. Much time also has been spent in studying entomological literature for information bearing on this subject and in bringing together the numerous isolated and scattered observations which have been published on the interrelation of these widely separated insects.

In making this study of aphid and ant association, upwards of 2,000 separate collections were studied, not all of which were mine. I wish, therefore, to express my appreciation to my collaborators to

*Part of the work submitted to the graduate faculty for the Degree of Doctor of Philosophy, major subject, Entomology, Iowa State College, June, 1927.

whom I am indebted for services rendered in various ways. I wish especially to acknowledge my indebtedness to Dr. C. P. Gillette, director, Colorado Experiment Station; Miss M. A. Palmer, delineator, Colorado Experiment Station, for assistance in determination of aphids, valuable suggestions, and proof reading; Dr. M. R. Smith, College Station, Mississippi; Professor A. E. Beardsley, Greeley, Colorado, for assistance in ant determination; Dr. Carl J. Drake, entomologist, Dr. W. H. Wellhouse and Dr. H. H. Knight, Iowa State College, for valuable suggestions and other assistance.

HISTORICAL REVIEW

The ant has attracted attention and has held the admiration of observers of nature from time immemorial. Its untiring exertions for the welfare of the community, its apparent devotion to and care of its young and its methods of obtaining, collecting and storing food materials have led to its being regarded as an insect of intelligence and of distinctive foresight.

The great Greek naturalist, Aristotle, extolled the sagacity of these 'bloodless animals.'' Ovid says, ''The ant does not bend his weary way to empty barns.'' Solomon* wrote about them thousands of years ago. Shakespeare put into the mouth of his delightful fool in King Lear the words, ''We'll set thee to school to the ant, to teach thee there's no labouring i' the winter.'' Cicero, without having read the Scriptures, ascribed to ants not only sensation, but mind, reason and memory.

Recent publications also contain much about ants. We need not believe all the fables about them. Error ultimately contributes to a more perfect knowledge, and despite the publications of the well-authorized facts discovered by careful observers, many of the old errors are still repeated by reliable authors.

The interrelation of ants and aphids is a subject that has claimed the attention of the most eminent naturalists for ages. Altho much has been written on this subject, a great deal has been taken for granted, copied and handed down from time to time regardless of the fact that the statements have been erroneous. Along with scientific advances, new facts have been discovered thru observation. Yet some writers have a tendency to repeat the long-established ideas, and others confirm pre-existing notions.

It was formerly supposed, and is generally accepted today, that aphids secrete a sweet substance, when in reality it is the excrementitious material emitted from the anus that the ant seeks. This is invert sugar. It affords a rich diet for various species of ants and is

*Prov. VI:6.

the prime cause for the existing relationship between these two groups of insects.

Goedart (125a) was probably the first person to observe the intimate relations between ants and aphids and he even went so far as to attribute conversation between them, saying that the two insects warned each other of their enemies. He published his observations in 1685 in De Insectis, London.

In the writings of Reaumur (383) in 1737, we find also that in his observation on the generation of aphids he noted the association of ants with them. The experiments which he began were passed on to Charles M. Bonnet, (381) then a young naturalist, and Reaumur encouraged Bonnet to extend these observations. Bonnet's aphid experiments were the sensation of the time, and in conducting them he also observed the ant associations.

Carl von Linne (195) noted that ants always were present on trees or plants where aphids abounded and his observations revealed the fact that the object of ant attendance was to obtain the sweet morsel of honey-dew emitted by the aphids. In his SYSTEMA NATURA, published in 1758, he said that "The ant ascends the tree that it may milk its cows, the aphids, not kill them." He likened the aphids to cows due to the fact that these possess terminal abdominal tubes or cornicles from which he stated that the sweet liquid (honey-dew) was emitted and collected on the tip of the abdomen when solicited by the ants. This idea was accepted, handed down and is in general the prevailing one today. He noted that the ants stroked the aphids with their antennae and likened this to thumbing the cows; hence the name, "*Hae formicarum vaccae.*"

A fairly good account of the existing relations between ants and aphids was next given by Abbe' Boisier de Sauvages (15). Aphid eggs in ants' nests however were first observed by the Rev. W. Gould (131) in 1747. He thought them to be a different type of ant eggs, but was not certain what type of ant individual they produced. De Geer (382) was the next to appear in press with an article on this subject.

In 1810, M. P. Huber (156) observed the same type of brown egg in ants' nests as Gould, and noted the great care with which the ants guarded and transported them to safety. In his experiments he bred aphids from these brown eggs. He believed the eggs were not ordinary eggs but merely developed and preserved by the ants up to a favorable time when the ants permitted them to hatch. He also was the first to note that ants enclosed aphids in portions of leaves in mud-constructed walls.

In 1828 and 1830, Gen. T. Hardwicke (136, 137) made a slight study of ants and aphids and published his observations on the "Love

of Ants and Aphids," and attributed this interrelation to the ant's fondness for sweets.

In 1845, E. Roberts (384) studied ants and aphids and published a brief paper on his observations, and in 1854 and 1857, C. L. Koch, (178) published an account of the relation of plant lice and ants. In 1860, Asa Fitch (90) noted the ant, *Formica*, attending aphids on a poplar tree and also noted that the peculiar odor of the ant was imparted to the aphid colony. He thought this odor proclaimed the ownership of the colony in question and that other ants would refrain from attending these aphids.

In 1867, O. Goureau (132) discovered the ant *Lasius flavus* associating with underground aphids on the roots of plants, and published his findings in the Annals of the Entomological Society of France.

In 1876, Sir John Lubbock (203) discovered aphid eggs in ants' nests and in 1877 he succeeded in rearing the aphids from them, the same as Huber (156, 157) did, but at that time was not aware of Huber's observations.

In addition to the specific citations, the relations of ants and aphids have been observed by Forel, 1874; Lichtenstein, 1877; Witlaczil, Trealease and Osten-Sacken, 1881-1882; Busgen, 1891, Forbes, 1894; Mordvilko, 1896, and others too numerous to mention. The most general and yet comprehensive works are by Huber, Lubbock and Mordvilko. Busgen's work, however, is the best on the yield of honey-dew by aphids.

Theobald (306) states that Walker says that when a certain species of plant louse is on one kind of plant that it is accompanied by a certain species of ants and that when the same aphid is found on another type of plant it is attended by another species of ant. He cites *Macrosiphum rosae* Linn. as occurring on teazle and roses. When it occurs on the former it is always attended by *Formica rufa*, and by *Formica nigra* on the latter.

LIFE HISTORY AND HABITS OF THE ANTS

An ant is an insect that is generally recognized by its anatomical structure and colonial or social habit. It belongs to the order *Hymenoptera* which also includes bees and wasps.

Ants pass thru indirect or complete metamorphosis and we find all four stages—egg, larva, pupa and adult—within the nest at almost any season of the year. The period of incubation is, on an average, 10 weeks, varying from 2 to 16 weeks, after which time the eggs hatch into footless grubs.

The colony life of the ants is a well-regulated one. They seem to be imbued with a strong sense of industry and loyalty, each indi-

vidual laboring, not for itself alone, but for all its fellows. A division of labor exists, groups of workers performing their definite functions at different stages of their existence.

Different species of ants vary greatly in the substances used as food, but in the majority of cases their nourishment appears to be sweet secretions secured directly from plants, as the nectar of flowers, or as honey-dew from insects, such as aphids, coccids, membracids, aleyrodes or psyllids, which is eliminated as a waste product from the alimentary canal.

Some ants will attack and devour any living thing that comes across their paths. Illingsworth (161) states that a large colony of the ant *Phcidole megaccphala* alone will collect daily over 100,000 other insects during its greatest activity. Others limit their food to vegetable materials. Most of them, however, have quite a range of food supplies and will feed upon almost anything. Some will feed upon dead animal materials such as insects, but are hardly ever thought of as scavengers, as they do not frequent decaying or foul-smelling substances.

LIFE HISTORY AND HABITS OF THE APHIDIDAE

Aphids are insects belonging to the order *Homoptera*, family *Aphididae*, and are commonly known as plant lice. They live either in colonies or singly, upon foliage, stems or roots of plants or enclosed in galls, or abnormal growths. They nourish themselves by sucking the sap from the plants upon which they live. They are remarkable for their peculiar mode of development the polymorphism exhibited in the different generations of the same species, and their extraordinary fecundity. This is not only due to the number of young produced by each individual but to the fact that the young mature in a very short time and begin to produce the next generation.

Aphids are plant feeders and attack the majority of cultivated and wild plants. The economic importance of this group is, therefore, very great. They do not confine their attacks to any particular portion of the plant but different species attack different parts, as root, twig, stem, trunk and leaves which are injured by their feeding upon them. The different food habits, consequently, result in a difference in life history of these pests and, while a great number have been thoroly worked out by specialists, many are yet unsolved.

Plant lice are, in most cases, very destructive insects and most plants are susceptible to their attacks. Their presence is manifested in various ways. They sap the plant of its vitality until it is permanently injured or dies. Certain species produce abnormal growths on the leaves or stems upon which the insect feeds. Some species

cause the twisting of the leaves which form a shelter in which the aphids live and produce their young in safety. Hollow galls are sometimes formed, inside of which the lice feed. Galls are produced on our cottonwood trees. On the elm leaves a gall is produced, which, due to its shape, is termed the cockcomb gall. Gall-like swellings are also produced on the roots of apple trees and grape vines due to injury from lice feeding upon the rootlets. The woolly aphis attack the former and the grape-phylloxera the latter. Aphid galls always have an opening to allow the exit of the lice. The ash trees also have an aphid that causes the terminal leaves to curl, forming a sort of a gall.

Wilting, malformations and discoloration of leaves and plants result from the attacks of aphids. Apples attacked by the rosy apple-aphis remain small, hard and bitter, and serious diseases like cucumber wilt, fireblight and oat blight, may be carried from infested to healthy plants by these insects (Gossard & Walton 128.) These insects feed by means of a slender piercing beak which they insert into the plant tissue, from which the plant juices are extracted. The foliage infested may literally dry up, with the common symptoms of the leaves curling.

APHID ENEMIES

Aphids have many natural enemies, among which the most important are chalcids, syrphids, coccinellids and chrysopids. Coccinellids feed upon them in the larval and adult stages.

Several years ago, while working out the life history of some chrysopids, the writer fed them on aphids and in many cases it was noted that the jaws of this little insect became so sticky with the waxy secretion from the aphids that it was impossible for them to open their mouths, so that in many cases, the experiments were lost. Miss M. A. Palmer, who worked on life histories of coccinellids of Colorado, also had occasion to feed her coccinellid beetles and larvae on aphids and in several cases she reports that the beetles became so smeared by the aphid waxy secretion that it was impossible for them to take any more food.* When chrysopid and coccinellid larvae feed upon plant lice they seize and hold them fast in their jaws until they are eaten bodily, or until all of the substance is sucked from their bodies.

Syrphid larvae also feed upon aphids but probably they are never killed from the effects of this waxy secretion. This was particularly noticed during the life-history experiments conducted by the author

*Ann. Ent. Soc. of Amer., 7:216.

when he was working up the Syrphidae of Colorado. Perhaps the reason for this is that when a syrphid larva seizes an aphid, it immediately raises the aphid into the air entirely free from the leaf; thus the latter does not have a chance to smear the mouthparts of its enemy because it has no footing. Marsh (210) in 1909, at Rocky Ford, Colorado, noted that the ant *Formica cinerea* var. *rufibarbis* Forel. was commonly found attending the melon louse, *Aphis gossypii* Glov., on cucurbits and he noted that it carried off the natural enemies of the louse such as lady bird beetles, chrysopids and syrphid larvae, and that where ants were abundant these natural enemies were very scarce and the aphids thrived in a healthy manner.

As shown above, ants to a certain degree protect aphids from many of their natural enemies, probably with the exception of syrphid larvae, as these insects can be found in almost any aphid colony and at any time. The larval habit of sticking closely to the leaves and remaining motionless when they are not feeding probably accounts for their presence. The other insects can be seen at almost all times running about the colony, and undoubtedly they attract the attention of the ants.

APHID PROTECTION AND DISSEMINATION

That aphids and aphid eggs are found in ants' nests and are protected thru the winter has long been known and citations have been given on this subject. There are certain aphids that cannot exist without the aid of ants. Forbes (107) has shown that the corn root-louse is absolutely dependent upon the cornfield ant for its existence, that this aphid is treated with the greatest care possible and that each ant has its particular charge. In his paper (101) on "The Corn Root-Aphid and its Ant Attendant" Forbes makes the following statement. "An ant coming up with a young aphid in its mandibles, carried this about 2 feet and placed it on a smart weed near the ground. Within the next 20 minutes, six more ants each transferred a single aphid from their underground burrows to smart weeds above the ground. In about an hour and a half one of the ants returned for its aphid and took it to the nest, and 35 minutes later all had been carried back. One of these ants, which was so marked that it could be recognized on its return, carried to the nest the same aphid which it had previously brought out."

Gossard (126) mentions ants taking the aphids below ground at night and returning them to their food plants when the sun is bright, and transferring the wingless aphids from plant to plant when the food supply becomes short, in order that the ant may get an abundance of honey-dew. Beyer (12) states that the citrus aphid cannot

survive when not attended by ants of the genus *Camponotus*. When this ant is absent the aphids become entangled in the honey-dew and die. Webster (337) noted the care that *Lasius americanus* Linn. gave to the peach root-louse and found that the ant moved the aphid about in the tree. He thot that it also conveyed it to the rootlets of the plant.

Thomas (307) is of the opinion that ants are entirely responsible for the spread of all aphids. Chapin (28) and Comstock (46) have also made observations on ants protecting wintering aphids. The writer has noted on numerous occasions aphids and aphid eggs in ants' nests in both summer and fall respectively, but no extended experiments were done along this line. The eggs in the fall were found in great numbers. Tanquary (290) found aphid eggs in ants' nests in the fall in surprisingly large numbers, 894 eggs having been found in one pocket in one ant nest. These eggs are kept separate from those of the ant brood. There was more than one pocket in a nest, so a single colony of ants would carry thru the winter thousands of aphids in the egg stage. Forbes (107) also found that the corn-field ant collected and harbored numerous aphids during the winter.

To protect their herds, ants build various structures over their aphids. The prevailing idea is that these shelters are to protect the aphids from their natural enemies, which they do, and to keep the aphids in a definite place. Stopes (288) and Brandes (20) are of the opinion that these shelters increase the honey-dew output as they keep the aphids warm and give them a longer feeding period. Brandes says, "Aphids are inactive early in the morning and the sheds built over them by the ants help to keep them warm and thus afford a longer feeding period and in consequence more honey-dew."

Cremastogaster are known as "tent-building ants" due to this habit. Several observations have been made on these ants and it was found that they constructed the sheds over the aphids at any place on the plant. *Lasius niger* var. *americanus* construct semi-sheds along branches that lie on the ground and their aphids are kept in these sheds.

ORIGIN OF HONEY-DEW

Honey-dew is a sweet fluid, the origin of which was a topic of much speculation among the ancients. It is now known to be derived from the sap of plants, and occurs, in nature, on many species of plants and is the name given to the excrementitious material of aphids. Ants obtain it in two distinct ways. First, from plants directly as a secretion from the small nectar-secreting glands of the plant which are situated on their leaves, stems or buds; second, and in a larger

quantity, from a group of insects which suck the juices from the plants. These insects, such as aphids, coccids, leaf-hoppers, mealy-bugs and psyllids, puncture the plant tissue and extract from it large quantities of juices which consist of a solution of cane sugars, dextrin and other sugars with small amounts of other substances. In the alimentary canal of these insects, the cane sugars are acted upon by the enzymes probably in the same manner as nectar in the stomach of the honey bee, and split up into invert sugar of which the necessary amount is assimilated. This, however, is relatively small in proportion to the entire amount ingested, consequently the excrementitious material is quite abundant and contains a large amount of invert sugar, the same as honey.

Many species of aphids are provided on each side of the sixth abdominal segment with a pair of tubules that open to the exterior. These tubules are termed siphons, cornicles, or nectaries. Early observers noted small drops of liquid exude from these, as well as from the anal opening, and supposed it to be the honey-dew of the aphids. Linne made the statement to that effect, and this erroneous statement has crept into our modern literature. Kirby and Spence (174) in their "Introduction to Entomology," state, "This fluid, which is scarcely inferior to honey in sweetness, issued in limpid drops from the abdomen of these insects, not only by the ordinary passage, but also by two setiform tubes placed, one on each side, just above it."

This statement is also repeated in the revised edition of the same publication of 1878, p. 335. G. B. Buckton (26) in his "Monograph of the British Aphids," says ..... "many species of aphids voluntarily yield honey-dew from their nectaries at the call of the ants;" and again (25) in speaking of Heyden's discovery of aphids with ants he says, "The part played by these aphids in the economy of these ants is not very obvious. Their presence can scarcely be for affording food to their hosts, for the absence of nectaries seems to preclude the secretion of the nutritive honey-dew." Hyatt and Arms (159) in their textbook published in 1890, also mention "honey-dew is secreted thru the cornicles." Tenny (291) also makes this same statement. Even Comstock in his early edition of "The Study of Insects" p. 157, stated that ..... "The fluid which is excreted thru the abdominal tubercles is a substance known as honey-dew." We may find this erroneous statement in almost any popular article of today. Observations of our more recent authors, such as Busgen, Kolbe, Mordvilko and others have, however, disproved these statements, and their investigations have shown that the material issuing from these cornicles is of a waxy consistency and does not contain any of the properties of honey-dew. Witlaczil (328), however, mistook this waxy substance for sugar crystals and claimed that large

"sugar cells" upon coming in contact with the air, underwent destruction and the sugar crystallized into needles thus forming a radiated crystalline mass, and that by pressing lightly on the body of the insect, small lumps of crystallized sugar would appear at the tips of the honey tubes or cornicles.

Busgen (27), however, does not agree with Witlaczil and emphatically denies that the secretion from the cornicles is sugar. He has shown by chemical analysis that it is more like wax; that the secretion from the cornicles hardens almost as soon as it comes in contact with the air and forms a wax-like mass, which can be crushed easily between the teeth and is almost tasteless. Bunister confirms Busgen's statements.

Reaumur (c) and Kaltenbach (169) were probably the first to announce that this honey-dew did not come from the cornicles but issued from the anus. Forel advanced the idea that the cornicles do not secrete a sweetened substance but a waxy gluey secretion, not coveted by ants, and that the honey-dew so much sought by the ants was also produced by scale-like insects that possess no cornicles. The silvery droplets of sugar which the ants obtain is in reality excrementitious material produced by the insects in question. Hence the first opinion of Linne that the aphids secreted a sweet substance thru the cornicles must be abandoned.

The waxey fluid secreted by the aphids is in reality a protective substance. Coccinellid and chrysopid larvae that have been fed on aphids have been noted to have their faces so smeared with this wax that the feeding process was impaired and after a time death was a result.

The excrement, or honey-dew is in a great many cases taken up directly by ants as it leaves the body of the aphid or other insect, but in cases where there are not sufficient ants to consume all the honey-dew produced by a colony of aphids it is thrown off from their bodies and the ants that are not habitually aphid attendants lick it up from the leaves upon which it falls. Bees and wasps are also very fond of this material and in case of a dearth of honey flow, honey bees will collect this material and store it away.

Many species of ants that are habitually aphid attendants have become very proficient in the art of stroking the aphids with their antennae and causing the plant lice to emit the honey-dew at the time the ant is there to imbibe it. In cases where ants are absent from colonies of aphids and the honey-dew is discharged on the leaves, it will, especially during dry weather, form a varnishy coating over the leaves. This coating interferes with plant respiration and is a good medium for the growth of a destructive leaf-fungus.

Not all aphids are attended by ants and likewise all kinds of ants do not attend aphids. While certain kinds of ants live exclusively at the expense of aphids, others utilize them only to a very slight degree, and there are others that do not pay any attention to them at all.

Early authors such as Huber (156) and Lubbock (202) have heretofore made certain observations on the relation of ants and aphids and these observations have been confirmed by subsequent observers. That there is an intimate relation has been definitely established.

Ants are enticed to aphids by the liquid excrement. This excrement, as has been shown heretofore, comes from the anal opening and not from the cornicles, and in species of aphids that are habitually attended by ants, it collects on the little group of posterior abdominal hairs in a light, spherical drop.

It has been the prevailing idea that these drops of honey-dew are never emitted unless the attending ant is present but such is not the case. Any stimulus such as shaking the leaves or a slight jar will cause the aphid to emit the excrement. Then again when the body of an aphid becomes filled with the excrement it naturally has to emit it, and in this case the aphid will raise the tip of its abdomen and, with a quick side-wise jerk, apparently try to throw the excrement some distance from its body. When the liquid falls on the leaves in a considerable amount it drys and forms a shiny viscid layer, and in this layer the case skins of the aphids collect in great numbers. It also furnishes a good medium for the propagation of a fungus, stops the breathing pores of the plant and in consequence thereof, is very detrimental to the plant itself. Aphids that are constantly in the care of ants naturally emit the honey-dew very slowly at all times, even when the ants have been kept from them long enough to allow the excrement to accumulate in their bodies in large quantities. In such cases when emitted the honey-dew can be noted to be held on the abdominal hairs where, if it is not removed, it will dry and form a viscid covering at the tip of the abdomen, which might be very detrimental to the aphid. Aphids, on the other hand, that are not continually or are only frequently in the care of ants, such as *Myzocallis* or *Rhopalosiphum*, (which are at times attended by ants such as *Formica fusca* var. *argentea* Whlr.) allow the honey-dew to come from their bodies slowly in the presence of ants, but when the ants are not at hand the excrement is squirted, so to speak, with a quick body movement, away from the aphid itself.

Some aphids such as, *Melanoxantherium bicolor*, are only occasionally attended by ants. Members of this species generally live in very large colonies on Salix, and excrete so much honey-dew that one can notice at any time during the day the little silvery droplets that

are thrown from their bodies, glistening in the sun as they fall to the ground. In this case the leaves and the ground under infested trees are always blackened by the fungus growth which attains a good footing in this medium.

The benefit derived by ants from plant lice has long been known. Many species of ants obtain a considerable amount or all of their food from aphids and other insects, honey-dew constituting a greater part of their food. In what way the plant lice profit by this association is not fully understood. The slight amount of protection afforded by the ants in occasionally driving away parasites and other insect enemies from the aphid colonies, can hardly be sufficient to account for this relationship. The fact, not generally known, that certain ants collect and preserve in their nests, the eggs of aphids during winter indicates that there are more important relationships between the two groups of insects than would at first appear. As shown by Forbes (107), *Aphis maidis* is entirely dependent upon *Lasius niger americanus*. This ant in early spring mines along the principal roots of corn, collects wingless aphids that have hibernated in the earth and conveys them into burrows where they watch and protect them. His experiments indicate that these plant lice are unable to establish themselves upon roots of corn without aid of the ants even if placed in great numbers at the base of the hill of corn.

Beyer (12) has shown that the citrus aphid cannot survive without ant attendants, due to the fact that the aphids become entangled in their honey-dew and soon die. Tanquary (290) and others including the writer have actually shown that many aphid eggs are stored in ants' nests in the winter.

Aphids are of great service to ants from the food standpoint and the aphids profit by the relationship as shown above. Many of them are habitually with the ants and many ants when disturbed will seize the aphids in their charge and carry them away to safety.

SYMBIOSIS

One of the most interesting phenomena of ant life is the symbiosis or living together of different species of ants, and of ants and other insects. According to Wassmann the symbiotic relations between different ants and other insects vary greatly. Some relationships are mutually useful, others parasitic, etc. Symbiosis between different ants may include connected colonies whose relations are hostile, friendly, or indifferent, and mixed colonies which usually involve either slavery or social parasitism. Cases have been cited (Wheeler 380) where three different species of ants occupied the same colony at the same time. The red ant, *Polyergus rufescens*, lives with *For-*

mica sanguinea, the latter probably the slave of the former. *Formica sanguinea* usually exists with captive workers of *Formica fusca* and cases have been recorded where a colony of this species, becoming queenless, accepted a young queen of *Formica pratensis*. Thus we have a mixed colony containing three different species. *Anergates* and *Tetramorium* have been known to become mixed in the same way.

The writer has found ant-hills where the galleries of the two species communicated, but the fusion of the nests was incomplete. Small ants also make their abode in hills of larger ones (*Pogonomyrmex* and little red and black sp.). In the mixing of little and large ants, the latter generally feed the former. Miss M. Holliday has found at least 10 varieties of workers of a small ant that live as guests of a larger species.

The myrmecophilous insects are not limited to any single order. Wasmann in 1900 recorded 1,177 arthropods living in ants' nests. These live either part or all their life in the ant-nest and are as follows:

993 beetles—Coleoptera, 22 families.
76 Hemiptera—15 plant lice and scale insects.
39 Hymenoptera—22 of which are other ants.
26 Lepidopterous larvae.
20 Thysanura.
18 Diptera.
7 Orthoptera.
1 Pseudo-Neuroptera.
34 mites.
26 spiders.
9 Isopod crustaceans.

The author has frequently found white ants associating with *Pogonomyrmex* in addition to great numbers of the above-mentioned forms.

While most of these are purely commensals, some are purely symbiotic. A great many of the insects, especially the beetles, show amazing modifications in body structure. These are usually degenerative. In adaptation to this extraordinary life a great many of the myremecophiles secrete a sweet substance which is readily devoured by the ants who in turn care for, clean, protect and feed the symbiotes by regurgitation of sweetened materials.

The interrelation of ants and aphids is very pronounced. Here we have two widely separated groups of insects, the one cultivating,

fostering and protecting the other, with a care almost human. This dependency and relationship has become, thru the lapse of time, so well established that certain plant lice would cease to exist (Forbes, 107; Beyer, 12) were it not for the care given them by the ants. However, this is not true of the ant as in cases when the aphids cannot be obtained the ants are capable of obtaining other kinds of food upon which they exist.

As a whole, however, we may say that there are two general types of insects found in ants's nests. First, those that maintain themselves in nests in spite of the opposition of the colony, and are generally commensals or parasites; and second, those that the ants foster and from which they derive a direct benefit. Slavery can be considered under the latter. Plant lice are the best known and most common guests due to the abundance of honey-dew they furnish upon which the ants feed.

Ants may be classed under three general groups relative to aphids.

First, those ants that visit aphid colonies on vegetation for the purpose of securing honey-dew. These ants, by stroking the aphids with their antennae cause them to emit drops of honey-dew which the attendants consume. In return for this sweet morsel the ants drive away the natural predaceous and parasitic enemies of the aphids.

Second, those ants that construct galleries along the roots of plants upon which certain root-aphids feed. In this case the ants bare the new roots so as to afford sufficient new feeding grounds as the aphids increase.

Third, and probably the most important from an economic standpoint, those that actually gather the winter eggs of aphids and take them into their nests where they are carefully guarded. As these eggs hatch the following spring the ants carefully convey the small plant lice to a place where food is readily obtainable and disseminate the species when necessary. Cases have actually been reported where this type of ant captured the adult female aphid, clipped her wings and carried her below ground to oviposit. Kirby (176) says, "But according to some recent observations of M. Lichtenstein, a French entomologist, who made a special study of the *Aphides*, *Formica*, *Fuliginosa* is not content to watch over colonies of *Aphidae*, or to keep herds in its nest, like other ants, but actually superintends their breeding in a manner which could hardly be imagined. Many *Aphidae* exhibit the phenomenon known as alternation of generation; that is there is a winged sexual brood, and a wingless asexual brood; and sometimes the former lives in the open air, and the latter on the roots

of plants. When, therefore, these ants meet with the winged *Aphis* about to lay eggs which will produce a subterranean brood, they first clip her wings to prevent her escape and then open a way for her, and guide her down to the roots of the grass.''

This observation seems to be more or less mythical and was probably not made on the true family Aphididae, as our egg-laying aphids of this family proper, not including the *Phylloxeridae,* are all apterous, with the exception of *Phyllaphis coweni* Ckll. and there was only one record where the female egg-layer was winged. Still there may be some European species that are not known to me that have this characteristic. Then again this clipping may take place for the reason which Mordvilko (224) thinks—to remove the wings because they hinder the ants in collecting the honey-dew. Aphid eggs are carefully guarded and protected as before mentioned. When nests that contain these eggs are disturbed the ants will as readily carry them off to safety as they do the young of their own species.

Ants' nests are found in fields, woods, under stones, in houses, in trees, among leaves and in fact everywhere. The structure is varied in accordance with the place chosen. Some occupy ready-formed cavities, others construct mounds with long distinct intricate galleries. These abodes are primarily for the ants, but as shown above they contain a distinct fauna in themselves. Some of these live partly on the ants while other species are symbiotes which are never found elsewhere. Ants' nests are therefore something more than a dwelling place for ants themselves. They are inhabited by a cosmopolitan group of insects, the ants acting as the builders and dominators. In addition to the ants the principal inhabitants are Coleoptera, Hemiptera, Homoptera, Lepidoptera, Diptera, Isoptera and Hymenoptera.

There may be recognized five groups of myrmecophilous insects:

1. Those that are captured by the ants and brought to the nests as a source of food supply.
2. Those found in the ant nest only in the larval stage.
3. Those found as adults, the life history of which is not known.
4. Accidental species, those found elsewhere and in ant nests.
5. True parasites of the ants that feed upon the ant larvae.

The aphids come under the first group and play a very important part in ant life, as the ants feed upon the honey-dew. The ants not only protect the aphids in their nests during winter but they collect the eggs and actually rear them in their nests and provide homes for them when necessary.

Lasius makes its nest under stones and close to the roots of shrubs and trees and collects thousands of eggs, probably *Pemphigus*, which it places around the cleared roots of the trees. When the aphid hatches, its food supply is near at hand. The ants in turn feed upon the honey-dew of the aphids. When the aphids obtain wings they fly to the alternate host plant and the ants must collect a fresh supply of eggs for the succeeding year. In cases where the aphids live in the open the ant is compelled to take another means to protect them. It then constructs sheds or tents for the lice and thus protects them from their enemies.

In this category also should come the slave species which are captured and enslaved by the owners of the nest. The purpose of the soft-bodied larvae of Lepidoptera, Coleoptera and Diptera in the ant-nest and what they feed upon is a mystery. Why these are not devoured by the ants is still undiscovered. Perhaps they feed upon the decaying and fermenting vegetable matter in the nest and act as scavengers, and in this way being useful, are tolerated by the ants. No records have been made showing that the ants try to retain the adult insect.

INTELLIGENCE OF ANTS

The ant has reached the climax of development in instinctive acts in the insect kingdom and one would consider, at times, that there is real intelligence displayed, but intelligence is the power of deliberation and acting with self-conscousness and applying new means of attaining various purposes. At times this seems to be displayed, then other actions show they are purely instinctive. The keeping of aphids by ants is likened to man's keeping cows for their milk. Aphids yield honey-dew to ants when they apparently solicit it by touching the aphids with their antennae, first on one side then the other. "Thumbing" apparently stimulates the aphid and is supposed to be necessary to start the act of expelling the honey-dew. If anyone will notice the actions of any species of ant he will notice that, regardless of whether an ant is in an aphid colony or on the bare ground, the antennae are constantly in motion with this supposed "petting" movement and, if the individual comes in contact with a stone or any other object in its way, it will hesitate and place one antenna, then the other, first on one side, then the other of the object in the same manner as will be observed in the aphid colony. The ants are either smelling or feeling as the sense organs, olfactory and tactile, are located on the antennae, hence these movements. The supposed "petting" is, therefore, not for the purpose of causing the aphids to emit the sweetened excrement. The statement "in the ab-

sence of this particular stimulation aphids will never excrete until compelled to do so by the superabundance of the accumulating excreta," very often occurs. Again this is erroneous for, if anyone will slightly shake a colony of aphids he may readily observe the little droplets of excreta given off by them. If a person takes a stiff hair' piece of grass or in fact any other object and gently touches the aphid, either on its back or sides, the same results will be obtained as in the case of the ants.

Holder (150) compares the intelligence of ants to that of man in the way they handle different types of aphids. Dixon (72) states that "Ants look into the future in their protecting aphids and constructing shelters over them," and that ants really domesticate aphids. In Sharp's (276) article ants are spoken of as treating aphids with great intelligence in the manner in which they cause them to produce honey-dew, and it is stated that all the acts of ants are acts of intelligence. Gossard (126) speaks of ants as attending aphids and aphid eggs in a human-like manner, taking the former below ground at night and returning them to their food plants when the sun is bright, and transferring the wingless forms from plant to plant when the food supply becomes short in order that the ants may have an abundance of honey-dew.

Bethe (365) concluded in 1898 on the psychological qualities of ants and bees that "They learn nothing, but act mechanically in whatever they do, their complicated reflexes being set off by simple physiological stimuli." Wheeler, (380) in Ants in Mixed Colonies, cites Forel's experiments with the Algerian ant stopping its entrance when annoyed by *Lasius niger* and *T. caespitum*, and Wasmann's observations on *Formica sanguinea* acting in the same manner when attacked by *Formica pratensis*, do not agree with Bethe's conception that ants are "reflex machines."

Experiments with ants and plant lice along this line were conducted by the author with the following results:

Several small lice (*Geoica* sp.) were dropped in the vicinity of a nest of *Lasius* sp. They were taken up by the ants and carried into their nests. The ants backed into the holes dragging the aphids after them. Later they were found eight inches under the ground on plant roots.

A large louse of a different species was dropped near the nest to determine whether the small ants could carry it away. The first ant that discovered it walked to the louse and stroked it with its antennae, then seized the louse by the thorax and proceeded to drag it

to the nest. When the course became too rough the ant could not drag the aphid because the louse held with its feet. Soon, other ants came to assist the first, but each individual ant seemed inclined to go in a different direction and in time they wore themselves out pulling against each other. The aphid remained motionless until the ants let go of it, when she walked away unnoticed. The young lice that were dropped on the hills were taken up immediately and carried away by the ants.

ANTS, APHIDS AND PLANT DISEASE

In agricultural and horticultural practices of today it has become necessary to turn our attention in the direction of controlling insect and fungus pests. Economic considerations generally compel the grower to aim at a larger crop; in consequence, losses caused by diseases and insects may be very heavy. We find numerous insects that are responsible for the spread of fungi and other organisms of plant disease and the ants play a part in several cases, either in disseminating plant disease, by acting as direct carriers, or by fostering some other insect that is instrumental in the spread of plant disease.

In viewing any insect in the connection that probably exists between it and the rapid spread of any plant disease there are certain conditions that must be fulfilled before the insect can be considered a vector. It must first occur in abundance in the diseased fields and where the disease is spreading, and live upon that part of the plant where the infection occurs.

Aphids puncture plant tissue and are readily disseminated by ants which almost invariably place the plant lice on the tender growing parts of the plants in order that the lice may have an abundance of succulent food and thus yield an abundance of honey-dew.

Marsh (210) noted that *Aphis gossypii* Glov. was very instrumental in the spread of cucurbit wilt and that when the attending ants were abundant this disease was more noticeable.

Charden (28) discusses *Aphis maidis* as being protected by ants and regards this aphid as being responsible for the spread of mosaic disease of sugar cane.

Hawley (144) says the hop louse, which deposits its eggs on the plum, injures the hops in two ways, by stunting the cones and by the honey-dew coating on the leaves which gives a suitable place for the growth of the fungus *Cladosporium.* "It has several ant attendants." Carpenter (31) also discusses fungi and honey-dew and Chase (31a) called attention to the great amount of honey-dew that is secreted by *Aphis pomi* De Geer and the effect of the fungus

disease that develops in it when there are insufficient ant-attendants.

Ants encourage the multiplication of aphids and these pests are capable of transmitting plant diseases as is shown by Gossard (127) (128). Fire blight *Bacillus amylovorus* is known to be spread by them.

Illingsworth (161) instead of regarding ants as being noxious in their relation to aphids claims they are beneficial because they remove the honey-dew and thus keep in check the destructive leaf fungus.

Clay (36) states that Melon wilt is disseminated by *Aphis gossypii* Glov. and that this disease is more prevalent when there is a great number of ants attending this aphid. This is due to the fact the ants keep away the natural enemies of the aphids. Frontanel (119) discusses the uncovering of roots of plants for the purpose of propagating aphids and the detrimental effect to the plants.

That ants play an important part in the dissemination of various plant diseases has already been suggested by various authors. Altho they are supposed to feed upon fluid or semi-fluid substances, Bailey (361) has shown that they have a curious infrabuccal chamber into which pass spores, fragments of mycelia and bits of decaying plant tissue, which become mixed with food residues, minerals and vegetable detritus, forming a pellett which is later voided upon any convenient surface. The composition of the pellett suggests that of a culture and is a potential source of infection. It has been demonstrated that hyphae and spores in these pelletts are actually viable and give rise to luxuriant growth of hyphae. In view of this fact, it seems probable that ants are very active in the dissemination of many of our higher fungi.

Several other authors have shown conclusively that ants are directly or indirectly, in accordance with their association with other insects, disseminators of various plant diseases, and that they are responsible in many cases for the death of plants. Hawley (376) noted that all the pine trees on a given area were killed by the ant, *Formica exsectoides*. This area had a radius not to exceed 10 feet capable of containing 40 trees; he concluded that the ants attended aphids on this area and that the death of these trees was caused by fungi or bacteria that were disseminated by insects.

Pear-blight dissemination has been traced directly to ants. Caesar (366-367) in his discussion on this disease claims that ants transmit the disease organism to the blossoms where they feed, and that bees pick up the organism in gathering nectar and spread it about the

orchard. Jones (376) also states that pear blight is transmitted by ants.

In greenhouses the common red ant, *Pheidole anastassi*, which is very active especially on the leaves of the plants which are near the ground, were found by Grevatt and Marshall (375) to be the bearers of numerous urediniospores and sporidia of *Cromartium rubicola* which adhered to their bodies, and after the ants fed on different spore stages their excreta and alimentary canal contained urediniospores, thus making them very instrumental in the spread of this fungus.

The fungus diseases of rubber trees on Malayan plantations have been augmented by ants as is shown by Sharples (379). His experiments show that ants in walking over spore-producing fungi carry away numerous conidia or ascospores attached to their appendages and transfer them to other trees.

Ants in their relation to plants are not only detrimental thru the spread of plant diseases but certain species completely defoliate trees, others carry away seeds, others eat the germ from the seeds of field crops, while others infest and destroy thru their excavation processes numerous valuable forest trees.

Cornwall (371) in his studies of Leishmania concluded that there was a possibility of ants carrying the organisms of this disease and transmitting it by contamination.

MIXED ANTS

In making collections of ants that attended aphids it was often noted that there seemed to be, in many cases, more than one species of ant that attended the same colony of aphids at the same time. This is, however, contrary to the general belief, as only one species of ant is supposed to attend any definite colony of plant lice. The ants are supposed (Fitch, 90) to give a distinctive odor to the aphid colony which proclaims it as personal property. This again is erroneous and misleading, as it was found when the determinations of ants were made that as many as three species of ants were taken at the same time on the same plant, and in many cases as many genera. This is not surprising when we look over the work that has been done and find how many different ants live in mixed colonies (Wheeler, 380), (King, 172).

In view of the number of mixed ants found in aphid colonies, it was decided to try to ascertain if any ant could be introduced on a plant where other ants were attending aphids. Capturing ants, apparently of the same species as those already on the plant, and placing

them on the plant where the aphids occurred, it was noted that the ant rushed over the leaves, or up and down the stem in rather a frantic manner. The ants already on the plant, upon encountering the introduced ant, appeared to give chase, and the stranger either rushed rapidly down the plant or jumped off. This experiment was repeated several times, and with ants which were known to be of the same species as those originally on the plant, and in all probability ants from the same nest, but with the same result. It was decided that the capturing of the ant with tweezers caused it to become disturbed or frightened and its quick movements on the plant caused the other ants to take up the chase.

These experiments do not exactly agree with Oestlund (234) who tried to mix 4 species of ants that occurred with one species of aphid, (*Aphis thaspii* on *Thaspium aureum*). All trials that were repeated several times, to cause the ants to mix on an individual plant, failed, the ants introduced always being attacked and driven away by those in possession of the aphid colony. When an ant of the same species as those with the aphids was placed on the plant, it had perfect freedom with the aphid colony.

In collecting the ants and aphids it was often noted that all the ants were not of the same pugnacious nature, while some of them were apparently ready for a fight, others did their best to get away and in many cases it was really difficult to get enough of the attending ants to make a good collection.

Camponotus, *Formica* and *Myrmica*: Two subsp. of *Camponotus* and *Formica*: *Camponotus* and two of *Formica*: *Lasius*, *Formica* and *Camponotus: Lasius*, *Myrmica* and *Formica: Pogonomyrmex*, and two species of *Formica* were the combinations of three genera taken from the same aphid colony at the same time and various combinations of two species as is shown in the list of ants associating together in aphid colonies. *Formica* seemed to be the predominating ant that mixed with the other ants. In something over 2000 collections it was found that 10 percent of the ants were mixed. It was not determined whether the mixed ants came from mixed colonies in every case or whether they naturally mixed on the plant. In some cases they were from mixed colonies as the determinations of ants collected from colonies showed; however, in all probability in most cases they mixed on the plant.

Almost all ants are apparently friendly towards aphids, even those species which only occasionally collect honey-dew or even those that do not collect it at all. In going over the literature only three papers were found that suggested that ants ever kill aphids.

Gruenberg (133) in speaking of the relation of plants to ants states that the *Cecropia* tree of South America contains the "*Azteca*" ant which gains entrance to the internodes thru small openings. This ant is said to protect the tree from all invading insects except one and destroys all plant lice. The excepted insect is a wasp and it appears that this wasp only builds its nest in trees that are inhabited by the "*Azteca*" ant. A similar case is cited by Schwarz (275) who states that a large ant of the genus *Pseudomyrma* lives in the *Acacia* thorns in Mexico and Central America and actually defends the trees from all invaders, ants, coccids and aphids included. These are the only two cases that state that ants actually destroy plant lice. The third case (Frontanel 119) simply mentioned that some ants may kill aphids and thus prevent the spread of the fungus that grows in the honey-dew on the leaves.

Relative to the statement which Theobald credits to Walker that when a certain species of aphid on a definite plant is attended by a definite ant and that when this aphid is found on another host plant it is attended by another species of ant. My observations prove that the ant attendant of any given aphid has nothing to do with the host plant. Numerous observations were made along this particular line and also to determine if the same ant attended the same aphid on different host plants, and this was also found to be true as is shown by a few of the observations recorded below. While these records do not represent the total number of observations made, they are sufficient to show that the above statement does not hold in my observation.

RECORDS OF DEFINITE APHIDS ON ONE HOST PLANT WITH THE NUMBER OF DIFFERENT ANT ATTENDANTS.

Aphis albipes Oest., taken on*Symphoricarpos* sp., 3 localities, 3 different ants.

Aphis artemisicola Will. on *Symphoricarpos, Artemisia cana* and *Artemisia tridentata*, 8 localities. 11 different species of ants.

Aphis near *cardui* Linn. on *Carduus* sp., 3 localities. 8 different species of ants.

Aphis cardui Linn. on *Carduus* sp., 5 localities. 5 species of ants.

Aphis near *eriogoni* Cowen on *Chrysothamnus* sp., 8 localities. 15 species of ants.

Aphis forbesi Weed. on roots of *Fragaria* sp., 2 localities. 5 species of ants.

Aphis helianthi Monell, on *Helianthus* sp. Various localities thruout the state. 24 records with 24 different species of ants. This species was also taken on *Yucca glauca, Oxybaphus, Cornus sanguinea;* on *Ambrosia trifida, Aster* and numerous other plants with like results relative to ant attendants.

Aphis hermistonii Wil. on *Artemisia tridentata*, 7 localities. 6 species of ants.

Aphis lugentis (or near) Will. on *Senecio atratus* and *S. triangularie*, 12 localities thruout state with 15 species of ants.

Aphis maidis Fitch on *Zea* sp., 11 records. 5 species of ants.

Aphis medicaginis Oest. 39 records from various parts of the state on *Salsola pestifer, Kochia* sp., *Carduus* sp., and *Glycyrrhiza lepidota*. 22 different species of ants.

Aphis pomi De Geer on *Malus malus*. 7 localities, 15 records. 11 species of ants.

Aphis valerianae Cowen on *Valeriana trachycarpa*. 13 records from various parts of the state. 12 species of ants.

Bipersona torticauda Gill. on *Carduus* sp. 26 records from various localities. 20 species of ants.
Chaitophorus negundinis Thos. on *Negundo Nuttallii*. 13 records from Fort Collins, Colo., 9 species of ants.
Lachnus ponderosae Will. on *Pinus scopulorum*. 18 records. 12 species of ants.
Lachnus glaber. Gill. & Pal. on *Pinus scopulorum*. 10 records. 9 species of ants.
Lachnus schwarzii Will. on *Pinus scopulorum*. 15 records. 13 species of ants.
Lachnus taxifoliae Swain. on *Pseudotsuga taxifolia*. 14 records. 13 species of ants.

RECORDS OF THE SAME ANT ATTENDING THE SAME APHID ON DIFFERENT HOST PLANTS.

Formica orcas var. *comptula* Whlr. attending *Aphis artemisicola* Will. on *Chrysothamnus* sp. and *Artemisia cana;* and also attending *Aphis helianthi* Monell, on *Ambrosia trifida*, *Allionia linearis*, and *Helianthus* sp.
Formica fusca var. *argentea* Whlr. attending *Aphis gossypii* Glov. on *cucumis sativa* and *Hibiscus esculentus;* and also attending *Aphis helianthi* Monell on *Urtica* sp., *Amaranthus* sp., *Ambrosia trifida*.
Formica fusca var. *gelida* Whlr. attending *Aphis helianthi* Monell on *Allionia linearis*, *Aster* sp., *Urtica* sp., and *Helianthus* sp.
Formica fusca var. *subaenescens* Emery. attending *Aphis helianthi* Monell on *Helianthus* sp. and *Allionia linearis*.
Lasius niger var. *neoniger* Emery attending *Aphis helianthi* Monell. on *Cornus sanguinea*, and *Oxybaphus* sp.
Formica fusca var. *argentea* Whlr. attending *Aphis medicaginis* Koch. on *Melilotus alba*, *Chenopodium album*, and *Salsola pestifer*.
Formica fusca var. *gelida* Whlr. attending *Aphis medicaginis* Koch. on *Glycyrrhiza lepidota*, *Kochia* sp., and *Vicia* sp.
Formica fusca var. *neoclara* Emery attending *Aphis medicaginis* Koch. on *Robinia neomexicana*, *R. pseudo-Acacia*, and *Kochia* sp.
Formica truncicola subsp. *integroides* var. *coloradensis* Whlr. attending *Aphis medicaginis* Koch. on *Glycyrrhiza lepidota*, *Kochia scoparia*, and *Melilotus alba*.
Formica fusca var. *gelida* Whrl. attending *Aphis middletonii* Thos. on *Leptilon* sp. and *Chrysothamnus* sp.
Formica fusca var. *subsericea* Say. attending *Aphis middletonii* Thos. on *Rumex acetosella* and *Leptilon* sp.
Formica fusca var. *argentea* Whlr. attending *Myzus persicae* Sulz. on *Lycopersicon esculentum*, *Malva* sp., and *Prunus domestica*.
Formica fusca var. *neorufibarbis* Emery. attending *Myzus persicae* Sulz. on *Viola* sp. and *Malus malus*.

GENERAL RELATIONSHIP BETWEEN ANTS AND APHIDS

In summing up the records of the various collections of ants and aphids it was found that the group of aphids attended most by ants was the genus *Aphis*.

There were 50 species of this genus which were attended in combination by 89 genera including 253 species of ants. This does not indicate that 89 different genera of ants were recorded but the combination of genera and species of ants, and the different species of *Aphis* totaled that number. Of course there were several cases when the same species of ant attended different species of *Aphis*. The genus *Lachnus* came next with a total number of 23 species attended by a combination of 54 genera, including 121 species of ants. *Chait-*

ophorus was next with 7 species which were attended by 22 genera and 79 species of ants combined. *Macrosiphum* had 15 species attended in combination by 24 genera with 60 species of ants.

Eighteen different genera of aphids were represented by a single species, and of these, 11 had but 1 genus of ants attendant of which 5 were represented by a single ant species; 5 genera had but 2 genera of ants in attendance and 3 of these but 2 species. The remainder varied from 3 to 7 genera with about the same number of species.

There were 34 genera of aphids collected including 149 species. This is about one-half of the number of species known to occur in Colorado.

The records on the ants attending aphids show that *Formica* was the most prevalent. There were 47 observations on this genus in which the combined records as above show it attended 208 genera including 483 species of aphids. *Camponotus* came next with 11 records attending 31 genera and 53 species of aphids. The records were combined as above. *Myrmica* and *Lasius* were practically equal, having 7 and 8 records with combined attendance of 27 to 24 genera and 48 and 45 species of aphids respectively.

There were several records of different ants that were single. This seems rather strange because the large amount of collecting done, and the extent of territory covered should have yielded more records. It must be that the ants or aphids in question are rare or the aphids are rarely attended by ants.

The total number of genera and species of ants collected was 15 genera of ants including 92 distinct species. Five cases were represented by a single record thruout.

Of the collections of mixed ants attending aphids, *Formica* was found to be the most common. It not only mixed with almost every other genus but with different species of its own genus. There were 34 records which included 37 different combined genera and 120 different species. Seventy-one species were combinations of *Formica* alone. The records show that over one-half the mixed ants contained species of this genus. *Camponotus* and *Myrmica* were about equally divided, each having 8 records with 12 and 11 genera and 25 and 19 species respectively. *Camponotus* had 5 records of mixed ants containing species of this genus. *Formica* and *Camponotus* were the only 2 genera that contained 1 or more different species of their respective genus.

Ten genera of mixed ants were collected in various combinations. These yielded 61 different species. Three genera in several cases were taken with a single colony of aphids.

The fire or occident ant, *Pogonomyrmex*, which habitually constructs its nest of small pebbles, clods of earth and other suitable materials that are unearthed in making its galleries and brought to the surface or collected and carried to the nest from the surrounding territory, is very often troublesome in orchards and cultivated fields, especially beets. It is a fierce biter and stinger and keeps down all vegetation around the nest for a radius of several feet. Prof. Leidy (212a) made a casual observation on this ant carrying a large *Coccidae* to its nest and he believed that the occident ant actually fosters these insects for their saccharine productions. It is true that there are a great number of Myrmecophilous insects found in the nests of these ants, but the writer has never found *Coccids* with them.

Howard (141) states that they have never been known to attend aphids but the writer has actually observed a species of this ant (*Pogonomyrmex occidentalis Cress.*) at Delta, Colorado, upon the leaves of *Phragmites communis*, a large grass that was heavily infested with *Hyalopterous arundinis* Fabr., lapping up the honey-dew from this aphid. They were in company, on this plant, with *Formica fusca* var. *neorufibarbis*. The "fire ant" apparently could not uproot this large grass and all specimens of it in that vicinity were heavily infested with aphids.

Another record of aphid attendance was made at Fort Collins in 1921 by R. R. Morris. This time the ant was taken with two different species of *Formica* while attending *Myzus persicae* Sulz. on *Syringa vulgaris*. This record seems to the writer a little doubtful as these ants do not as a rule wander very far from their beaten path on the ground and this aphid generally is to be found only on the tender growing tips at the top of the plant.

The plant lice of the genus *Eriosoma* which secrete a waxy covering for their bodies and from this fact are termed "woolly aphis" are seemingly only rarely attended by ants. Only three observations were made and those were all different as to species of ant and host plants.

Eriosoma americana Riley on *Ulmus americana* attended by *Formica cinerea Mayr.* var. ?

Eriosoma crataegi Oest. on *Crateaegus* sp. attended by *Formica fusca* var. *subsericea* Say.

Eriosoma lanigera Hausm. on *Malus malus*, attended by *Myrmica brevinodis* Emery. var. ?

Cory (53) thinks, however, that there is a true relationship between *Eriosoma lanigera* Hausm, and *Lasius interjectus* as this ant fosters and transports these aphids.

LIST OF COLORADO ANTS AND RECORDS OF APHIDS ATTENDED

Aphaenogaster sp. ?
Myzus glandulosus Kalt. on *Artemisia frigida*
Rist Canon, Bellvue, Colo., O. 29, '22, by M. A. Palmer.
Camponotus herculeanus Linn. subsp. ?
Aphis sp. on *Valeriana trachycarpa* Rydb.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Chaitophorus populella Gill. & Pal. on *Populus tremuloides*
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia*
Fort Collins, Colo., by C. P. Gillette.
Camponotus heracleanus Linn. var. ?
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Jl. 7, '24 by M. A. Palmer;
Chambers Lake, Colo., Je. 30, '23 by M. A. Palmer.
Lachnus hottesi Gill. & Pal. on *Picea engelmanni* (Parry) Engelm.
Fern Lake, Estes Park, Colo., Je. 13, '23 by F. C. Hottes.
Lachnus splendens Gill. & Pal. on*Pseudotsuga taxifolia*
Poudre Park, Colo., Ag. 26, '23, by M. A. Palmer.
Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch.
Aphis sp. on *Valeriana trachycarpa* Rydb.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Chaitophorus nigrae Oest. on *Salix irrorata*
Stove Prairie, Colo., Ag. 29, '98 by C. P. Gillette.
Lachnus schwarzii Wil. on *Pinus scopulorum* (Engelm.) Lemmon.
Fort Collins, Colo., Je. 25, '21, by M. A. Palmer.
Lachnus solitarius Gill. & Pal. on *Pinus scopulorum* (Engelm.) Lemmon.
Rist Canon, Bellvue, Colo., Je. 3, '22, by J. L. Hoerner.
Camponotus herculeanus var. *modoc* Whlr.
Aphis lugentis Will. on *Senecio atratus*
Estes Park, Colo., Jl. 25, '26.
Camponotus herculeanus subsp. *pennsylvanicus* De Geer.
Chaitophorus populicola Thos. on *Populus tremuloides*
Estes Park, Colo., Ag. 4, '19, by C. P. Gillette.
Lachnus coloradensis Gill. on *Picea parryana*
Gunnison, Colo., Jl. 27, '26 by C. R. Jones.
Lachnus flexilis Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., S. 18, '21, by M. A. Palmer.
Camponotus herculeanus var. *whymperi* Forel.
Aphis sp. on *Gaura coccinea*
Pingree Park, Colo., Ag. 20, '26 by C. P. Gillette.
Aphis near *lugentis* Will. on *Senecio* sp.
Steamboat Springs, Colo., Ag. 27, '24 by C. R. Jones.
Aphis valerianae Cowen on *Valeriana trachycarpa* Rydb.
Gunnison, Colo., Jl., 27, '26;
Grand Mesa. Colo., Ag. 4, '26 by C. R. Jones.
Chaitophorus sp. on *Populus* sp.
Estes Park, Colo., Ag. 22, '21 by M. A. Palmer.
Chaitophorus populicola Thos. on *Populus tremuloides*
Grand Mesa, Colo., Ag. 4, '26;
Lost Lake, Colo., Ag. 2, '26 by C. R. Jones.
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Pingree Park, Colo., Ag. 30, '24, Ag. 22, '25 by C. P. Gillette.
Lachnus flexilis Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Jl. 29, '23 by M. A. Palmer.

Lachnus near *grossus* Kalt. on *Abies lasiocarpa*
Fall River road, Estes Park, Colo., Jl. 7, '23 by M. A. Palmer.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia* (Poir.) Britt.
Estes Park, Colo., S. 18, '21 by M. A. Palmer.
Lachnus vandykei Wil. on *Picea engelmannii*
Estes Park, Colo., Jl. 26, '21 by C. P. Gillette.
Macrosiphum frigidae Oest. on *Artemisia* sp.
La Porte, Colo., O. 14, '22 by F. C. Hottes.
Macrosiphum valerianae Clarke on *Valeriana ceratophylla*
Pingree Park, Colo., Ag. 25, '23 by M. A. Palmer.
Pterocomma populea Kalt. on *Populus tremuloides*
Lost Lake, Colo., Ag. 2, '26 by C. R. Jones.
Toxoptera graminum Rond. on *Triticum vulgarum*
Rocky Ford, Colo., Ap. 2, '07 by C. P. Gillette.

Camponotus maculatus Fabr. var. ?
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Ag. 30, '23 by M. A. Palmer.

Camponotus maculatus var. *nitidiventris* Emery.
Aphis helianthi Monell on *Helianthus* sp. ?
Bellvue, Colo., Jl. 24, '25 by C. R. Jones.
Aphis middletonii Thos. on *Helianthus* sp. ?
Buckhorn Creek, Masonville, Colo., S. 11, '25 by C. R. Jones.
Bipersona torticauda Gill. on *Carduus* sp.
Bellevue, Colo., Jl. 24, '25 by C. R. Jones.
Chaitophorus viminalis Monell on *Salix* sp.
Bellvue, Colo., Jl. 24, '25 by C. R. Jones.
Lachnus edulis Wil. on *Pinus edulis*
Palisade, Colo., Ag. 29, '23 by F. C. Hottes.
Lachnus ponderosae Will. on *Pinus scopulorum*
Fort Collins, Colo., O. 8, '27 by C. P. Gillette.
Lachnus pulvervlens Gill. & Pal. on *Sabina scopulorum*
Buckhorn Creek, Masonville, Colo., Ag. 21, '22 by F. C. Hottes and M. A. Palmer.
Lachnus schwarzii Wil. on *Pinus scopulorum*
Soldiers Canon, Fort Collins, Colo., O. 22, '22 by F. C. Hottes;
Fort Collins, Colo., Mr. 10, '22 by C. A. Bjurman;
Bellevue, Colo., S. 17, '22 by M. A. Palmer.

Camponotus maculatus subsp. *vicinus* Mayr.
Aphis valerianae Cowen on *Valeriana* sp.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Lachnus edulis Wil. on *Pinus edulis*
Salida, Colo., S. 1, '22 by C. P. Gillette.
Lachnus flexilis Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Jl. 22, '22, and
Ag. 18, '21 by M. A. Palmer.
Lachnus oregonensis Wil. on *Pinus contorta*
Estes Park, Colo., Ag. 25, '21 by M. A. Palmer. (2 records).
Lachnus ponderosae Will. on *Pinus scopulorum*
Estes Park, Colo., Jl. 22, '22 by C. P. Gillette.
Lachnus schwarzii Wil. on *Pinus ponderosa*
Buckhorn Creek, Masonville, Colo., Ag. 20, '22 by M. A. Palmer.
Lachnus solitarius Gill. & Pal. on *Pinus ponderosa*
Mt. Vernon, Fort Collins, Colo., Ag. 1, '22 by C. P. Gillette.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia*
Estes Park, Colo., S. 18, '21 by M. A. Palmer.
Macrosiphum valerianae Clarke on *Valeriana* sp.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Thecabius populi-monilis Riley on *Populus* sp.
Boulder, Colo., Ag. 13, '13 by L. C. Bragg.

Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Aphis helianthi Monell on *Helianthus* sp.
Cedaredge, Colo., Ag. 4, '26 by C. R. Jones.

Bipersona torticauda Gill. on *Carduus* sp. ?
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Chaitophorus populella Gill. & Pal. on *Populus tremuloides*
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Lachnus ponderosae Will. on *Pinus scopulorum*
Poudre Canon, Colo., Je. 21, '21 by C. P. Gillette.
Lachnus schwarzii Wil. on *Pinus ponderosa*
Estes Park, Colo., Jl. 30, '22 by C. P. Gillette.
Macrosiphum grindeliae Will. ? on *Chrysothamnus* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Camponotus maculatus subsp. *sansabeanus* Buckley.
Thecabius populi-monilis Riley on *Populus* sp.
Boulder, Colo., Ag. 13, '13 by L. C. Bragg.
Cremastogaster sp.
Aphis symphoricarpi Thos. on *Symphoricarpos* sp.
Fort Collins, Colo., Jl. 2, '08 by L. C. Bragg.
Lachnus ater Gill. & Pal. on *Pinus edulis*
Owl Canon, Larimer Co., Colo., S. 25, '21 by M. A. Palmer;
S. 1, '25 by C. R. Jones.
Lachnus edulis Wil. on *Pinus edulis*
Owl Canon, Larimer Co., Colo., S. 25, '21 by M. A. Palmer.
Lachnus glaber Gill. & Pal. on *Pinus scopulorum* (Engelm.) Lemmon
Copeland Lake, Allen's Park, Colo., O. 21, '22 by M. A. Palmer.
Melanoxantherium bicolor Oest. on *Populus* sp.
Fort Collins, Colo., Ap. 21, '08 by L. C. Bragg.
Cremastogaster laeviuscula Mayr.
Aphis sp. on *Frasera speciosa*
Rist Canon, Bellevue, Colo., Jl. 21, '17 by C. R. Jones. (2 records).
Aphis sp. on *Phacelia* sp.
Rist Canon, Bellvue, Colo., Jl. 21, '17 by C. R. Jones.
Lachnus ponderosae Will. on *Pinus scopulorum*
Je. 16, '22 by J. L. Hamilton.
Cremastogaster lineolata Say.
Lachnus ater Gill. & Pal. on*Pinus edulis*
Owl Canon, Larimer Co., Colo., S. 1, '25 by C. R. Jones.
Lachnus edulis Wil. ? on *Pinus edulis*
Owl Canon, Larimer Co., Colo., S. 1, '24 by C. R. Jones.
Lachnus schwarzii Wil. on *Pinus scopulorum*
Owl Canon, Larimer Co., Colo., S. 25, '21 by M. A. Palmer.
Cremastogaster lineolata Say var. ?
Lachnus ater Gill. & Pal. on *Pinus edulis*
Owl Canon, Larimer Co., Colo., S. 25, '21 by M. A. Palmer.
Lachnus murrayanae Gill. & Pal. on *Pinus contorta*
Stove Prairie, Colo., Je. 3, '22 by M. A. Palmer.
Lachnus schwarzii Wil. on *Pinus scopulorum*
Owl Canon, Larimer Co., Colo., S. 24, '22 by F. C. Hottes.
Dorymyrmex pyramicus Rogers
Aphis near *eriogoni* Cowen on *Chrysothamnus* sp.
Antonito, Colo., Ag. 12, '20 by C. R. Jones.
Chaitophorus negundinis Thos. on *Negundo Nuttallii* (Nieuwl.) Rydb.
Greeley, Colo., My. 5, '26 by A. E. Beardsley.
Chaitophorus populella Gill. & Pal. on *Populus* sp.
Rist Canon, Bellvue, Colo., Jl. 22, '19 by C. R. Jones.
Formica sp. ?
Aphis sp. on *Valeriana trachycarpa* Rydb.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Aphis near *eriogoni* Cowen on *Chrysothamnus* sp.
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Aphis helianthi Monell on *Cornus sanguinea* Linn.
Fort Collins, Colo., S. 15, '21 by F. C. Hottes.
Aphis helianthi Monell on *Yucca glauca*
Greeley, Colo., Je. 7, '25 by A. E. Beardsley.

Aphis near *lugentis* Will. on *Senecio triangularis* Hook.
Colo. Springs, Colo., Jl. 25, '26;
Grand Mesa, Colo., Ag. 4, '26;
Salida, Colo., Jl. 26, '26 by C. R. Jones.
Aphis lugentis Will. on *Senecio spartioides*
Greeley, Colo., Jl. 11, '26 by A. E. Beardsley.
Aphis menthae Walk on *Mentha* sp. roots
Hotchkiss, Colo., Jl. 14, '94 by J. H. Cowen.
Aphis pomi De Geer on *Malus malus*
Fort Collins, Colo., Jl. 30, '98 by C. P. Gillette.
Asiphum sacculi Gill. on *Populus tremuloides*
Pikes Peak, Colo., Ag. 9, '13 by C. P. Gillette.
Chaitophorus sp. on *Salix* sp.
Estes Park, Colo., Ag. 22, '21 by M. A. Palmer.
Chaitophorus populicola Thos. on *Populus tremuloides*
Battle Creek, Colo., Ag. 28, '24 by C. R. Jones.
Salix sp. and *Populus angustifolia*
Waterdale, 8 miles west of Loveland, Colo., S. 29, '24 by A. E. Beardsley.
Forda sp. on Grass roots
Paonia, Colo., My. 25, '20 by C. P. Gillette.
Forda olivaceae Rohw. on Grass roots
Palisade, Colo., My. 27, '20 by C. P. Gillette.
Hyalopterus arundinis Fab. on *Phragmites communis*
Delta, Colo., Jl. 21, '98 by C. P. Gillette.
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Jl. 22, '22 by M. A. Palmer.
Lachnus schwarzii Wil. on *Pinus scopulorum*
Salida, Colo., S. 1, '22 by C. P. Gillette.
Macrosiphum solidaginis Fabr. ? on *Solidago* sp.
Paonia, Colo., Ag. 1, '26 by C. R. Jones.
Melanoxantherium bicolor Oest. on *Salix* sp.
Rabbits Ears Pass, Colo., Jl. 19, '25 by S. McCampbell.
Melanoxantherium smithiae Monell on *Salix* sp.
Fort Collins, Colo., S. 10, '21 by C. A. Bjurman.
Microsiphum artemisiae Gill. on *Artemisia aromatica*
Fort Collins, Colo., S. 3, '90 by C. P. Gillette.
Myzus persicae Sulz. on *Syringa* sp.
Fort Collins, Colo., S. 12, '24 by M. Johnson.
Formica aterrima Cress.
Chaitophorus populella Gill. & Pal. on *Populus* sp.
Fort Collins, Colo., Jl. 14, '19 by C. R. Jones.
Formica cinerea Mayr. var. ?
Aphis sp. on *Thalictrum* sp.
Rabbit Ears Pass, Colo., Ag. 26, '24 by C. R. Jones.
Aphis forbesi Weed on *Fragaria* sp.
Fort Collins, Colo., Jl. 20, '98 by C. P. Gillette;
Jl. 11, '21 by E. A. Hamilton.
Aphis gossypii Glov. on *Echinocystis fabata*
Fort Collins, Colo., S. 20, '23 by W. R. Sauley.
Aphis helianthi Monell on *Helianthus* sp.
Masonville, Colo., S. 25, '20 by V. Blaz;
Bellvue, Colo., Jl. 26, '25 by C. R. Jones.
Fort Collins, Colo., S. 24, '21 by F. C. Hottes;
Je. 10, '26 by C. P. Gillette.
Aphis maidis Fitch on *Zea* sp.
Fort Collins, Colo., S. 10, '21 by V. Blaz.
Aphis medicaginis Koch. on *Melilotus alba*
Fort Collins, Colo., Jl. 2, '22;
Glycyrrhiza lepidota, Steamboat Springs, Colo., Ag. 8, '26;
Kochia sp., Fort Collins, Colo., Jl. 14, '19 by C. R. Jones;
Salsola pestifera Nels., Fort Collins, Colo., S. 19, '20 by V. Blaz;
S. 20, '20 by J. L. Hamilton.

Aphis middletonii Thos. on *Leptilon canadense* (Linn.) Britt.
Fort Collins, Colo., S. 20, '20 by J. L. Hamilton.
Aphis pomi De Geer on *Malus malus*
Fort Collins, Colo., S. 21, '20.
Bipersona torticauda Gill. on *Carduus* sp.
Windsor, Colo., Jl. 22, '19 by P. N. Annand;
Jl. 24, '19 by C. R. Jones.
Eriosoma americana Riley on *Ulmus americana* Linn.
Fort Collins, Colo., Je. 28, '22 by C. R. Jones.
Hyalopterus arundinis Fab. on *Prunus* sp.
Fort Collins, Colo., Ag. 16, '19 by L. C. Bragg. (2 records).
Lachnus coloradensis Gill. on*Picea* sp.
Loveland, Colo., O. 2, '06 by C. P. Gillette.
Lachnus hottesi Gill. & Pal. on *Picea Engelmannii*
Estes Park, Colo., Je. 13, '23 by F. C. Hottes.
Lachnus sabinae Gill. & Pal. on *Sabina scopulorum*
Fort Collins, Colo., My. 25, '22 by M. A. Palmer.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia* (Poir) Britt.
Fort Collins, Colo., Jl. 7, '21 by M. A. Palmer;
Estes Park, Colo., Ag. 10, '22 by C. R. Jones.
Macrosiphum ambrosiae Thos. on *Helianthus* sp.
Fort Collins, Colo., S. 19, '21 by A. M. Binkley.
Macrosiphum erigeronensis Thos. on *Aster* sp.
Lost Lake, Colo., Ag. 2, '26 by C. R. Jones.
Prociphilus fraxinifolii Riley on *Fraxinus* sp.
Fort Collins, Colo., S. 22, '20 by A. M. Binkley.

Formica cinerea var. *altipetens* Whlr.
Bipersona torticauda Gill. on *Carduus* sp.
Fort Collins, Colo., by C. P. Gillette.

Formica cinerea var. *canadensis* Santschi.
Aphis sp. on *Salix* sp.
Rabbit Ears Pass, Colo., Ag. 26, '24;
on *Aster azura* Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Aphis helianthi Monell on *Helianthus* sp.
Fort Collins, Colo., Jl. 11, '22 by C. R. Jones.
Aphis near *lugentis* Will. on *Senecio* sp.
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.
Aphis medicaginis Koch. on *Kochia* sp.
Fort Collins, Colo., Jl. 23, '25 by C. R. Jones. (2 records).
Aphis pomi De Geer on *Malus malus*
Fort Collins, Colo., S. 13, '21 by R. C. Thompson;
on *Pyrus malus* Fort Collins, Colo., S. 13, '21 by C. A. Bjurman.
Aphis valerianae Cowen on *Valeriana trachycarpa* Ryd.
Lost Lake, Colo., Ag. 2, '26 by C. R. Jones.
Chaitophorus sp. on *Populus tremuloides*
Steamboat Springs, Colo., Ag. 8, '26;
on *Populus angustifolia* Gunnison, Colo., Jl. 26, '26 by C. R. Jones.
Chaitophorus populella Gill. & Pal. on *Populus angustifolia* Jas.
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus acuminata*
Fort Collins, Colo., S. 12, '19 by R. Morris.
Drepanaphis acerifolii Thos. on *Acer* sp.
Fort Collins, Colo., S. 21, '21 by R. L. Willis.
Drepanosiphum braggii Gill.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia*
Fort Collins, Colo., S. 16, '21 by F. C. Hottes.
Macrosiphum sp. on *Taraxacum officinalis*
Fort Collins, Colo., S. 19, '21 by R. R. Morris.
Macrosiphum ambrosiae Thos. on *Iva xanthifolia*
Mesa, Colo., Ag. 5, '26 by C. R. Jones;
Fort Collins, Colo., S. 11, '20 by V. Blaz.

Myzus sp. on *Prunus persica*
Fort Collins, Colo., S. 29, '21 by R. R. Morris. (2 records).
Pterochlorus viminalis Boyer on *Salix* sp.
Fort Collins, Colo., S. 15, '21 by H. Sweetman. (2 records).
Formica cinerea var. *lepida* Whlr. ?
Aphis helianthi Monell on *Iva* sp.
Fort Collins, Colo., S. 9, '20, by J. L. Hamilton.
Rhopalosiphum nymphaeae Linn. on *Polygonum punctatum* (Ell.) Small.
Fort Collins, Colo., S. 19, '20 by A. M. Binkley.
Formica cinerea var. *neocinerea* Whlr.
Aphis helianthi Monell on *Carduus* sp.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.
Aphis oregonensis Wil. on *Artemisia tridentata*
Sheep Creek, Cherokee Park, Colo., Ag. 27, '22 by M. A. Palmer.
Aphis tridentatae Wil. on *Artemisia tridentata*
Cherokee Park, Colo., Ag. 27, '22 by M. A. Palmer.
Chaitophorus populicola Thos. on *Populus* sp.
Fort Collins, Colo., S. 20, '20 by C. Drexel.
Lachnus similis Gill. & Pal. on *Pinus contorta*
Poudre Canon, Colo., Ag. 12, '22 by C. P. Gillette.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia*
Fort Collins, Colo., Ag. 4, '21 by M. A. Palmer.
Macrosiphum grindeliae Will. ? on *Chrysothamnus* sp.
Poudre Canon, Colo., Ag. 12, '22 by C. P. Gillette.
Myzus glandulosus Kalt. on *Artemisia tridentata*
Sheep Creek, Cherokee Park, Colo., Ag. 27, '22 by M. A. Palmer.
Formica comata Whlr.
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Sheep Creek, Colo., Ag. 27, '22 by M. A. Palmer.
Lachnus schwarzii Wil. on *Pinus scopulorum*
Estes Park, Colo., Ag. 18, '21 by M. A. Palmer.
Lachnus splendens Gill. & Pal. on *Pseudotsuga taxifolia*
Estes Park, Colo., S. 18, '21 by M. A. Palmer.
Formica criniventris Whlr.
Aphis near *eriogoni* Cowen on *Chrysothamnus* sp.
Gunnison, Colo., Jl. 27, '26 by C. R. Jones. (2 records).
Macrosiphum frigidae Oest. on *Artemisia tridentata*
Gunnison, Colo., Jl. 28, '26 by C. R. Jones.
Formica dakotensis Emery.
Chaitophorus populicola Thos. on *Populus* sp.
Devils Gulch, Glenn Haven, Colo., Jl. 27, '21 by M. A. Palmer.
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Sheep Creek, Colo., Ag. 27, '22 by M. A. Palmer.
Formica exsectoides var. *opaciventris* Emery.
Aphis helianthi Monell on *Helianthus* sp.
Fort Collins, Colo., Jl. 20, '26 by C. R. Jones. (2 records).
Aphis medicaginis Koch. on *Salsola pestifer*
Fort Collins, Colo., Je. 23, '24 by C. R. Jones.
Formica sp. fusca group
Aphis sp. on *Amaranthus retroplexus*
Fort Collins, Colo., Ag. 13, '06.
Aphis bakeri Cowen on *Crataegus rivularis*
Biol. Station, Almont, Gunnison Co., Colo., Ag. 28, '26 by A. E. Beardsley.
Malus malus at Paonia, Colo., Je. 10, '18 by C. P. Gillette.
Aphis cardui Linn. on *Carduus* sp.
Fort Collins, Colo.
Aphis medicaginis Koch. on *Carduus* sp.
Fort Collins, Colo., Ag. 4, '06 by L. C. Bragg.
Aphis valerianae Cowen. on *Valeriana* sp.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Chaitophorus populella Gill. & Pal. on *Populus tremuloides*
Biol. Station, Almont, Gunnison Co., Colo., Ag. 29, '26 by A. E. Beardsley.

Forda sp. on Grass roots
Fort Collins, Colo., My. 22, '18 by L. C. Bragg.
Macrosiphum valerianae Clarke. on *Valeriana* sp.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Formica fusca Linn.
Aphis artemisicola Will. on *Artemisia cana*
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Aphis near *cardui* Linn. on *Carduus* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis near *eriogoni* Cowen on *Chrysothamnus* sp.
Ridgway, Colo., Jl. 29, '26;
Gunnison, Colo., Jl. 27, '26 by C. R. Jones.
Aphis hermistonii Wil. ? on *Artemisia tridentata*
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Aphis houghtonensis Troop on *Ribes* sp.
Poudre Canon, Colo., S. 5, '26 by C. R. Jones.
Aphis near *lugentis* Will. on *Senecio* sp.
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.
Aphis maidis Fitch on Zea saccharina
Fort Collins, Colo., S. 17, '21 by H. Sweetman.
Aphis medicaginis Koch. on *Meliotus alba* Rydb.
Craig, Colo., Ag. 7, '26;
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis middletonii Thos. on *Helianthus* sp.
Buckhorn Creek, Masonville, Colo., S. 11, '25 by C. R. Jones.
Aphis pomi De Geer on *Malus malus*
Fort Collins, Colo., S. 13, '21 by R. C. Thompson.
Aphis viburnicola Gill. on *Viburnum opulus* var. *sterile*
Fort Collins, Colo., S. 19, '21 by A. Magnuson.
Chaitophorus sp. on *Populus tremuloides*
Gunnison, Colo., Jl. 27, '26 by C. R. Jones.
Chaitophorus negundinis Thos.
Fort Collins, Colo., Jl. '18 by A. A. Granovsky.
Chaitophorus populella Gill. and Pal. on *Populus angustifolia* Jas.
Steamboat Springs, Colo., Ag. 8, '26;
Populus tremuloides, Estes Park, Colo., Jl. 23, '21 by C. R. Jones.
Drepanosiphum braggii Gill. on *Negundo Nuttallii* (Nieuwl) Rydb.
Fort Collins, Colo., S. 21, '23 by R. Saulcy.
Geoica sp. on grass roots
Cherokee Park, Colo., Ag. 27, '22 by Harold L. Jones.
Lachnus brevispinosus on *Pinus contorta*
Chambers Lake, Colo., Je. 30, '23 by M. A. Palmer.
Macrosiphum near *erigeronensis* Thos. on *Lactuca pulchella*
Fort Collins, Colo., Ag. 12, '98 by C. P. Gillette.
Macrosiphum frigidae Oest. on *Artemisia frigida*
Gunnison, Colo., Jl. 27, '26 by C. R. Jones.
Myzus persicae Sulz. on *Cassina elegans* Zinn.
Paonia, Colo., Ag. 1, '26 by C. R. Jones.
Pterochlorus viminalis Boyer on *Salix* sp.
Fort Collins, Colo., S. 21, '21 by R. C. Thompson.
Symydobius salicicortis Essig. on *Salix* sp.
Estes Park, Colo., Jl. 26, '25 by C. R. Jones.
Formica fusca Linn. var. ?
Anuraphis sp.
Fort Collins, Colo., Jl. '18 by A. A. Granovsky.
Aphis sp. on *Gaura coccinea* Pursh.
Fort Collins, Colo., Je. 11, '98;
on *Philadelphus* sp. ? and *Viburnum opulus* var. *sterile*
Fort Collins, Colo., Ag. 1, '98 by C. P. Gillette. (2 records).
Aphis artemisicola Will. on *Artemisia tridentata*
Meeker, Colo., Ag. 6, '26 by C. R. Jones. (2 records).
Aphis near *cardui* Linn. on *Carduus* sp.

Ridgway, Colo., Jl. 29, '26 by C. R. Jones. (2 records).
Aphis cardui Linn. on *Carduus* sp.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Aphis near *eriogoni* Cowen on *Chrysothomnus* sp.
Manassa, Colo., Ag. 11, '20;
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis gossypii Glov. on *Cucumis sativa*
Fort Collins, Colo., S. 16, '21 by C. A. Bjuman;
Catalpa sp., Fort Collins, Colo., Jl. 15, '21 by F. C. Hottes.
Aphis helianthi Monell on *Catalpa* sp; *Cornus sanguinea* Linn.
Fort Collins, Colo., S. 14, '21 by H. Sweetman;
Helianthus sp., Fort Collins, Colo., Ag. 25, '23 by P. N. Annand.
Aphis hermistonii Wil. ? on *Artemisia tridentata*
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Aphis heraclei Cowen on *Pastinaca* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis medicaginis Koch. on *Glycyrrhiza lepidota*
Meeker, Colo., Ag. 6, '26 by C. R. Jones;
Kochia sp. ? Fort Collins, Colo., Je. 26, '23 by M. A. Palmer;
on *Malva*, sp., Fort Collins, Colo., Ag. 19, '06 by L. C. Bragg.
Aphis oenotherae Oest. on *Oenothera* sp.
Fort Collins, Colo., Jl. 9, '07 by C. P. Gillette.
Aphis pomi De Geer on *Malus malus*
Fort Collins, Colo., S. 13, '21 by R. C. Thompson;
Paonia, Colo., Mr. 25, '20 by C. P. Gillette;
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis salicicola Monell on *Salix* sp.
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Aphis sorbi Kalt. on *Malus malus*
Fort Collins, Colo., My. 25, '20 by C. P. Gillette.
Aphis tetrapteralis Ckl. on *Sarcobatus rubra* A. Nels.
Ridgway, Colo., Jl. 29, '26 by C. R. Jones.
Bipersona torticauda Gill. on *Carduus* sp.
Ridgway, Colo., Jl. 29, '26;
Buckhorn Creek, Masonville, Colo., Jl. 10, '25 by C. R. Jones.
Brevicoryne brassicae Linn. on *Brassica rapa*
Fort Collins, Colo., S. 16, '21 by C. R. Jones.
Capitophorus rosarum Kalt. on *Rosa setigera*
Fort Collins, Colo., S. 21, '21 by M. A. Johnson.
Chaitophorus sp. on *Caltha leptosepala* DC.
Fal River, Colo., Je. 30, '25 by M. A. Palmer;
on *Populus* sp., Fort Collins, Colo., S. 24, '21 by F. C. Hottes.
Chaitophoroides maculatae Oest. on *Populus balsamifera*
Estes Park, Colo., Ag. 18, '21 by M. A. Palmer;
on *Populus* sp., Fort Collins, Colo., S. 28, '21 by G. Boyd.
Chaitophorus negundinis on *Negundo Nuttallii* (Nieuwl) Rydb.
Fort Collins, Colo., S. 24, '23 by A. Moinat. (7 records).
Chaitophorus populella Gill. & Pal. on *Populus angustifolia* Jas.
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus* sp.
Fort Collins, Colo., S. 16, '20 by M. A. Palmer;
Ouray, Colo., Jl. 29, '26 by C. R. Jones.
Chaitophorus viminalis Monell on *Salix* sp.
Cedaredge, Colo., Ag. 4, '26;
Bellvue, Colo., Jl. 24, '25 by C. R. Jones.
Drepanosiphum braggii Gill. on *Negundo Nutallii* (Nieuwl) Rydb.
Fort Collins, Colo., S. 25, '19 by R. Morris.
Lachnus edulis Wil. ? on *Pinus edulis*
Owl Canon, Larimer Co., Colo., S. 1, '25 by C. R. Jones.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia* (Poir) Britt.
Estes Park, Colo., S. 18, '21 by M. A. Palmer.

Macrosiphum sp. on *Taraxacum officinalis*
Fort Collins, Colo., S. 19, '21 by R. R. Morris;
on *Thermopsis* sp., Fort Collins, Colo., S. 20, '23 by U. R. Saulcy.
Macrosiphum ambrosiae Thos. on *Ambrosia trifida*
Laporte, Colo., Je. 26, '25 by C. R. Jones.
Macrosiphum erigeronensis Thos. on *Erigeron* sp.
Greeley, Colo., Je. 29, '25 by C. R. Jones.
Macrosiphum frigidae Oest. on *Artemisia tridentata*
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Macrosiphum grindeliae Will. ? on *Chrysothamnus* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Melanoxantherium bicolor Oest. on *Salix* sp.
Fort Collins, Colo., S. 10, '21 by C. A. Bjurman.
Melanoxantheium salicis Linn. on *Salix* sp.
Gunnison, Colo., Jl. 27, '26 by C. R. Jones;
Fort Collins, Colo., Je. 13, '99 by C. P. Gillette.
Myzocallis discolor Monell on *Quercus coccinea*
Fort Collins, Colo., S. 14, '25 by F. C. Hottes.
Myzus sp. on *Aquilegia coerulea*
Fort Collins, Colo., Je. 30, '25 by C. R. Jones.
Myzus cerasi Fitch on *Salix* sp.
Paonia, Colo., Je. 10, '20 by W. L. May.
Myzus oenotherae Will. on *Oenothera subulifera* Rydb.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Myzus persicae Sulz. on *Prunus* sp.
Fort Collins, Colo., S. 26, '21 by A. Magnuson;
on *Syringa vulgaris,* Fort Collins, Colo., O. 20, '21 by R. R. Morris;
on *Cassina eligans* Zinn., Paonia, Colo., Ag. 1, '26 by C. R. Jones.
Myzus ribis Linn. on *Ribes* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Formica fusca var. *argentea* Whlr.
Aphis sp. on *Helianthus* sp.
Fort Collins, Colo., S. 16, '20 by J. L. Hamilton;
on *Ribes* sp., Fort Collins, Colo., S. 21, '21 by R. L. Willis.
Aphis near *eriogoni* Cowen on *Chrysothamnus* sp. ?
Manassa, Colo., Ag. 11, '20 (2 records);
Antonito, Colo., Ag. 12, '20;
Meeker, Colo., Ag. 5, '26 by C. R. Jones.
Aphis gossypii Glover on *Cucumis sativus* Linn.
Fort Collins, Colo., Jl. 15, '19 (4 records);
on *Hibiscus esculentus,* S. 20, '24 by C. R. Jones.
Aphis helianthi Monell on *Amaranthus* sp.
Fort Collins, Colo., Jl. 20, '26 by C. R. Jones (3 records);
on *Ambrosia trifida,* S. 25, '20 by V. Blaz;
on *Carduus* sp., Rist Canon, Bellevue, Colo., Jl. 22, '19, by C. R. Jones;
on *Urtica* sp. Antonito, Colo., Ag. 12, '20 by C. R. Jones (2 records).
Aphis heraclei Cowen on *Cicuta occidentalis* Greene
Antonito, Colo., Ag. 12, '20 by C. R. Jones.
Aphis near *lugentis* Will. on *Senecio spartioides* T. & G.
Fort Collins, Colo., S. 21, '22 by L. Johnson.
Aphis medicaginis Koch. on *Chenopodium album* Linn.
Fort Collins, Colo., S. 17, '20 by J. L. Hamilton;
on *Melilotus alba,* Fort Collins, Colo., S. 20, '20 by A. M. Binkley, (3 records);
on *Salsola pestifer,* Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis middletonii Thos. on *Leptilon* sp.
Manassa, Colo., Ag. 10, '20 by C. R. Jones.
Aphis sambucifolii Fitch on *Sambucus* sp.
Fort Collins, Colo., Jl. '18 by A. A. Granvosky.
Aphis spiraeella Schout. on *Spiraea vanhouttei*
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.

Bipersona torticauda Gill. on *Carduus* sp.
Fort Collins, Colo., Jl. 23, '25, (2 records);
Meeker, Colo., Ag. 6, '26 by C. R. Jones, (2 records).

Capitophorus rosarum Kalt. on *Rosaceae*
Fort Collins, Colo., S. 19, '22 by L. Johnson.

Chaitophoroides maculatae Oest. on *Populus* sp.
Fort Collins, Colo., By A. M. Binkley.

Chaitophorus negundinus Thos. on *Negundo Nuttalli* (Nieuwl.) Rydb.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones, (5 records).

Chaitophorus nigrae Oest. on *Salix* sp.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.

Chaitophorus populella Gill. & Pal. on *Populus* sp.
Fort Collins, Colo., Jl. 25, '19 by C. R. Jones, (6 records).

Chaitophorus populicola Thos. on *Populus* sp.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones, (4 records).

Chaitophorus viminalis Monell on *Salix* sp.
Bellvue, Colo., Jl. 24, '25 by C. R. Jones, (2 records).

Drepanaphis acerifolli Thos. on *Acer* sp.
Fort Collins, Colo., S. 25, '21 by H. Sweetman.

Drepanosiphum braggii Gill. on *Negundo Nuttallii* (Nieuwl) Rydb.
Fort Collins, Colo., S. 14, '21 by H. Sweetman. (2 records).

Lachnus apini Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Ag. 16, '17 by M. A. Palmer.

Lachnus glaber Gill. & Pal. on *Pinus ponderosa*
Stove Prairie, Colo., Ag. 21, '22 by M. A. Palmer;
Estes Park, Colo., Jl. 30, '22 by C. P. Gillette.

Lachnus ponderosae Will. on *Pinus scopulorum* (Engelm.) Lemmon
Fort Collins, Colo., My. 2, '22;
Buckhorn Creek, Masonville, Colo., Ag. 20, '22 by M. A. Palmer.

Macrosiphum ambrosiae Thos. on *Ambrosia trifida*
Fort Collins, Colo., S. 25, '20 by V. Blaz, (4 records);
on *Iva xanthifolia* in Rist Canon, Bellvue, Colo., Jl. 22, '19;
Greeley, Colo., Je. 29, '25 by C. R. Jones.

Macrosiphum near *erigeronensis* Thos. on *Lactuca virosa*
Fort Collins, Colo., S. 20, '20 by C. Drexel.

Macrosiphum euphorbiae Thos. on *Euphorbia marginata*
Mr. 28, '25 by M. A. Hoyt.

Macrosiphum solidaginis Fabr. ? on *Populus* sp.
Fort Collins, Colo., S. 25, '20 by V. Blaz.

Macrosiphum taraxaci Kalt. on *Taraxacum* sp.
Fort Collins, Colo., Je. 20, '25 by C. R. Jones.

Melanoxantherium smithiae Monell on *Salix* sp.
Fort Collins, Colo., S. 26, '22 by E. A. Hamilton.

Myzocallis discolor Monell on *Quercus coccinia*
Fort Collins, Colo., S. 14, '21 by H. Sweetman.

Myzus sp. on *Ribes longiflorum*
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.

Myzus persicae Sulz. on *Lycopersicon esculentum* Mill.
Fort Collins, Colo., S. 18, '20 by J. L. Hamilton;
on *Convolvula* sp., Fort Collins, Colo., Jl. 22, '19 by C. R. Jones;
on *Prunus domestica,* Fort Collins, Colo., S. 21, '21 by H. L. Willis;
on *Malva* sp., Fort Collins, Colo., S. 12, '24 by M. Johnson.

Myzus ribis Linn. on *Stachys scopulorum*

Prociphilus fraxinifolii Riley on *Fraxinus* sp.
Fort Collins, Colo., S. 18, '22 by C. R. Jones, (2 records).

Rhopalosiphum lactucae Kalt. on *Ribes cereum* Lindl.
Greeley, Colo., Je. 30, '25 by C. R. Jones.

Rhopalosiphum rhois Monell on *Elymus canadensis*

Formica fusca var. *gelida* Whlr.
Aphis sp. on *Chrysothamnus* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones;
on *Bahia dissecta* A. Gray, Antonito, Colo., Ag. 11, '20 by C. R. Jones. (2 records);
on *Cosmos* sp., Paonia, Colo., Ag. 2, '26 by C. R. Jones;
on *Artemisia tridentata,* Estes Park, Colo., Jl. 28, '04 by C. P. Gillette.
Aphis artemisicola Will. on *Artemisia tridentata*
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis bakeri Cowen on *Malus malus*
Eckert, Colo., Ap. 24, '16 by C. P. Gillette.
Aphis near *cardui* Linn. on *Carduus* sp.
Craig, Colo., Ag. 7, '26;
Ridgway, Colo., Jl. 27, '26 by C. R. Jones.
Aphis helianthi Monell on *Allionia linearis* Pursh
Fort Collins, Colo., S. 11, '06 by C. P. Gillette;
on *Urtica* sp., Antonito, Colo., Ag. 12, '20;
on *Helianthus* sp., Meeker, Colo., Ag. 6, '26;
on *Aster,* Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Aphis near *hermistonii* Wil. on *Artemisia tridentata*
Estes Park, Colo., Jl. 28, '04 by C. P. Gillette;
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Aphis medicaginis Koch. on *Kochia* sp.
Fort Collins, Colo., Jl. 23, '25;
on *Glycyrrhiza lepidota,* Meeker, Colo., Ag. 6, '26;
Ridgway, Colo., Jl. 29, '26;
on *Glycyrrhiza lepidota* Nutt., Delta, Colo., Jl. 31, '26;
on *Vicia* sp., Ridgway, Colo., Jl. 29, '26 by C. R. Jones.
Aphis middletonii Thos. on *Chrysothamnus* sp.
Ridgway, Colo., Jl. 29, '26;
on *Leptilon* sp., Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Aphis nerii Fonsc. on *Asclepias* sp.
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Aphis oenotherae var. *rufa* Gill. on *Epilobium* sp.
Cameron Pass, Colo., S. 29, '26 by C. P. Gillette.
Aphis pomi De Geer on *Malus malus*
Paonia, Colo., Ag. 1, '26 by C. R. Jones, (2 records).
Aphis valerianae Cowen on *Valeriana* sp.
Grand Mesa. Colo., Ag. 4, '26 by C. R. Jones.
Bipersona torticauda Gill. on *Carduus* sp.
Paonia, Colo., Ag. 1, '26 by C. R. Jones.
Chaitophoroides maculatae Oest. on *Populus* sp.
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Chaitophorus sp. on *Salix* sp.
Meeker, Colo., Ag. 6, '26;
Ridgway, Colo., Jl. 29, '26 by C. R. Jones.
Chaitophorus negundinis Thos. on *Salix* sp.
Paonia, Colo., Ag. 1, '26;
on *Negundo Nuttalii* (Nieuwl.) Rydb., Ridgway, Colo., Jl. 29, '26;
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus* sp.
Ridgway, Colo., Jl. 29, '26 by C. R. Jones.
Chaitophorus viminalis Monell on *Salix* sp.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Forda sp. on *Setaria glauca* Linn.
Paonia, Colo., Je. 10, '18 by C. P. Gillette.
Lachnus edulis Wil. on *Pinus edulis*
Salida, Colo., S. 1, '22 by C. P. Gillette.
Lachnus occidentalis Davidson on *Abies concolor*
Poudre Canon, Colo., by F. C. Hottes.
Lachnus sibiricae Gill. & Pal. on *Juniperus sibirica*
Sheep Creek, Colo., Ag. 27, '22 by M. A. Palmer.

Macrosiphum erigeronensis Thos. on *Carduus* sp.
Cedaredge, Colo., Ag. 4, '26 by C. R. Jones.
Macrosiphum frigidae Oest. on *Artemisia gnaphalodes* Nutt.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Macrosiphum grindeliae Will. ? on *Chrysothamnus* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Macrosiphum solidaginis Fabr. on *Solidago* sp.
Paonia, Colo., Ag. 1, '26 by C. R. Jones.
Macrosiphum valerianae Clarke on *Valeriana* sp.
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Melanoxanthcium bicolor Oest. and *Chaitophorus* sp. on *Salix* sp.
Ridgway, Colo., Jl. 29, '26 by C. R. Jones.
Melanoxantherium smithiae Monell on *Salix* sp.
Fort Collins, Colo., S. 21, '21 by G. Boyd.
Myzus cerasi Fitch on *Prunus* sp.
Colorado Springs, Colo., Ag. 5, '19 by L. C. Bragg.
Myzus persicae Sulz. on *Prunus domestica*
Fort Collins, Colo., S. 16, '21 by C. A. Bjurman;
on *Prunus persica,* Paonia, Colo., Je. 9, '22 by R. E. Wall.
Formica fusca var. *neoclara* Emery.
Aphis sp. on *Helianthus* sp.
Colorado Springs, Colo., Ag. 18, '19 by L. C. Bragg.
Aphis bakeri Cowen on *Melilotus* sp.
Fort Collins, Colo., Jl. '18 by A. A. Granvosky.
Aphis near *eriogoni* Cowen on *Artemisia trifida* ?
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Aphis gossypii Glover
Fort Collins, Colo., Jl. '18 by A. A. Granovsky;
on *Cucurbita* sp., Fort Collins, Colo., S. 20, '23 by A. Moinat;
on *Cucurbita meloriticulatrus,* Fort Collins, Colo., S. 16, '21 by C. A. Bjurman.
Aphis helianthi Monell on *Helianthus* sp.
Fort Collins, Colo., S. 11, '20 by J. L. Hamilton, (3 records);
Pueblo, Colo., Ag. 16, '24 by C. R. Jones.
Aphis lugentis Will. on *Senecio* sp.
Owl Canon, Larimer Co., Colo., S. 25, '21 by M. A. Palmer.
Aphis maidis Fitch on *Zea* sp.
Denver, Colo., Ag. 12, '19 by L. C. Bragg;
Fort Collins, Colo., O. 12, '22 by C. R. Jones.
Aphis medicaginis Koch on *Kochia* sp.
Fort Collins, Colo., Jl. 25, '19 by C. R. Jones;
on *Robinia pseudo-acacia* Linn., Fort Collins, Colo., S. 15, '21 by Sweetman, (3 records);
on *Robinia neomexicana* A. Gray, Fort Collins, Colo., O. 12, '22 by C. R. Jones.
Aphis middletonii Thos.
Fort Collins, Colo., Je. 16, '09 by C. P. Gillette.
Aphis neilliae Oest. on *Physocarpos Rameleyi*
Cheyenne Canon, Manitou, Colo., Jl. 30, '19 by L. C. Bragg.
Aphis pomi De Geer on *Pyrus* sp.
Paonia, Colo., S. 15, '06 by C. P. Gillette.
on *Malus malus,* Fort Collins, Colo., S. 12, '20 by V. Blaz, (2 records).
Aphis salicicola Monell on *Salix* sp.
Fort Collins, Colo., S. 19, '21 by R. Morris.
Aphis spiraecella Schout. on *Prunus*
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.
Aphis spiraecola Patch on *Spiraea vanhouttei*
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.
Aphis varians Patch on *Ribes longiflorum* Nutt.
Fort Collins, Colo., Jl. 25, '19 by C. R. Jones.
Bipersona torticauda Gill. on *Carduus* sp.
Akron, Colo., My. 18, '07 by C. P. Gillette, (2 records).

Chaitophoroides maculatae Oest. on *Populus lombarda*
Fort Collins, Colo., S. 28, '21 by G. Boyd.
Chaitophorus sp. on *Salix* sp.
Fort Collins, Colo., Jl. '18 by A. A. Granovsky.
Chaitophorus negundinis Thos. on *Negundo Nuttallii* (Nieuwl.) Rydb.
Fort Collins, Colo., Jl. '18 by A. A. Granovsky, (11 records);
Colorado Springs, Colo., Ag. 5, '19 by L. C. Bragg.
Chaitophorus populella Gill. & Pal. on *Populus tremuloides*
Estes, Park, Colo., Ag. 19, '22 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus* sp.
Fort Collins, Colo., S. 16, '20 by V. Blaz, (7 records).
Chaitophorus salicti Schr. on *Salix* sp.
Fort Collins, Colo., S. 14, '20 by C. Drexel.
Chaitophorus viminalis Monell on *Salix* sp.
Fort Collins, Colo., S. 26, '22 by R. Thompson.
Drepanaphis acerifolii Riley on *Acer* sp.
Fort Collins, Colo., O. 12, '22 by E. A. Hamilton.
Hysteroneura setariae Thos. on *Prunus* sp.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones, (2 records).
Lachnus schwarzii Wil. on *Pinus scopulorum*
South St. Vrain, Lyons, Colo., O. 21, '22 by M. A. Palmer.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia*
Stove Prairie, Colo., Ag. 21, '22 by F. C. Hottes.
Liosomaphis aquatica Gill. & Bragg on grass
Denver, Colo., My. 19, '07 by C. P. Gillettee.
Macrosiphum near *erigeronensis* Thos. on *Lactuca pulchella* (Pursh.) D. C.
Fort Collins, Colo., Je. 25, '19 by C. R. Jones.
Macrosiphum rudbeckiae Fitch on *Rudbeckia* sp.
Poudre Canon, Colo., Jl. 22, '19 by C. R. Jones.
Macrosiphum solanifolii Ash. on *Armoracia armoracia* (L.) Ckl.
Fort Collins, Colo., O. 12, '22 by E. A. Hamilton.
Macrosiphum taraxaci Kalt. on *Taraxacum officinalis* Webr.
Fort Collins, Colo., O. 10, '21 by C. R. Jones.
Melanoxantherium bicolor Oest.
Fort Collins, Colo., Jl. '18 by A. A. Granovsky, (3 records).
Melanoxantherium smithiae Monell on *Salix* sp.
Fort Collins, Colo., S. 26, '22 by R. Thompson.
Myzocallis discolor Monell on *Quercus coccinia*
Fort Collins, Colo., S. 14, '21 by H. Sweetman.
Myzocallis ulmifolii Monell on *Ulmus americana* Linn.
Fort Collins, Colo., S. 25, '21 by H. Sweetman, (2 records).
Myzus cerasi Fitch. on *Prunus cerasus* Fitch
Fort Collins, Colo., S. 16, '21 by C. A. Bjurman.
Myzus persicae Sulz. on *Prunus* sp.
Fort Collins, Colo., S. 21, '21 by E. A. Hamilton;
on *Cucurbita* sp., Fort Collins, Colo., S. 20, '23 by A. Moinat.
Pemphigus fraxinifoliae Riley on *Fraxinus* sp.
Fort Collins, Colo., S. 14, '20 by J. L. Hamilton.
Pterochlorus rosae Cholod on *Rosa* sp.
Fort Collins, Colo., Ag. 22, 1900 by C. R. Jones.
Pterochlorus viminalis Boyer on *Salix vitallina*
Fort Collins, Colo., S. 15, '21 by F. C. Hottes.
Symydobius americanus Baker on *Betula* sp.
Fort Collins, Colo., S. 19, '21 by R. R. Morris.

Formica fusca var. *neorufibarbis* Emery

Aphis sp. on *Rosa setigera*
Fort Collins, Colo., S. 25, '23 by U. R. Saulcy;
on *Sarcobatus rubra* A. Nels, by C. P. Gillette.
Aphis albipes Oest. on *Symphoricarpos* sp.
Fort Collins, Colo., Jl. 29, '19 by C. R. Jones.

Aphis helianthi Monell on *Helianthus* sp.
Cedaredge, Colo., Ag. 4, '26;
Montrose, Colo., Jl. 30, '26;
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Aphis medicaginis Koch on *Melilotus alba* Desv.
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Aphis middletonii Thos. on *Melilotus alba* Desv.
Eckert, Colo., Jl. 21, '02 by C. P. Gillette.
on *Achillea* sp., in Cheyenne Canon, Manitou, Colo., Jl. 30, '19, by L. C. Bragg.
Aphis pomi De Geer on *Malus malus*
Paonia, Colo., Ag. 1, '26 by C. R. Jones, (3 records).
Brevicoryne brassicae Linn. on *Raphanus sativa*
Paonia, Colo., Ag. 1, '26 by C. R. Jones.
Capitophorus rosarum Kalt. on *Rosa setigera*
Fort Collins, Colo., S. 20, '23 by U. R. Saulcy.
Chaitophorus viminalis Monell on *Salix* sp.
Craig, Colo., Ag. 7, '26;
Ridgway, Colo., Jl. 29, '26;
Cedaredge, Colo., Ag. 4, '26 by C. R. Jones.
Hyalopterus arundinis Fabr. on *Phragmites communis* Trin.
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Lachnus sabinae Gill. & Pal. ? on *Sabina* sp.
Colorado Springs, Colo., Ag. 1, '19 by L. C. Bragg.
Macrosiphum sp. on *Lactuca* sp.
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Macrosiphum ambrosiae Thos. on *Ambrosia* sp.
Cedaredge, Colo., Ag. 4, '26;
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Macrosiphum solidaginis Fabr ? on *Lactuca* sp.
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Melanoxantherium salicis Linn. on *Salix* sp.
Fort Collins, Colo., by C. A. Bjurman.
Myzocallis ulmifolii Monell on *Ulmus americana* Linn.
Fort Collins, Colo., S. 15, '21 by F. C. Hottes.
Myzus cerasi Fitch on *Prunus melanocarpa* Rydb.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Myzus persicae Sulz. on *Malus malus*
Paonia, Colo., Jl. 16, '24 by J. H. Newton;
on *Viola* sp., Paonia, Colo., Ag. 1, '26 by C. R. Jones.
Prociphilus fraxinifolii Riley on *Fraxinus americana* Linn.
Fort Collins, Colo., S. 8, '20 by A. Binkley;
S. 18, '22 by C. R. Jones;
S. 12, '20 by V. Blaz.
Rhopalosiphum nervatum Gill. on *Rosa* sp.
Fort Collins, Colo., S. 20, '21 by R. R. Morris.

Formica fusca var. *subaenescens* Emery.
Aphis sp. on *Humulus lupulus*
Colorado Springs, Colo., Ag. 18, '19 by L. C. Bragg.
Aphis avenae Fabr. on grass
Fort Collins, Colo., O. 10, '25 by C. R. Jones.
Aphis canae Will. on *Artemisia cana*
Pueblo, Colo., Ag. 16, '24 by C. R. Jones.
Aphis near *cardui* Linn. on *Carduus* sp.
Craig, Colo., Ag. 7, '26;
Meeker, Colo., Ag. 5, '26 by C. R. Jones.
Aphis cardui L. on *Carduus* sp.
Virginia Dale, Colo., Ag. 9, '24;
Fort Collins, Colo., Jl. 23, '25 by C. R. Jones.
Aphis hederae Kalt. on *Viburnum opulus* var. *sterile*
Fort Collins, Colo., O. 5, '24 by M. Johnson.

Aphis helianthi Monell ? on *Carduus* sp.
Ridgway, Colo., Jl. 29, '26;
on *Helianthus* sp., Big Thompson Canon, Colo., Ag. 5, '25 by C. R. Jones.
Aphis near *lugentis* Will. on *Senecio triangularis* Hook.
Virginia Dale, Colo., S. 25, '24 by C. R. Jones.
Aphis lugentis Will. on *Senecio atratus*
Loch Vale, Estes Park, Colo., Jl. 26, '21 by M. A. Palmer
Aphis salicicola Monell on *Salix* sp.
Rabbit Ears Pass, Colo., Ag. 26, '24 by C. R. Jones.
Aphis valerianae Cowen on *Valeriana trachycarpa* Rydb.
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.

Bipersona torticauda Gill. on *Carduus* sp.
Craig, Colo., Ag. 7, '26 by C. R. Jones.

Chaitophorus populella Gill. & Pal. on *Populus tremuloides*
Grand Mesa, Colo., Ag. 4, '26 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus* sp.
Fort Collins, Colo., '25 by C. R. Jones;
on *Populus balsamifera*, Fort Collins, Colo., S. 17, '21 by R. C. Thompson.
Chaitophorus viminalis Monell on *Salix* sp.
Battle Creek, Colo., Ag. 28, '24 by C. R. Jones, (2 records).

Geoica squamosa Hart. on grass roots
Virginia Dale, Colo., Je. 5, '25 by C. R. Jones.

Macrosiphum sp. on *Epilobium* ? sp.
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.
Macrosiphum rudbeckiae Fitch on *Solidago* sp.
Steamboat Springs, Colo., Ag. 22, '24 by C. R. Jones.
Macrosiphum solidaginis Fabr. on *Solidago* sp.
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones;
on *Solidago canadensis* at Fort Collins, Colo., S. 24, '21 by F. C. Hottes.

Pterochlorus viminalis Boyer on *Salix vitellina* ?
Fort Collins, Colo., S. 15, '21 by F. C. Hottes.
Schizolachnus tomentosus De Geer on *Pinus scopulorum*
Devils Gulch, Glenn Haven, Colo., Jl. 27, '21 by M. A. Palmer.

Formica fusca var. *subsericea* Say
Aphis sp. on *Ambrosia trifida*
Fort Collins, Colo., S. 17, '21 by J. L. Hamilton;
on *Chenopodium album* Linn., Manassa, Colo., Ag. 10, '20 by C. R. Jones;
on *Oenothera biennis* Cheyenne Canon, Manitou, Colo., Jl. 30, '19 by L. C. Bragg.
on *Primula* sp., Fort Collins, Colo., Je. 28, '22 by C. R. Jones.

Aphis albipes Oest. on *Symphoricarpos* sp.
Colorado Springs, Colo., Ag. 1, '16 by L. C. Bragg.
Aphis near *cardui* Linn. on *Carduus* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis near *crigoni* Cowen on *Chrysothamnus* sp.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Aphis eriogoni Cowen ? on *Eriogonum* sp.
Estes Park, Colo., Jl. 21, '22 by C. P. Gillette.
Aphis helianthi Monell ? on *Carduus* sp.
Walden, Colo., S. 3, '26 by C. R. Jones;
on *Allionia* sp., Fort Collins, Colo., Jl. 21, '13 by L. C. Bragg;
on *Allionia linearis* Pursh., Fort Collins, Colo., S. 11, '06 by C. P. Gillette;
on *Urtica* sp., Fort Collins, Colo., Ag. 1, '20 by C. R. Jones.
Aphis heraclei Koch. on *Heracleum lanatum*
Fort Collins, Colo., Jl. 9, '98 by C. P. Gillette.
Aphis lugentis Will. on *Senecio spartioides*
Buckhorn Creek, Masonville, Colo., S. 11, '25 by C. A. Bjurman.
Aphis middletonii Thos. on *Leptilon* sp. ?
Manassa, Colo., Ag. 10, '20;
on *Rumex acetosella* Linn., Antonito, Colo., Ag. 11, '20 by C. R. Jones.

Aphis neilliae Oest. on *Physocarpus rameleyi* A. Nels.
Estes Park, Colo., Ag. 25, '21 by M. A. Palmer.
Aphis sambucifolii Fitch on *Sambucus canadensis*
Greeley, Colo., N. 14, '25 by A. E. Beardsley.
Bipersona torticauda Gill. on *Carduus* sp.
Log Cabin, Colo., Jl. 30, '26 by C. P. Gillette.
Chaitophorus populicola Thos. on *Populus* sp.
Rist Canon, Bellvue, Colo., Jl. 22, '19 by C. R. Jones.
on *Populus tremuloides* Michx., Estes Park, Colo., Jl. 25, '21 by C. P. Gillette, (3 records).
Chaitophorus viminalis Monell on *Populus tremuloides*
Estes Park, Colo., Ag. 17, '19 by C. P. Gillette;
on *Salix*, sp., Devils Gulch, Glenn Haven, Colo., Jl. 27, '21 by M. A. Palmer.
Eriosoma crataegi Oest. on *Crataegus* sp.
Fort Collins, Colo., S. 14, '20 by C. R. Jones.
Lachnus glaber Gill. & Pal. on *Pinus scopulorum* (Engelm.) Lemmon
Big Thompson Canon, Colo., O. 22, '21 by M. A. Palmer;
Estes Park, Colo., Jl. 23, '22 by C. P. Gillette.
Lachnus occidentalis Davidson on *Abies concolor*
Poudre Canon, Colo., by F. C. Hottes.
Lachnus oregonensis Wil. on *Pinus contorta*
Estes Park, Colo., Jl. 30, '22 by C. P. Gillette;
Stove Prairie hill, Colo., O. 2, '21 by M. A. Palmer.
Lachnus schwarzii Wil. on *Pinus scopulorum*
Devils Gulch, Glenn Haven, Colo., Jl. 27, '21 by M. A. Palmer, (2 records);
on *Pinus ponderosa*, Estes Park, Colo., Mr. 8, '19 by C. P. Gillette.
Lachnus sibiricae Gill. and Pal. on *Juniperus sibirica* Bursd.
Grand Lake, Colo., O. 9, '21 by M. A. Palmer.
Lachnus similis Gill. & Pal. on *Pinus contorta*
Poudre Canon, Colo., Ag. 12, '22 by F. C. Hottes and M. A. Palmer.
Lachnus solitarius Gill. & Pal. on *Pinus ponderosa*
Estes Park, Colo., Jl. 30, '22 by C. P. Gillette.
Lachnus splendens Gill. & Pal. on *Pseudotsuga taxifolia*
Estes Park, Colo., Jl. 20, '22 by C. P. Gillette, (3 records).
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia*
Estes Park, Colo., Jl. 22, '22 by C. P. Gillette.
Schizolachnus tomentosus De Geer on *Pinus scopulorum* (Engelm.) Lemmon
Estes Park, Colo., Ag. 7, '19 by C. P. Gillette.
Macrosiphum coweni var. *filifoliae* Gill. & Pal.
Greeley, Colo., Jl. 16, '25 by A. E. Beardsley.
Macrosiphum near *erigeronensis* Thos. on *Lactuca virosa*
Pemphigus sp. on *Artemisia gnapholodes* Nutt.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Rhopalosiphum hippophaes Koch. on *Hippophaes sporadic*
Eagle, Colo., S. 3, '22 by C. P. Gillette.
Rhopalosiphum nervatum Gill. on *Rosa chinensis*
Fort Collins, Colo., S. 21, '21 by R. C. Thompson.
Rhopalosiphum ribis Linn. on *Setaria glauca* Linn.
Cheyenne Canon, Manitou, Colo., Jl. 30, '19 by L. C. Bragg.
Symydobius americanus Baker on *Betula* sp.
Estes Park, Colo., Ag. 22, '21 by M. A. Palmer.

Formica munda Whlr.
Aphis albipes Oest. on *Symphoricarpos* sp.
Laporte, Colo., Jl. 1, '98 by C. P. Gillette.
Aphis medicaginis Koch. on *Chenopodium album* Linn.
Antonito, Colo., Ag. 12, '20 by C. R. Jones.
Aphis middletonii Thos. on *Helianthus* sp. ?
Buckhorn, Masonville, Colo., S. 11, '25 by C. R. Jones.
Bipersona torticauda Gill. on *Carduus* sp.
Big Thompson Canon, Colo., Ag. 5, '25 by C. R. Jones.
Lachnus ater Gill. & Pal. on *Pinus edulis*
Owl Canon, Larimer Co., Colo., S. 1, '25 by C. R. Jones.

Formica neogagates Emery
Aphis sp. on grass roots
Fort Collins, Colo., Mr. 27, '18 by L. C. Bragg.
Aphis artemisicola Will. on *Artemisia tridentata*
Rio Blanca, Colo., Ag. 6, '26 by C. R. Jones.
Aphis near *cardui* Linn. on *Carduus* sp.
Ridgway, Colo., Jl. 29, '26 by C. R. Jones.
Aphis cerasifolii Fitch on *Prunus melanocarpa* Rydb.
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Aphis near *eriogoni* Cowen on *Chrysothamnus*
Meeker, Colo., Ag. 6, '26;
Axel, Colo., Ag. 6, '26 by C. R. Jones.
Aphis helianthi Monell on *Helianthus* sp.
Colorado Springs, Colo., Jl. 31, '19 by L. C. Bragg.
Aphis medicaginis Koch. on *Kochia* sp.
Fort Collins, Colo., Ag. 19, '19 by C. R. Jones.
Chaitophorus sp. on *Populus angustifolia*
Gunnison, Colo., Jl. 26, '26 by C. R. Jones.
Forda olivaceae Rohw. on grass roots
Paonia, Colo., My. 26, '20 by H. Newton;
on *Hordeum* sp., Fort Lewis, Colo., S. 29, '17 by C. P. Gillette.
Lachnus ponderosae Will. on *Pinus scopulorum*
Fort Collins, Colo., Je. 8, '22 by C. A. Bjurman.

Formica neogagates Emery var. ?
Aphis helianthi Monell on *Helianthus* sp.
Denver, Colo., Jl. 1, '04 by S. A. Johnson:
Chaitophorus negundinis Thos. on *Negundo Nuttallii* (Nieuwl.) Rydb.
Bellvue, Colo., Jl. 24, '26 by C. R. Jones.

Formica neogagates var. *morbida* Whlr.
Aphis minutissima Gill. & Pal. on *Artemisia filifolia*
Denver, Colo., Ag. 11, '19 by L. C. Bragg.

Formica neogagates var. *vetula* Whlr.
Aphis sp. on *Pentstemon* sp.
Estes Park, Colo., Jl. 25, '21 by C. P. Gillette.

Formica neogagates subsp. *lasioides* var. *limata* Whlr.
Aphis maidis Fitch
Colorado Springs, Colo., by L. C. Bragg.
Aphis medicaginis Koch.
Colorado Springs, Colo., Ag. 1, '19 by L. C. Bragg.

Formica neogagates subsp. *lasioides* var. *vetula* Whlr.
Aphis sp. on *Salsola pestifer* A. Nels.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Aphis artemisicola Will. on *Artemisia cana*
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Aphis cardui Linn. ? on *Carduus* sp.
Battle Creek, Colo., Ag. 28, '24 by C. R. Jones.
Aphis near *eriogoni* Cowen on *Chrysothamnus*
Gunnison, Colo., Jl. 22, '26 by C. R. Jones.
Aphis helianthi Monell on *Helianthus* sp.
Antonito, Colo., Ag. 11, '20;
Cedaredge, Colo., Ag. 4, '26 by C. R. Jones, (2 records).
Forda formicaria Heyd on grass roots
Owl Canon, Larimer Co., Colo., Ag. 2, '25 by C. R. Jones.
Lachnus solitarius Gill. & Pal. on *Pinus scopulorum*
Estes Park, Colo., Jl. 22, '22 by C. P. Gillette.
Macrosiphum cowenі Hunter on *Artemisia* sp.
Sargent, Colo., Jl. 26, '26 by C. R. Jones.

Formica oreas Whlr.
Aphis artemisicola Will. on *Artemisia* sp.
Steamboat Springs, Colo., Ag. 26, '24 by C. R. Jones.

Aphis near *eriogoni* Cowen on *Chrysothamnus gravcolens* (Nutt.) Greene.
Fort Collins, Colo., S. 9, '22 by L. Johnson.
Aphis helianthi Monell on *Helianthus* sp.
Delta, Colo., Jl. 31, '26 by C. R. Jones;
on *Carduus* sp., Fort Collins, Colo., Jl. 29, '25 by C. P. Gillette;
on *Yucca* sp., Salida, Colo., Jl. 26, '26 by C. P. Gillette.
Bipersona torticauda Gill. on *Carduus* sp.
Fort Collins, Colo., Jl. 29, '25 by C. P. Gillette, (2 records).
Lachnus rosae Cholod. on *Rosa* sp.
Rist Canon, Bellvue, Colo., O. 8, '22 by M. E. Blodget.
Lachnus solitarius Gill. & Pal. on *Pinus scopulorum*
Denver, Colo., S. 10, '22 by C. A. Bjurman.
Macrosiphum erigeronensis Thos. on *Carduus* sp.
Fort Collins, Colo., Jl. 29, '25 by C. P. Gillette.
Myzus persicae Sulz.
Fort Collins, Colo., Ag. 14, '21 by M. A. Palmer.

Formica oreas var. *comptula* Whlr.
Aphis sp. on *Frasera* sp.
Rist Canon, Bellvue, Colo., Jl. 22, '17 by C. R. Jones, (2 records).
Aphis artemisicola Will. on *Artemisia cana*
Rio Blanco, Colo., Ag. 5, '26;
on *Chrysothamnus* sp., Craig, Colo., Ag. 7, '26 by C. R. Jones.
Aphis cerasifolii Fitch on *Prunus virginiana*
Estes Park, Colo., by M. A. Palmer.
Aphis near *eriogoni* Cowen on *Chrysothamnus* sp.
Ingleside, Colo., Ag. 17, '22 by M. A. Palmer;
Antonito, Colo., Ag. 2, '20 by C. R. Jones.
Aphis eriogoni Cowen ? on *Eriogonum* sp.
Estes Park, Colo., Jl. 21, '22 by M. A. Palmer.
Aphis helianthi Monell on *Helianthus* sp.
Ridgway, Colo., Jl. 29, '26 by C. R. Jones;
on *Allionia linearis* Pursh., Eagle, Colo., S. 3, '22 by C. P. Gillette;
on *Ambrosia trifida*, Bellvue, Colo., Jl. 26, '25 by C. R. Jones.
Bipersona torticauda Gill. on *Carduus* sp. and
on *Salsola pestifer*, Fort Collins, Colo., Jl. 23, '25 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus* sp. ?
Fort Collins, Colo., O. 2, '06 by L. C. Bragg.
Hysteroneura setariae Thos. on *Poa* sp.
Fort Collins, Colo., Ag. 16, '06 by C. P. Gillette.
Lachnus murrayanae Gill. & Pal. on *Pinus contorta*
Stove Prairie, Colo., Je. 3, '22 by M. A. Palmer.
Lachnus taxifoliae Swain on *Pseudotsuga* sp.
Estes Park, Colo., S. 18, '21 by M. A. Palmer.
Microsiphum artemisiae Gill. on *Artemisia* sp.
Laporte, Colo., O. 14, '22 by C. P. Gillette.

Formica pallide-fulva subsp. *schaufussi* var- *incerta* Emery
Chaitophorus populicola Thos. on *Populus occidentalis*
Greeley, Colo., Je. 6, '26;
Ag. 8, '25 by A. E. Beardsley.
Melanoxantherium smithiae Monell on *Populus occidentalis*
Greeley, Colo., O. 16, '23 by A. E. Beardsley.
Myzus persicae Sulz. on *Prunus americana*
Greeley, Colo., Je. 6, '25 by A. E. Beardsley.

Formica sp. rufa group
Aphis near *eriogoni* Cowen on *Chrysothamnus gravcolens*
Fort Collins, Colo., Ag. 28, '98 by C. P. Gillette.
Aphis hermistonii Wil. ? on *Artemisia tridentata*
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Aphis houghtonensis Troop on *Ribes* sp.
Black Mountain, Colo., Jl. 12, '25 by C. R. Jones.

Aphis medicaginis Koch. on *Melilotus alba* Desv.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.

Chaitophorus sp. on *Salix* sp.
Rabbit Ears Pass, Colo., Jl. 19, '23 by S. McCampbell;
on *Populus tremuloides*, Aspen, Colo., O. 2, '06 by C. P. Gillette.

Lachnus sp.
Antonito, Colo., Ag. 12, '20 by C. R. Jones.

Lachnus ponderosae Will. on *Pinus scopulorum* (Engelm.) Lemmon
Devils Gulch, Glenn Haven, Colo., Jl. 27, '21 by M. A. Palmer.

Lachnus schwarzii Wil. on *Pinus ponderosa*
Stove Prairie, Colo., Ag. 21, '22 by M. A. Palmer and F. C. Hottes.

Lachnus solitarius Gill. & Pal. on *Pinus scopulorum* (Engelm.) Lemmon
Estes Park, Colo., Jl. 22, '22 by C. P. Gillette.

Melanoxantherium smithiae Monell on *Salix* sp.
Fort Collins, Colo., S. 11, '25 by R. Willis.

Formica rufa Linn. var. ?

Lachnus ponderosae Will. on *Pinus scopulorum* (Engelm.) Lemmon
Estes Park, Colo., Jl. 23, '22 by C. P. Gillette;
on *Pinus scopulorum*, Estes Park, Colo., Ag. 25, '21 by M. A. Palmer.

Lachnus schwarzii Wil. on *Pinus scopulorum*
Estes Park, Colo., Ag. 14, '21 by M. A. Palmer.

Formica rufa var. *aggerans* Whlr.

Aphis middletonii Thos. on *Leptilon* sp.
Manassa, Colo., Ag. 10, '20 by C. R. Jones.

Chaitophorus populicola Thos. on *Populus* sp.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.

Formica rufa subsp. *integra* Nyl.

Macrosiphum sp. on *Lactuca pulchella*
Fort Collins, Colo., Ag. 12, '98 by C. P. Gillette.

Formica rufa subsp. *obscuripes* Forel

Aphis sp. on *Aster* sp.
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones;
on *Eriogonum* sp., Estes Park, Colo., Jl. 24, '21 by C. P. Gillette;
on *Crataegus* sp., Paonia, Colo., Ag. 1, '26 by C. R. Jones.

Aphis artemisicola Will. on *Artemisia cana*
Steamboat Springs, Colo., Ag. 8, '26;
on *Artemisia tridentata*, Meeker, Colo., Ag. 5, '26 by C. R. Jones.

Aphis canae Will. on *Artemesia cana*
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.

Aphis cerasifolii Fitch on *Prunus melanocarpa*
Fort Collins, Colo., Je. 18, '98 by C. P. Gillette;
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.

Aphis chrysothamnicola Gill. & Pal. on *Chrysothamnus* sp.
Rio Blanco, Colo., Ag. 5, '26;
Meeker, Colo., Ag. 5, '26 by C. R. Jones.

Aphis cornifoliae Ftch. on *Cornus stolonifera*
Rist Canon, Bellvue, Colo., O. 8, '22 by M. A. Palmer.

Aphis near *eriogoni* Cowen on *Chrysothamnus* sp.
Manassa, Colo., Ag. 11, '20;
Ridgway, Colo., Jl. 29, '26;
Sargent, Colo., Jl. 26, '26 by C. R. Jones, (2 records).

Aphis eriogoni Cowen ? on *Eriogonum effusum*
Owl Canon, Larimer Co., Colo., Ag. 23, '25 by M. A. Palmer;
on *Eriogon* sp., Estes Park, Colo., Jl. 12, '24 by C. R. Jones.

Aphis helianthi Monell on *Helianthus* sp.
Fort Collins, Colo., S. 19, '20 by V. Blaz;
Antonito, Colo., Ag. 11, '21;
Pueblo, Colo., Ag. 16, '24;
on *Yucca glauca*, Colorado Springs, Colo., Jl. 24, '25 by C. R. Jones.

Aphis hermistonii Wil. ? on *Artemisia tridentata*
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Aphis near *lugentis* Will. on *Senecio* sp.
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.
Aphis medicaginis Koch
Buena Vista, Colo., Je. 18, '07 by C. P. Gillette.
Aphis middletonii Thos. on *Chenopodium album* Linn.
Antonito, Colo., Ag. 12, '20 by C. R. Jones.
Aphis neilliae Oest. on *Physocarpus* sp.
Estes Park, Colo., Jl. 28, '21 by C. P. Gillette.
Aphis oregonensis Wil. on *Artemisia tridentata*
Sargent, Colo., Jl. 21, '16 by C. R. Jones.
Aphis near *pentstemonis* Will. on *Pentstemon* sp.
Owl Canon, Larimer Co., Colo., Ag. 23, '25 by C. R. Jones.
Bipersona torticauda Gill. on *Carduus* sp.
Steamboat Springs, Colo., Ag. 8, '26;
Virginia Dale, Colo., Ag. 9, '25 by C. R. Jones.
Chaitophorus populella Gill. & Pal. on *Populus* sp.
Fort Collins, Colo., Jl. 25, '19 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus* sp.
Cheyenne Canon, Manitou, Colo., Ag. 30, '19 by L. C. Bragg.
on *Populus tremuloides*, Chambers Lake, Colo., Je. 30, '23 by M. A. Palmer, (2 records).
Chaitophorus viminalis Monell on *Salix* sp.
Estes Park, Colo., Ag. 18, '21 by M. A. Palmer.
Lachnus glaber Gill. & Pal. on *Pinus scopulorum*
Estes Park, Colo., Ag. 15, '21 by M. A. Palmer.
Lachnus ponderosae Will. on *Pinus scopulorum* (Engelm.) Lemmon
Estes Park, Colo., Jl. 23, '22 by C. P. Gillette, (2 records);
Fort Collins, Colo., Mr. 23, '22 by C. A. Bjurman.
Lachnus similis Gill. & Pal. on *Pinus contorta*
Poudre Canon, Colo., Ag. 12, '22 by F. C. Hottes and M. A. Palmer.
Lachnus solitarius Gill. & Pal. on *Pinus scopulorum* (Engelm.) Lemmon
Estes Park, Colo., Jl. 22, '22 by C. P. Gillette;
Ag. 15, '21 by M. A. Palmer.
Lachnus splendens Gill. & Pal. on *Pseudotsuga taxifolia* (Poir.) Britt.
Estes Park, Colo., S. 1, '24 by M. A. Palmer.
Macrosiphum solidaginis Fabr. ? on *Solidago* sp.
Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Melanoxantherium salicis on *Salix* sp.
Estes Park, Colo., Ag. 22, '21 by M. A. Palmer.
Symydobius salicicorticis Essig on *Salix* sp.
Antonito, Colo., Ag. 11, '20;
Manassa, Colo., Ag. 10, '20 by C. R. Jones.
Thecabius populi-monilis Riley on *Populus angustifolia*

Formica rufa subsp. *obscuripes* var. *melanotica* Emery.

Aphis artemisicola Will. on *Artemisia tridentata*
Sargent, Colo., Jl. 26, '26 by C. R. Jones.

Aphis near *eriogoni* Cowen on *Chrysothamnus* sp.
Manassa, Colo., Ag. 11, '20 by C. R. Jones.

Aphis helianthi Monell on *Helianthus* sp.
Fort Collins, Colo., Jl. 25, '26 by C. R. Jones.

Aphis oregonensis Wil. on *Artemisia tridentata*
Sargent, Colo., Jl. 26, '26 by C. R. Jones.

Chaitophorus sp. on *Populus tremuloides* Michx.
Estes Park, Colo., Jl. 25, '22 by C. P. Gillette.

Chaitophorus populicola Thos. on *Populus tremuloides*
Steamboat Springs, Colo., Ag. 8, '26;
Black Mountain, Colo., Jl. 8, '25 by C. R. Jones;
on *Populus* sp., Fort Collins, Colo., S. 24, '21 by F. C. Hottes.

Bipersona torticauda Gill. on *Carduus* sp.
Walden, Colo., S. 3, '26;
Colorado Springs, Colo., Jl. 24, '26 by C. R. Jones.
Macrosiphum sp. on *Epilobium* sp.
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.
Macrosiphum frigidae Oest. on *Artemisia tridentata*
North Park, Colo., S. 3, '26;
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Microsiphum artemisiae Gill. on *Artemisia gnaphalodes* Nutt.
Antonito, Colo., Ag. 21, '20 by C. R. Jones.
Lachnus glaber Gill. & Pal. on *Pinus scopulorum*
Big Thompson Canon, Colo., O. 22, '21 by M. A. Palmer.
Lachnus hottesi Gill. & Pal. on *Picea engelmanni*
Fern Lake, Estes Park, Colo., Je. 13, '23 by F. C. Hottes.

Formica rufibarbis var. *gnava* Buckley

Aphis middletonii Thos. on *Rumex acetosella* Linn.
Antonito, Colo., Ag. 12, '20 by C. R. Jones.

Lachnus edulis Wil. on *Pinus edulis*
Salida, Colo., S. 1, '22 by C. P. Gillette.

Lachnus schwarzii Wil. on *Pinus scopulorum*
Salida, Colo., S. 1, '22 by C. P. Gillette.

Symydobius salicicorticis Essig. on *Salix* sp.
Fort Collins, Colo., by C. R. Jones.

Formica sanguinea Latr. subsp. ?
Bipersona torticauda Gill. on *Carduus* sp.
Fort Collins, Colo., Je. 30, '98 by C. P. Gillette.
Macrosiphum erigeronensis Thos. on *Aster* sp.
Lost Lake, Colo., Ag. 2, '26 by C. R. Jones.

Formica sanguinea subsp. *aserva* Forel
Lachnus glaber Gill. & Pal. on *Pinus scopulorum*
Estes Park, Colo., Jl. 23, '22 by C. P. Gillette.

Formica sanguinea subsp. *rubicunda* Emery
Aphis lugentis Will. on *Senecio atratus*
Loch Vale, Estes Park, Colo., Jl. 26, '21 by M. A. Palmer.

Formica sanguinea subsp. *puberule* Emery.
Aphis sp. on *Senecio* sp.
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.

Formica sanguinea subsp. *subintegra* Emery
Aphis sp. on *Gaura coccinea*
Pingree Park, Colo., Ag. 20, '26 by C. P. Gillette.
Aphis near *eriogoni* Cowen on *Chrysothamnus* sp.
Craig, Colo., Ag. 7, '26 by C. R. Jones.
Macrosiphum ambrosiae Thos. on *Iva xanthifolia*
Fort Collins, Colo., S. 15, '15 by L. C. Bragg.

Formica sanguinea subsp. *subnuda* Emery
Aphis sp. on *Valeriana trachycarpa* Rydb.
Lost Lake, Colo., Ag. 2, '26 by C. R. Jones.
Aphis lugentis Will. on *Senecio triangularis* Hook
Salida, Colo., Jl. 25, '26 by C. R. Jones.
Aphis valerianae Cowen on *Valeriana trachycarpa* Rydb.
Lost Lake, Colo., Ag. 2, '26 by C. R. Jones.
Chaitophorus sp. on *Populus tremuloides*
Estes Park, Colo., Jl. 26, '25 by C. R. Jones.
Chaitophorus viminalis Monell on *Salix* sp.
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Ag. 8, '23 by M. A. Palmer, (2 records).
Lachnus near *grossus* Kalt. on *Abies lasiocarpa*
Rabbit Ears Pass, Colo., S. 22, '20 by C. P. Gillette.

Formica truncicola subsp. *integroides* Emery
Aphis helianthi Monell on *Yucca glauca*
Greeley, Colo., Jl. 11, '26 by A. E. Beardsley.
Chaitophorus populicola Thos. on *Populus tremuloides*
Laramie-Poudre Tunnel, Colo., Ag. 12, '20 by C. P. Gillette.
Lachnus ponderosae Will. on *Pinus scopulorum* (Engelm) Lemmon
Estes Park, Colo., My. 28, '22 by M. A. Palmer.

Formica truncicola subsp. *integroides* var. *coloradensis* Whlr.
Aphis sp. on *Artemisia* sp.
Fort Collins, Colo., S. 24, '21 by F. C. Hottes.
Aphis medicaginis Koch on *Glycyrrhiza lepidota*
Greeley, Colo., Jl. 7, '24 by A. E. Beardsley.
Aphis medicaginis Koch on *Kochia scoparia*
Greeley, Colo., Ag. 14, '25;
on *Melilotus alba,* Greeley, Colo., Ag. 10, '24 by A. E. Beardsley.
Lachnus apini Gill. & Pal. on *Pinus flexilis*
Estes Park, Colo., Ag. 16, '21 by M. A. Palmer.
Macrosiphum coweni var. *filifoliae* Gill. & Pal.
Greeley, Colo., Jl. 16, '25 by A. E. Beardsley.

Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.
Aphis helianthi Monell on *Helianthus* sp.
Fort Collins, Colo., S. 26, '21 by Geo. Boyd;
S. 24, '21 by F. C. Hottes.
Aphis lugentis Will. on *Senecio triangularis* Hook
Salida, Colo., Jl. 25, '26 by C. R. Jones.
Aphis medicaginis Koch. on *Salsola pestifer*
Fort Collins, Colo., Jl. 25, '19 by C. R. Jones.
Aphis pomi De Geer on *Malus malus*
Fort Collins, Colo., S. 9, '22 by L. Johnson.
Bipersona torticauda Gill. on *Carduus* sp. ?
Log Cabin, Colo., Jl. 30, '26 by C. P. Gillette.
Chaitophorus populicola Thos. on *Populus* sp.
Poudre Canon, Colo., Ag. 12, '20 by C. P. Gillette;
Ouray, Colo., Jl. 29, '26 by C. R. Jones;
Fort Collins, Colo., S. 20, '22 by E. A. Hamilton.
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Jl. 23, '22 by C. P. Gillette, (3 records).
Lachnus glaber Gill. & Pal. on *Pinus ponderosa*
Estes Park, Colo., Jl. 30, '22 by C. P. Gillette.
Lachnus oregonensis Wil. on *Pinus contorta*
Stove Prairie, Colo., Ap. 22, '22 by J. L. Hoerner.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia*
Stove Prairie, Colo., Ag. 21, '22 by C. P. Gillette;
Rist Canon, Bellvue, Colo., My. 6, '24 by M. A. Palmer.
Macrosiphum solidaginis Fabr. ? on *Solidago* sp.
Fort Collins, Colo., O. 17, '22 by E. A. Hamilton.

Formica ulkei Emery
Chaitophorus viminalis Monell on *Salix* sp.
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.

Iridomyrmex pruinosus Rogers
Fort Collins, Colo., Mr. 27, '15 by L. C. Bragg.

Lasius sp.
Geoica radicola Essig under a stone on grass roots
Greeley, Colo., Ap. 11, '25 by A. E. Beardsley.

Lasius claviger Rogers
Macrosiphum ambrosiae Thos. on *Iva xanthifolia*
Fort Collins, Colo., S. 15, '15 by L. C. Bragg.

Lasius flavius var. *nearcticus* Whlr.
Aphis sp. on *Ambrosia trifida*
Rocky Ford, Colo., Je. 10, '06 by C. P. Gillette.

Lasius latipes Walsh
Aphis hermistonii Wil. ? on *Artemisia tridentata*
Craig, Colo., Ag. 7, '26 by C. R. Jones.

Lasius niger var. *americanus* Emery
Chaitophorus populicola Thos. on *Populus angustifolia*
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Geoica squamosa Hart. on grass roots
Fort Collins, Colo., Mr. 17, '18 by L. C. Bragg.
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Cherokee Park, Colo., S. 2, '22 by M. A. Palmer.
Lachnus edulis Wil. on *Pinus edulis*
Owl Canon, Larimer Co., Colo., S. 1, '25 by C. R. Jones.
Lachnus hottesi Gill. & Pal. on *Picea engelmanni*
Fern Lake, Estes Park, Colo., Je. 13, '23 by F. C. Hottes.

Lasius niger var. *neoniger* Emery
Aphis sp. on *Frasera* sp.
Rist Canon, Bellvue, Colo., Jl. 22, '19 by C. R. Jones;
on *Eleusine indica*, Gaertn., Fort Collins, Colo., S. 20, '21 by C. Drexel;
on *Cercocarpus parvifolius*, Stove Prairie, Colo., Ag. 21, '22 by F. C. Hottes;
Colorado Springs, Colo., Jl. 25, '26 by C. R. Jones.
Aphis avenae Fabr. on *Prunus* sp.
Cheyenne Canon, Manitou, Colo., Jl. 30, '19, by L. C. Bragg.
Aphis cerasifoliae Fitch on *Prunus melanocarpa* A. Nels.
Manitou, Colo., Je. 30, '21 by C. P. Gillette.
Aphis forbesi Weed on *Fragaria* sp.
Greeley, Colo., Ag. 10, '22 by A. E. Beardsley, (2 records).
Aphis gossypii Glover on *Cucumis sativus* Linn.
Fort Collins, Colo., Jl. 15, '19 by C. R. Jones.
Aphis helianthi Monell on *Oxybaphus* sp.
Estes Park, Colo., Jl. 20, '22 by C. P. Gillette;
on *Cornus sanguinea* Linn., Fort Collins, Colo., S. 14, '21 by H. Sweetman.
Aphis near *hermistonii* Wil. on *Artemisia tridentata*
Estes Park, Colo., Ag. 7, '19 by C. P. Gillette.
Aphis hermistonii Wil. on *Artemisia tridentata*
Estes Park, Colo., Ag. 7, '98 by C. P. Gillette.
Capitophorus glandulosus Kalt. on *Artemisia tridentata*
Estes Park, Colo., Ag. 7, '98 by C. P. Gillette.
Chaitophorus negundinis Thos. on *Negundo Nutalli* (Nieuwl.) Rydb.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.
Chaitophorus populella Gill. & Pal. on *Populus* sp.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones, (2 records).
Chaitophorus populicola Thos. on *Populus* sp.
Fort Collins, Colo., S. 24, '21 by F. C. Hottes;
Colorado Springs, Colo., Jl. 21, '19 by L. C. Bragg;
on *Populus tremuloides*, Steamboat Springs, Colo., Ag. 8, '26 by C. R. Jones.
Geoica phaseoli Pass on *Eragrostis megastachya*
Greeley, Colo., Ag. 20, '25 by A. E. Beardsley;
on *Phaseolus* roots, Fort Collins, Colo., O. 7, '24 by C. P. Gillette.
Essigella sp. on *Pinus* sp.
Cheyenne Canon, Manitou, Colo., Jl. 30, '19 by L. C. Bragg.
Essigella fusca Gill. & Pal. on *Pinus ponderosa* (Engelm) Lemmon
Stove Prairie, Colo., Ag. 21, '22 by F. C. Hottes.
Forda formicaria Heyd. on grass roots
Estes Park, Colo., Ag. 22, '21 by M. A. Palmer.
Lachnus sp. on *Pinus* sp.
Cheyenne Canon, Manitou, Colo., Jl. 30, '19 by L. C. Bragg.
Lachnus glaber Gill. & Pal. on *Pinus ponderosa*
Estes Park, Colo., Jl. 30, '22 by C. P. Gillette;
Stove Prairie, Colo., Ag. 21, '22 by M. A. Palmer;
on *Pinus scopolorum* (Engelm.) Lemmon, Estes Park, Colo., Jl. 30, '22, 8000 ft., by C. P. Gillette.

Lachnus schwarzii Wil. on *Pinus scopulorum*
Stove Prairie, Colo., Ag. 21, '22 by M. A. Palmer and F. C. Hottes.
Lachnus solitarius Gill. & Pal. on *Pinus scopulorum* (Engelm.) Lemmon
Estes Park, Colo., Jl. 23, '22 by C. P. Gillette, (2 records);
Stove Prairie, Colo., Ag. 21, '22 by F. C. Hottes and M. A. Palmer.
Lachnus taxifoliae Swain on *Pseudotsuga taxifolia*
Estes Park, Colo., Jl. 22, '22 by C. P. Gillette.
Macrosphoniella sanborni Gill. on *Chrysanthemum indicum*
Fort Collins, Colo., S. 19, '21 by R. C. Thompson.
Macrosiphum solanifollii Ash ? on *Amaranthus* sp.
Fort Collins, Colo., S. 20, '20 by C. Drexel.
Macrosiphum taraxaci Kalt. on *Taraxacum* sp.
Fort Collins, Colo., S. 14, '21 by C. R. Jones.
Myzus sp. on *Ribes longiflorum* Nutt.
Fort Collins, Colo., Jl. 24, '19 by C. R. Jones.
Myzus glandulosus Kalt. on *Artemisia tridentata*
Estes Park, Colo., Ag. 7, '19 by C. P. Gillette.
Schizolachnus tomentosus De Geer on *Pinus scopulorum*
Devils Gulch, Glenn Haven, Colo., Jl. 27, '21 by M. A. Palmer.
Symydobius americanus Baker on *Betula* sp.
Masonville, Colo., Je. 11, '22 by M. A. Palmer.

Lasius niger var. *sitkaensis* Pergande
Anuraphis sp.
Fort Collins, Colo., Jl. '18 by A. A. Granovsky.
Aphis sp. on *Onagra* sp.
Greeley, Colo., Ag. 19, '25;
on *Valeriana trachycarpa* Rydb., Lost Lake, Colo., Ag. 2, '26 by C. R. Jones.
Chaitophorus sp. on *Salix* sp.
Fort Collins, Colo., J. '18 by A. A. Granovsky.
Chaitophorus populella Gill. & Pal. on *Salix* sp.
Fort Collins, Colo., S. 17, '22 by E. A. Hamilton, (2 records).
Chaitophorus populicola Thos. on *Populus* sp.
Greeley, Colo., Je. 29, '25 by C. R. Jones.
Geoica radicola Essig. on grass roots
Fort Collins, Colo., Jl. 7, '25 by C. R. Jones.
Symydobius salicicortis Essig. on *Salix* sp.
Estes Park, Colo., Jl. 26, '25 by C. R. Jones.

Leptothorax acervorum subsp. *canadensis* Provancher
Aphis artemisicola Will. on *Artemisia* sp.
Walden, Colo., O. 3, '26 by C. R. Jones.

Liometopum apiculatum var- *occidentale* Emery
Lachnus edulis Wil. on *Pinus edulis*
Manitou, Colo., Jl. 3, '19 by L. C. Bragg.

Liometopum apiculatum subsp. *luctuosum* Whlr.
Lachnus edulis Wil. on *Pinus edulis*
Trinidad, Colo., Je. 19, '11 by L. C. Bragg.

Monomorium minimum Buckley
Macrosiphum gaurae Will. on *Gaura parviflora*
Fort Collins, Colo., S. 21, '22 by Leonard Johnson.

Myrmica sp.
Aphis bakeri Cowen on *Crataegus* sp.
Eagle, Colo., Ag. 3, '22 by C. P. Gillette.
Aphis forbesi Weed on *Fragaria* sp.
Fort Collins, Colo., Jl. 11, '21 by E. A. Hamilton.
Aphis helianthi Monell on *Urtica* sp. ?
Antonito, Colo., Ag. 12, '20 by C. R. Jones.
Aphis medicaginis Koch on *Chenopodium album* Linn.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Aphis oregonensis Wil. on *Artemisia gnaphalodes* Nutt.
Manassa, Colo., Ag. 11, '20 by C. R. Jones.

Bipersona torticauda Gill. on *Carduus* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Forda sp. on grass roots
Manitou, Colo., Ag. 3, '19 by L. C. Bragg.
Lachnus edulis Wil. on *Pinus edulis*
Fort Collins, Colo., Je. 16, '22 by M. A. Palmer.
Myzus aquilegiae Essig. on *Aquilegia coerulea*
Fort Collins, Colo., Je. 30, '25 by C. R. Jones.
Rhopalosiphum rhois Monell on *Elymus canadensis*

Myrmica brevinodis Emery
Aphis helianthi Monell on *Helianthus* sp.
Fort Collins, Colo., Jl. 17, '26 by C. P. Gillette.
Aphis medicaginis Koch on *Vicia* ?
Ridgway, Colo., Jl. 29, '26 by C. R. Jones.
Aphis menthae-radicis Cowen on *Monarda* sp.
Fort Collins, Colo., N. 4, '06 by L. C. Bragg.

Myrmica brevinodis Emery var. ?
Aphis sp. on *Valeriana trachycarpa* Rydb.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis gossypii Glov. on *Cucumis sativus* Linn.
Fort Collins, Colo., S. 16, '21 by C. A. Bjurman;
S. 25, '20 by V. Blaz.
Aphis helianthi Monell on *Cornus sanguinea* Linn.
Fort Collins, Colo., S. 14, '21 by H. Sweetman, (2 records).
Aphis maidis Fitch on *Zea saccharina*
Fort Collins, Colo., S. 17, '21 by H. Sweetman.
Aphis medicaginis Koch. on *Salsola pestifer*
Fort Collins, Colo., S. 19, '21 by R. R. Morris.
Aphis persicae Sulz. on *Negundo Nuttallii* (Nieuwl.) Rydb.
Fort Collins, Colo., S. 14, '21 by Magnuson.
Aphis pomi De Geer on *Malus malus*
Fort Collins, Colo., S. 20, '23 by U. R. Saulcy.
Aphis populicola Thos. on *Salix* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis salicicola Monell on *Salix* sp.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Chaitophorus negundinis Thos. on *Negundo Nuttallii* (Nieuwl.) Rydb.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus angustifolia*
Antonito, Colo., Ag. 12, '20 by C. R. Jones.
Eriosoma lanigera Hausm. on *Malus malus*
Fort Collins, Colo., by H. L. Wadley.
Macrosiphum ambrosiae Thos. on *Ambrosia trifida*
Fort Collins, Colo., Jl. '18 by A. A. Granovsky, (2 records).
Melanoxantherium bicolor Oest. on *Salix* sp.
Fort Collins, Colo., My. 2, '08 by L. C. Bragg.
Rhopalosiphum nervatum Gill. on *Rosa chinensis*
Fort Collins, Colo., S. 11, '21 by C. A. Bjurman.
Symydobius salicicorticis Essig. ? on *Salix* sp.
Manassa, Colo., Ag. 16, '20 by C. R. Jones.

Myrmica brevinodis var. *sulcinodoides* Emery.
Aphis helianthi Monell on *Helianthus* sp.
Pueblo, Colo., S. 2, '20 by C. R. Jones.
Aphis carbocolor Gill. on *Rumex* sp.
Fort Collins, Colo., Je. 30, '98 by C. P. Gillette.
Aphis oenotherae Oest. on *Oenothera biennis*
Fort Collins, Colo., Jl. 8, '98 by C. P. Gillette.
Aphis saliceti Kalt. on *Salix* sp.
Antonito, Colo., Ag. 11, '20 by C. R. Jones.
Chaitophorus viminalis Thos. on *Salix* sp.
Sargent, Colo., Jl. 25, '26 by C. R. Jones.

Myrmecina graminicola Latr.
Aphis forbesi Weed on *Fragaria* sp. roots
Greeley, Colo., My. 23, '24 by A. E. Beardsley.
Chaitophorus viminalis Monell on *Salix exigua*
Waterdale, Colo., O. 2, '24 by A. E. Beardsley.

Myrmica rubra Linn.
Lachnus apini Gill. & Pal. on *Apinus flexilis*
Estes Park, Colo., Ag. 16, '17 by M. A. Palmer.

Myrmica rubra subsp. *brevinodis* Emery
Aphis artemisicola Will. on *Artemisia tridentata*
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Aphis near *cardui* Linn. on *Cardnus* sp.
Meeker, Colo., Ag. 6, '26 by C. R. Jones.
Chaitophorus populicola Thos. on *Populus* sp.
Delta, Colo., My. 11, '08 by C. P. Gillette.
Lachnus oregonensis Wil. on *Pinus contorta*
Eldorado, Colo., Je. 23, '10 by L. C. Bragg.

Myrmica rubra subsp. *brevinodis* var. *canadensis* Whlr.
Aphis carbocolor Gill. on *Rumex* sp.
Fort Collins, Colo., Jl. 30, '98 by C. P. Gillette.
Melanoxantherium salicis Linn. on *Salix* sp.
Fort Collins, Colo., Je. 13, '99 by C. P. Gillette.

Myrmica scabrinodis Nyl.
Aphis forbesi Weed on *Frageria* sp.
Greeley, Colo., Ag. 10, '22 by A. E. Beardsley.
Aphis helianthi Monell on *Helianthus* sp.
Big Thompson Canon, Colo., Ag. 5, '25 by C. R. Jones.
Chaitophorus sp. ? on *Populus angustifolia*
Eagle, Colo., S. 3, '22 by C. P. Gillette.
Drepanaphis acerifoliae Thos. on *Acer.* sp.
Fort Collins, Colo., S. 25, '21 by H. Sweetman.
Lachnus brevispinosus Gill. & Pal. on *Pinus contorta*
Pingree Park, Colo., Ag. 22, '23 by M. A. Palmer.
Myzus persicae Sulz. on *Convolvula* sp. ?
Fort Collins, Colo., Jl. 22, '19 by C. R. Jones.
Myzus ribis Linn. on *Stachys scopulorum*

Pheidole sp.
Aphis gossypii Glover on *Cucumis melo*
Rocky Ford, Colo., Jl. 3, '07 by L. C. Bragg.

Pheidole palifera subsp. *coloradensis* Emery.
Asiphum sp. on *Populus occidentalis*
Fort Collins, Colo., Je. 28, '13 by L. C. Bragg.
Pemphigus populi-ramulorum Riley on *Populus* sp.
Boulder, Colo., Je. 24, '13 by L. C. Bragg.

Pheidole vinelandica Forel
Aphis helianthi Monell on *Helianthus* sp.
Colorado Springs, Colo., Jl. 13, '19;
on *Yucca glauca* Nutt., Colorado Springs, Colo., Ag. 5, '19 by L. C. Bragg.
Thecabius populi-monilis Riley on *Populus* sp.
Boulder, Colo., Ag. 13, '13 by L. C. Bragg.

Pogonomyrmex occidentalis Cress.
Hyalopterus arundinis Fabr. lapping honey dew from Aphids on *Phragmites communis* Trim
Delta, Colo., Jl. 31, '26 by C. R. Jones.
Myzus persicae Sulz. on *Syringa vulgaris*
Fort Collins, Colo., O. 20, '21 by R. R. Morris.

Solenopsis sp. ?
Macrosiphum ambrosiae Thos. on *Iva xanthifolia*
Fort Collins, Colo., S. 15, '15 by L. C. Bragg.

Tapinoma sessile Say
Aphis sp. on *Carduus pumilum* Mill
Mt. Vernon, Ft. Collins, Colo., Ag. 1, '22 by C. P. Gillette, and M. A. Palmer.
Aphis cardui Linn. on *Carduus* sp.
Virginia Dale, Colo., Ag. 9, '25 by C. R. Jones.
Aphis helianthi Monell on *Oxybaphus* sp.
Estes Park, Colo., Jl. 20, '22 by C. P. Gillette.
Aphis sorbi Kalt.
Grand Junction, Colo., Je. 20, '07 by C. P. Gillette.
Bipersona torticauda Gill. on *Carduus* sp.
Cedaredge, Colo., Ag. 4, '26 by C. R. Jones.
Chaitophorus populella Gill. & Pal. on *Populus tremuloides*
Grand Mesa, Colo., Ag. 6, '26 by C. R. Jones, and
Estes Park, Colo., Ag. 17, '19 by C. P. Gillette.
Chaitophorus populicola Thos. on *Populus tremuloides*
Battle Creek, Colo., Ag. 28, '25 by C. R. Jones.
Chaitophorus viminalis Monell on *Populus tremuloides* Michx.
Estes Park, Colo., Ag. 7, '19 by C. P. Gillette.
Lachnus sp. on *Pinus contorta*
Estes Park, Colo., Jl. 21, '22 by C. P. Gillette.
Lachnus ponderosae Will. on *Pinus scopulorum* (Engelm.) Lemmon
Poudre Canon, Colo., Je. 11, '22 by C. P. Gillette.
Schizolachnus tomentosus De Geer ? on *Pinus scopulorum*
Black Mountain, Colo., Jl. 18, '25 by C. R. Jones.

A LIST OF COLORADO ANTS WITH THE NUMBER OF GENERA AND SPECIES OF APHIDS THEY ATTENDED

Legend: 1, number of genera of aphids; 2, number of species; 3, number of observations.

Name of ant	1	2	3
Aphaenogaster sp. ?	1	1	1
Camponotus herculeanus Linn. subsp. ?	3	3	3
Camponotus herculeanus Linn. var. ?	1	3	3
Camponotus herculeanus subsp. *lingniperda* var. *noveboracensis* Fitch.	3	4	5
Camponotus herculeanus var. modoc Whrl.	1	1	1
Camponotus herculeanus subsp. *pennsylvanicus*De Geer.	2	3	3
Camponotus herculeanus var. *whymperi* Forel.	6	13	14
Camponotus maculatus Fabr. var. ?	1	1	1
Camponotus maculatus var. *nitidiventris* Emery.	4	8	10
Camponotus maculatus subsp. *vicinus* Mayr.	4	10	11
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.	5	6	6
Camponotus maculatus subsp. *sansabeanus* Buckley.	1	1	1
Cremastogaster sp.	3	6	6
Cremastogaster laeviuscula Mayr.	2	2	3
Cremastogaster lineolata Say.	1	3	3
Cremastogaster lineolata Say. var. ?	1	3	3
Dorymyrmex pyramicus Rogers.	2	3	3
Formica sp. ?	10	20	22
Formica aterrima Cress.	1	1	1
Formica cinerea Mayr. var. ?	7	19	31
Formica cinerea Var. *altipetens* Whlr.	1	1	1
Formica cinerea var. *canadensis* Santschi	8	19	25
Formica cinerea var. *lepida* Whlr. ?	2	2	2
Formica cinerea var. *neocinerea* Whlr.	5	8	8
Formica comata Whlr.	1	3	3
Formica criniventris Whlr.	2	2	3

Formica dakotensis Emery.	2	2	2
Formica exsectoides var. *opaciventris* Emery	1	2	3
Formica sp. *fusca* group	4	8	9
Formica fusca Linn.	9	23	25
Formica fusca Linn. var. ?	13	41	64
Formica fusca var. *argentea* Whlr.	14	36	80
Formica fusca var. *gelida* Whlr.	8	31	48
Formica fusca var. *neoclara* Emery.	15	42	80
Formica fusca var. *neorufibarbis* Emery.	12	20	31
Formica fusca var. *subaenescens* Emery.	7	21	28
Formica fusca var. *subsericea* Say.	10	32	53
Formica munda Whlr.	3	5	5
Formica neogagates Emery.	4	10	12
Formica neogagates Emery. var. ?	2	2	2
Formica neogagates var. *morbida* Whlr.	1	1	1
Formica neogagates var. *vetula* Whlr.	1	1	1
Formica neogagates subsp. *lasioides* var. *limata* Whlr.	1	2	2
Formica neogagates subsp. *lasioides* var. *vetula* Whlr.	4	8	9
Formica oreas Whlr.	5	8	12
Formica oreas var. *comptula* Whlr.	6	12	18
Formica pallide-fulva subsp. *schaufussi* var. *incerta* Emery.	3	3	3
Formica sp.*rufa* group	4	10	11
Formica rufa Linn. var. ?	1	2	3
Formica rufa var. *aggerans* Whlr.	2	2	2
Formica rufa subsp. *integra* Nyl.	1	1	1
Formica rufa subsp. *obscuripes* Forel.	8	32	50
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.	6	12	16
Formica rufibarbis var. *gnava* Buckley.	3	4	4
Formica sanguinea subsp. ?	2	2	2
Formica sanguinea subsp. *aserva* Forel.	1	1	1
Formica sanguinea subsp. *rubicunda* Emery.	1	1	2
Formica sanguinea subsp. *puberula* Emery.	1	1	1
Formica sanguinea subsp. *subintegra* Emery.	2	3	3
Formica sanguinea subsp. *subunda* Emery.	3	7	8
Formica truncicola subsp. *integroides* Emery.	3	3	3
Formicola truncicola subsp. *integroides* var. *coloradensis* Whlr.	3	5	6
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.	4	11	17
Formica ulkei Emery	1	1	1
Iridomyrmex pruinosus Rogers.	1	1	1
Lasius sp.	1	1	1
Lasius claviger Rogers	1	1	1
Lasius flavius var. *nearcticus* Whlr.	1	1	1
Lasius latipes Walsh	1	1	1
Lasius niger var. *americanus* Emery.	3	5	6
Lasius niger var. *neoniger* Emery	12	29	45
Lasius niger var. *sitkaensis* Pergande.	5	7	10
Leptothorax acervorum subsp. *canadensis Provancher*	1	1	1
Liometopum apiculatum var. *occidentale* Emery.	1	1	1
Liometopum apiculatum subsp. *luctuosum* Whlr.	1	1	1
Monomorium minimum Buckley.	1	1	1
Myrmecina graminicola Latr.	2	2	2
Myrmica sp.	6	10	10
Myrmica brevinodis Emery.	1	3	3
Myrmica brevinodis Emery. var. ?	7	16	20
Myrmica brevinodis var. *sulcinodoides* Emery.	2	5	5
Myrmica rubra Linn.	1	1	1
Myrmica rubra subsp. *brevinodis* Emery.	3	4	4
Myrmica rubra subsp. *brevinodis* var. *canadensis* Whlr.	2	2	2
Myrmica scabrinodis Nyl.	5	7	7
Pheidole sp.	1	1	1

Pheidole palifera subsp. *coloradensis* Emery.	2	2	2
Pheidole vinelandica Forel.	2	2	3
Pogonomyrmex occidentalis Cress.	2	2	2
Solenopsis sp. ?	1	1	1
Tapinoma sessile Say.	5	10	12

THE FOLLOWING IS A LIST OF APHIDS WITH ANT ATTENDANT

Anuraphis sp.
- *Formica fusca* Linn. var. ?
- *Lasius niger* var. *sitkaensis* Pergande.

Aphis sp.
- *Camponotus herculeanus* var. *whymperi* Forel.
- *Cremastogaster* subsp. *leviuscula* Mayr. (2 records)
- *Formica cinerea* Mayr. var. ?
- *Formica cinerea* var. *canadensis* Santschi. (2 records)
- *Formica* sp. fusca group.
- *Formica fusca* Linn. var. ? (2 records)
- *Formica fusca* var. *argentea* Whrl. (4 records)
- *Formica fusca* var. *gelida* Whlr. (6 records)
- *Formica fusca* var. *neoclara* Emery.
- *Formica fusca* var. *neorufibarbis* Emery. (2 records)
- *Formica fusca* var. *subaenescens* Emery.
- *Formica fusca* var. *subsericea* Say. (4 records)
- *Formica neogagates* Emery.
- *Formica neogagates* var. *vetula* Whlr.
- *Formica oreas* var. *comptula* Whlr. (2 records)
- *Formica rufa* subsp. *obscuripes* Forel.
- *Formica sanguinea* subsp. *subintegra* Emery.
- *Formica truncicola* subsp. *integroides* var. *coloradensis* Whlr.
- *Lasius flavius nearcticus* Whlr.
- *Lasius niger* var. *neoniger* Emery. (4 records)
- *Lasius niger* var. *sitkaensis* Pergande.

Aphis albipes Oest.
- *Formica fusca* var. *neorufibarbis* Emery.
- *Formica fusca* var. *subsericea* Say.
- *Formica munda* Whlr.

Aphis artemisicola Will.
- *Formica fusca* Linn. (2 records)
- *Formica fusca* Linn. var. ? (2 records)
- *Formica fusca* var. *gelida* Whlr.
- *Formica neogagates* Emery.
- *Formica neogagates* subsp. *lasioides* var. *vetula* Whlr.
- *Formica oreas* Whlr.
- *Formica oreas* var. *comptula* Whlr. (2 records)
- *Formica rufa* subsp. *obscuripes* Forel. (2 records)
- *Formica rufa* subsp. *obscuripes* var. *melanotica* Emery.
- *Leptothorax acervorum* subsp. *canadensis* Provancher
- *Myrmica rubra* subsp. *brevinodis* Emery.

Aphis avenae Fabr.
- *Formica fusca* var. *subaenescens* Emery.
- *Lasius niger* var. *neoniger* Emery.

Aphis bakeri Cowen.
- *Formica* sp. fusca group. (2 records)
- *Formica fusca* var. *gelida* Whlr.
- *Formica fusca* var. *neoclara* Emery.
- *Myrmica* sp.

Aphis canae Will.
- *Formica fusca* var. *subaenescens* Emery.
- *Formica rufa* subsp. *obscuripes* Forel.

Aphis carbocolor Gill.
Myrmica brevinodis var. *sulcinodoides* Emery.
Myrmica rubra subsp. *sulcinodoides* Emery.

Aphis near *cardui* Linn.
Formica fusca Linn.
Formica fusca Linn. var. ?
Formica fusca var. *gelida* Whlr. (2 records)
Formica fusca var. *subaenescens* Emery. (2 records)
Formica fusca var. *subsericea* Say.
Formica neogagates Emery.
Myrmica rubra subsp. *brevinodis* Emery.

Aphis cardui Linn.
Formica fusca Linn.
Formica fusca Linn. var. ?
Formica fusca var. *subaenescens* Emery. (2 records)
Formica negagates subsp. *lasioides* var. *vetula* Whlr.
Tapinoma sessile Say.

Aphis cerasifolii Ftch.
Formica neogagates Emery.
Formica oreas var. *comptula* Whlr.
Formica rufa subsp. *obscuripes* Forel. (2 records)
Lasius niger var. *neoniger* Emery.

Aphis chrysothamnicola Gill. & Pal.
Formica rufa subsp. obscuripes Forel. (2 records)

Aphis cornifoliae Ftch.
Formica rufa subsp. *obscuripes* Forel.

Aphis near *eriogoni* Cowen
Dorymyrmex pyramicus Rogers.
Formica sp.
Formica criniventris Whlr. (2 records)
Formica fusca Linn. (2 records)
Formica fusca Linn. var. ? (2 records)
Formica fusca var. *argentea* Whlr. (4 records)
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subsericea* Say.
Formica neogagates Emery. (2 records)
Formica neogagates subsp. *lasiodes* var. *vetula* Whlr.
Formica oreas Whlr.
Formica oreas var. *comptula* Whlr.
Formica sp. rufa group.
Formica rufa subsp. *obscuripes* Forel. (6 records)
Formica sanguinea subsp. *subintegra* Emery.

Aphis eriogoni Cowen
Formica fusca var. *subsericea* Say.
Formica oreas var. *comptula* Whlr.
Formica rufa subsp. *obscuripes* Forel. (2 records)

Aphis forbesi Weed
Formica cinerea Mayr. var. ? (2 records)
Lasius niger var. *neoniger* Emery. (3 records)
Myrmecina graminicola Latr.
Myrmica sp.
Myrmica scabrinodis Nyl. var. ?

Aphis gossypii Glover
Formica cinerea Mayr. var. ?
Formica fusca Linn. var. ? (2 records)
Formica fusca var. *argentea* Whlr. (7 records)
Formica fusca var. *neoclara* Emery. (3 records)
Lasius niger var. *neoniger* Emery.
Myrmica brevinodis Emery. var. ? (2 records)
Pheidole sp.

Aphis helianthi Monell ?
Formica cinerea var. *neocinerea* Whlr.
Formica fusca var. *subaenescens* Emery.
Formica fusca var. *subsericea* Say.
Formica oreas Whlr.
Tapinoma sessile Say.

Aphis helianthi Monell
Camponotus maculatus var. *nitidiventris* Emery.
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Formica sp. (4 records)
Formica cinerea Mayr. var. ? (4 records)
Formica cinerea var. *canadensis* Santschi.
Formica cinerea var. *lepida* Whlr.
Formica exsectoides var. *opaciventris* Emery. (2 records)
Formica fusca Linn. var. ? (4 records)
Formica fusca var. *argentea* Whlr. **(6 records)**
Formica fusca var. *gelida* Whlr. (8 records)
Formica fusca var. *neoclara* Emery. (4 records)
Formica fusca var. *neorufibarbis* Emery. (3 records)
Formica fusca var. *subaenescens* Emery.
Formica fusca var. *subsericea* Say. (3 records)
Formica neogagates Emery.
Formica neogagates Emery. var. ?
Formica neogagates subsp. *lasioides* var. *vetula* Whlr. (3 records)
Formica oreas Whlr. (2 records)
Formica oreas var. *comptula* Whlr. (3 records)
Formica rufa subsp. *obscuripes* Forel. (3 records)
Formica rufa subsp. *obscuripes* var. *melanotica* Emery. (2 records)
Formica truncicola subsp. *integroides* Emery.
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery. (2 records)
Iridomyrmex humilis Mayr.
Lasius niger var. *neoniger* Emery. (2 records)
Myrmica sp. ?
Myrmica brevinodis Emery.
Myrmica brevinodis Emery. var. ?
Myrmica brevinodis var. *sulcinodoides* Emery.
Myrmica scabrinodis Emery var. ? (2 records)
Pheidole vinelandica Forel. (2 records)
Tapinoma sessile Say.

Aphis hederae Kalt.
Formica fusca var. *subaenescens* Emery.

Aphis heraclei Cowen
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.
Formica fusca var. *subsericea* Say.

Aphis hermistonii Wil. or near
Formica fusca Linn. (2 records)
Formica fusca var. *gelida* Whlr. (2 records)
Formica sp. *rufa* group
Formica rufa subsp. *obscuripes* Forel.
Lasius latipes Walsh.
Lasius niger var. *neoniger* Emery. (2 records)

Aphis houghtonensis Troop.
Formica sp. *rufa* group
Formica fusca Linn.

Aphis near *lugentis* Will.
Camponotus herculeanus var. *whymperi* Forel.
Formica sp. (3 records)
Formica cinerea var. *canadensis* Santschi.
Formica fusca Linn.

Formica fusca var. *subaenescens* Emery.
Formica rufa subsp. *obscuripes* Forel
Formica sanguinea subsp. *puberals* Emery.

Aphis lugentis Will.
Camponotus herculeanus var. *modoc* Whlr.
Formica sp.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subaenescens* Emery.
Formica fusca var. *subsericea* Say.
Formica sanguinea subsp. *rubicunda* Emery.
Formica sanguinea subsp. *subnuda* Emery.
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.

Aphis nerii Fonsc.
Formica fusca var. *gelida* Whlr.

Aphis maidis Ftch.
Formica cinerea Mayr. var. ?
Formica fusca Linn.
Formica fusca var. *neoclara* Emery. (2 records)
Formica neogagates subsp. *lasioides* var. *limata* Whlr.
Myrmica brevinodis Emery. var. ?

Aphis marutae Oest.
Formica cinerea Mayr. var. ?

Aphis medicaginis Koch.
Formica cinerea Mayr. var. ? (4 records)
Formica cinerea var. *canadensis* Santschi. (2 records)
Formica exsectoides var. *opaciventris* Emery.
Formica sp. *fusca* group.
Formica fusca Linn. (2 records)
Formica fusca Linn. var. ? (3 records)
Formica fusca var. *argentea* Whlr. (3 records)
Formica fusca var. *gelida* Whlr. (6 records)
Formica fusca var. *neoclara* Emery. (4 records)
Formica fusca var. *neorufibarbis* Emery.
Formica munda Whlr.
Formica neogagates Emery.
Formica neogagates subsp. *lasioides* var. *limata* Whlr.
Formica neogagates subsp. *lasioides* var. *vetula* Whlr.
Formica sp. rufa group
Formica rufa subsp. *obscuripes* Forel.
Formica truncicola subsp. *integroides* var. *coloradensis* Whlr. (3 records)
Formica truncicola subsp. *integroides* var. *haemorroidalis* Whlr.
Myrmica sp.
Myrmica brevinodis Emery.
Myrmica brevinodis Emery. var. ?

Aphis menthae Walk.
Formica sp. ?

Aphis menthae-radicis Cowen
Myrmica breviniodis Emery

Aphis middletonii Thos.
Camponotus maculatus var. *nitidiventris* Emery.
Formica cinerea Mayr. var. ?
Formica fusca Linn.
Formica fusca var. *argentea* Whlr.
Formica fusca var. *gelida* Whlr. (2 records)
Formica fusca var. *neoclara* Emery.
Formica fusca var. *neorufibarbis* Emery.
Formica fusca var. *subsericea* Say. (2 records)
Formica munda Whlr.
Formica rufa var. *aggerans* Whlr.
Formica rufa subsp. *obscuripes* Forel. var. ?
Formica rufibarbis var. *gnava*. Buckley.

Aphis minutissima Gill. & Pal.
Formica neogagates var. *morbida* Whlr.

Aphis neilliae Oest.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subsericea* Say.
Formica rufa subsp. *obscuripes* Forel.

Aphis oenotherae Oest.
Formica fusca Linn. var. ?
Myrmica brevinodis var. *sulcinodoides* Emery.

Aphis oenotherae var. *rufa* Gill.
Formica fusca var. *gelida* Whlr.

Aphis oregonensis Wil.
Formica cinerea var. *neocinerea* Whlr.
Formica rufa subsp. *obscuripes* Forel.
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.
Myrmica sp.

Aphis pentstemonis Will. ?
Formica rufa subsp. *obscuripes* Forel.

Aphis pomi De Geer
Cremastogaster sp.
Formica sp.
Formica cinerea Mayr. var. ?
Formica cinerea var. *canadensis* Santschi. (2 records)
Formica fusca Linn.
Formica fusca Linn. var. ? (3 records)
Formica fusca var. *gelida* Whrl. (3 records)
Formica fusca var. *neoclara* Emery. (3 records)
Formica fusca var. *neorufibarbis* Emery. (3 records)
Formica truncicola var. *haemorrhoidalis* Emery.
Myrmica brevinodis Emery. var. ?

Aphis rumicis Linn. ?
Formica rufa subsp. *obscuripes* Forel.

Aphis saliceti Kalt.
Formica fusca Linn. var. ?
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subaenescens* Emery.
Myrmica brevinodis Emery var. ?
Myrmica brevinodis var. *sulcinodoides* Emery.

Aphis sambucifolii Ftch.
Formica fusca var. *argentea* Whlr.
Formica fusca var. *subsericea* Say.

Aphis sorbi Kalt.
Formica fusca Linn. var. ?
Tapinoma sessile Say.

Aphis spiraeella Patch.
Formica fusca var. *argentea* Whl.
Formica fusca var. *neoclara* Emery. (2 records)

Aphis symphoricarpi Thos.
Cremastogaster sp.

Aphis tetrapteralis Ckl.
Formica fusca Linn. var. ?

Aphis tridentatae Wil.
Formica cinerea var. *neocinerea* Whlr.

Aphis near *valerianae* Cowen.
Camponotus herculeanus Linn. subsp. ?
Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch.
Formica sanguinea subsp. *subnuda* Emery.
Lasius niger var. *sitkaensis* Pergande.
Myrmica brevinodis Emery var. ?

Aphis valerianae Cowen
Camponotus herculeanus var. *whymperi* Forel. (2 records)
Camponotus maculatus subsp. *vicinus* Mayr.
Formica cinerea var. *canadensis* Santschi.
Formica sp. *fusca* group.
Formica fusca var. *gelida* Whlr.
Formica fusca var. *subaenescens* Emery.
Formica sanguinea subsp. *subnuda* Emery.

Aphis varians Ptch.
Formica fusca var. *neoclara* Emery.

Aphis viburnicola Gill.
Formica fusca Linn.

Asiphum sp.
Pheidole pilifera subsp. *coloradensis* Emery.

Asiphum sacculi Gill.
Formica sp.

Bipersona torticauda Gill.
Camponotus maculatus var. *nitidiventris* Emery.
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Formica cinerea Mayr. var. ? (3 records)
Formica cinerea var. near *altipetens* Whlr.
Formica cinerea var. *neocinerea* Whlr. (2 records)
Formica fusca Linn. var. ? (2 records)
Formica fusca var. *argentea* Whlr. (4 records)
Formica fusca gelida Whlr.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subaenescens* Emery.
Formica fusca var. *subsericea* Say.
Formica munda Whlr.
Formica oreas Whlr.
Formica oreas var. *comptula* Whlr. (2 records)
Formica rufa subsp. *obscuripes* Forel. (2 records)
Formica rufa subsp. *obscuripes* var. *melanotica* Emery. (2 records)
Formica sanguinea Latr. var. ?
Formica truncicola subsp. *integroidcs* var. *haemorrhoidalis* Emery.
Myrmica group.
Tapinoma sessile Say.

Brevicoryne brassicae Linn.
Formica fusca Linn. var. ?
Formica fusca var. *neorufibarbis* Emery.

Capitophorus rosarum Kalt.
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.
Formica fusca var. *neorufibarbis* Emery.

Cerosipha sp.
Formica fusca Linn. var. ?

Chaitophoroides maculatae Oest.
Formica fusca Linn. var. ? (2 records)
Formica fusca var. *argentea* Whlr.
Formica fusca var. *gelida* Whlr.
Formica fusca var. *neoclara* Emery.
Myrmica brevinodis Emery. var. ?

Chaitophorus sp.
Camponotus herculeanus var. *whymperi* Forel.
Formica sp.
Formica cinerea var. *canadensis* Santschi.
Formica fusca Linn.
Formica fusca Linn. var. ? (2 records)
Formica fusca var. *gelida* Whlr. (2 records)

Formica fusca Linn. var. *neoclara* Emery.
Formica neogagates Emery.
Formica sp. *rufa* group. (2 records)
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.
Formica sanguinea subsp. *subnuda* Emery.
Lasius niger var. *sitkaensis* Pergande.
Myrmica scabrinodis Nyl. var. ?

Chaitophorus negundinis Thos.
Dorymyrmex pyramicus Rogers.
Formica fusca Linn.
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.
Formica fusca var. *gelida* Whlr. (3 records)
Formica fusca var. *neoclara* Emery. (11 records)
Formica neogagates Emery. var. ?
Lasius niger var. *neoniger* Emery.
Myrmica brevinodis Emery. var. ?

Chaitophorus populella Gill. & Pal.
Camponotus herculeanus Linn. subsp. ?
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Dorymyrmex pyramicus Rogers.
Formica sp. fusca group.
Formica cinerea var. *canadensis* Santschi.
Formica fusca Linn. (2 records)
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr. (6 records)
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subaenescens* Emery.
Formica fusca var. *subsericea* Say.
Formica rufa subsp. *obsuripes* Forel.
Lasius niger var. *neoniger* Emery. (2 records)
Lasius niger var. *sitkaensis* Pergande. (2 records)
Tapinoma sessile Say. (2 records)

Chaitophorus populicola Thos.
Camponotus herculeanus subsp. *pennsylvanicus* De Geer.
Camponotus herculeanus var. *whymperi* Forel. (3 records)
Formica sp. (2 records)
Formica cinerea var. *canadensis* Santschi.
Formica cinerea var. *neocinerea* Whlr.
Formica dakotensis Emery.
Formica fusca Linn. var. ? (3 records)
Formica fusca var. *argentea* Whrl. (3 records)
Formica fusca var. *gelida* Whlr.
Formica fusca var. *neoclara* Emery. (7 records)
Formica fusca var. *neorufibarbis* Emery.
Formica fusca var. *subaenescens* Emery. (2 records)
Formica fusca var. *subsericea* Say. (5 records)
Formica oreas var. *comptula* Whlr.
Formica pallidefulva subsp. *schaufussi* var. *incerta* Emery. (2 records)
Formica rufa subsp. *aggerans* var. *melanotica* Emery.
Formica rufa subsp. *obscuripes* Forel. (2 records)
Formica rufa subsp. *obscuripes* var. *melanotica* Emery. (3 records)
Formica truncicola var. *haemorrhoidalis* Emery.
Formica truncicola subsp. *integroides* Emery.
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery. (2 records)
Lasius niger var. *americanus* Emery.
Lasius niger var. *neoniger* Emery. (3 records)
Lasius niger var. *sitkaensis* Pergande.
Myrmica brevinodis Emery. var. ?
Myrmica rubra subsp. *brevinodis* Emery. var. ?
Tapinoma sessile Say.

Chaitophorus salicti Schk.
Formica fusca var. *neoclara* Emery.

Chaitophorus viminalis Monell
Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch.
Camponotus maculatus var. *nitidiventris* Emery.
Formica fusca Linn. var. ? (2 records)
Formica fusca var. *argentea* Whlr. (3 records)
Formica fusca var. *gelida* Whlr.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *neorufibarbis* Emery. (3 records)
Formica fusca var. *subaenescens* Emery. (2 records)
Formica fusca var. *subsericea* Say.
Formica rufa subsp. *obscuripes* Forel.
Formica sanguinea subsp. *subnuda* Emery.
Formica ulkei Emery.
Myrmica graminicola Latr.
Myrmica brevinodis var. *sulcinodoides* Emery.

Drepanaphis acerifolii Thos.
Formica cinerea var. *canadensis* Santschi.
Formica fusca var. *neocara* Emery.
Myrmica scabrinodis Nyl. var. ?

Drepanosiphum braggii Gill.
Formica cinerea var. *canadensis* Santschi.
Formica fusca Linn.
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whrl. (2 records)

Eriosoma americana Riley
Formica cinerea Mayr. var. ?

Eriosoma crataegi Oest.
Formica fusca var. *subsericea* Say.

Eriosoma lanigera Hausm.
Myrmica brevinodis Emery. var. ?

Essigella sp. ?
Lasius niger var. *neoniger* Emery.

Essigella fusca Gill. & Pal.
Lasius niger var. *neoniger* Emery.

Forda sp.
Formica sp. ?
Formica sp. ? fusca group.
Formica fusca var. *gelida* Whlr.
Lasius latipes Walsh.
Myrmica sp.

Forda formicaria Heyd.
Formica fusca Linn.
Formica neogagates subsp. *lasioides* var. *vetula* Whlr.
Lasius niger var. *neoniger* Emery.

Forda olivaceae Rohw.
Formica sp.
Formica neogagates Emery. (3 records)
Formica truncicola subsp. *integra* Nyl.

Geoica sp. ?
Formica fusca Linn.

Geoica phaseoli Pass.
Lasius niger var. *neoniger* Emery. (2 records)

Geoica radicola Essig.
Lasius sp.
Lasius niger var. *sitkaensis* Pergande.
Lasius umbratus subsp. *minutus* Emery.

Geoica squamosa Hart.
Formica fusca var. *subaenescens* Emery.
Lasius niger var. *americanus* Emery.

Hyaloptorus arundinis Fab.
Formica sp.
Formica cinerea Mayr. var. ? (3 records)
Formica fusca var. *neorufibarbis* Emery.
Pogonomyrmex occidentalis Cress.

Hysteroneura setariae Thos.
Formica fusca var. *neoclara* Emery.
Formica oreas var. *comptula* Whlr.

Lachnus sp.
Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch.
Formica sp. rufa group.
Lasius niger var. *neoniger* Emery.
Tapinoma sessile Say.

Lachnus apini Gill. & Pal.
Camponotus herculeanus Linn. var. ? (2 records)
Camponotus herculeanus var. *whymperi* Forel. (2 records)
Camponotus maculatus Fabr. var. ?
Formica sp.
Formica comata Whlr.
Formica dakotensis Emery.
Formica fusca var. *argentea* Whlr.
Formica sanguinea subsp. *subnuda* Emery. (2 records)
Formica truncicola subsp. *integroides* var. *coloradensis* Whlr.
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery. (3 records)
Lasius niger var. *americanus* Emery.
Myrmica rubra var. or subsp. ?

Lachnus ater Gill. & Pal.
Cremastogaster sp. (2 records)
Cremastogaster lineolata Say. var. ? (2 records)
Formica munda Whlr.

Lachnus brevispinosus Gill. & Pal.
Formica fusca Linn.
Myrmica scabrinodis Nyl. var. ?

Lachnus coloradensis Gill.
Camponotus pensylvanicus De Geer.
Formica cinerea Mayr. var. ?

Lachnus edulis Wil.
Camponotus maculatus var. *nitidiventris* Emery.
Camponotus maculatus subsp. *vicinus* Emery.
Cremastogaster sp.
Cremastogaster lineolata Say.
Formica fusca Linn. var. ?
Formica fusca var. *gelida* Whlr.
Formica rufibarbis var. *gnava* Buckley.
Lasius niger var. *americanus* Emery.
Liometopum apiculatum subsp. *luctuosum* Whlr.
Liometopum occidentale Emery.
Myrmica sp.

Lachnus flexilis Gill. & Pal.
Camponotus herculeanus subsp. *pennsylvanicus* De Geer.
Camponotus herculeanus var. *whymperi* Forel.
Camponotus maculatus subsp. *vicinus* Mayr. (2 records)

Lachnus glaber. Gill. & Pal.
Cromastogaster sp.
Formica fusca near *argentea* Whlr.
Formica fusca var. *argentea* Whlr.

Formica fusca var. *subsericea* Say. (2 records)
Formica integroides var. *haemorrhoidalis* Emery.
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.
Formica rufa subsp. *obscuripes* Forel.
Formica sanguinea subsp. *aserva* Forel.
Lasius niger var. *neoniger* Emery. (3 records)

Lachnus near *grossus* Kalt.
Camponotus herculeanus var. *whymperi* Forel.
Formica sanguinea subsp. *subnuda* Emery.

Lachnus hottesi Gill. & Pal.
Camponotus herculeanus Linn. var. ?
Formica cinerea Mayr. var. ?
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.
Lasius niger var. *americanus* Emery.

Lachnus murrayanae Gill. & Pal.
Cremastogaster lineolata Say. var. ?
Formica oreas var. *comptula* Whlr.

Lachnus occidentalis David.
Formica fusca var. *gelida* Whlr.
Formica fusca var. *subsericea* Say.

Lachnus oregonensis Wil.
Camponotus maculatus subsp. *vicinus*, Mayr. (2 records)
Formica fusca var. *subsericea* Say. (2 records)
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.
Myrmica rubra subsp. *brevinodis* Emery. var. ?

Lachnus ponderosae Will.
Camponotus maculatus var. *nitidiventris* Emery.
Camponotus maculatus subsp. *vicinus* Mayr.
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Cremastogaster laeviuscula Mayr.
Formica fusca var. *argentea* Whlr. (2 records)
Formica neogagates Emery.
Formica sp. rufa group.
Formica rufa Linn. subsp. ?
Formica rufa Linn. var. ?
Formica rufa subsp. *obscuripes* Forel. (3 records)
Formica truncicola subsp. *integroides* Emery.
Tapinoma sessile Say.

Lachnus rosae Cholod.
Formica oreas Whlr.

Lachnus sabinae Gill. & Pal.
Formica cinerea Mayr. var. ?
Formica fusca var. *neorufibarbis* Emery.

Lachnus schwarzii Wil.
Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch.
Camponotus maculatus var. *nitidiventris* Emery. (3 records)
Camponotus maculatus subsp. *vicinus* Mayr.
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Cremastogaster lineolata Say. (2 records)
Formica sp.
Formica comata Whlr.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subsericea* Say. (3 records)
Formica sp. rufa group.
Formica rufa Linn. var. ?
Formica rufibarbis var. *gnava* Buckley.
Lasius niger var. *neoniger* Emery.

Lachnus sibiricae Gill. & Pal.
Camponotus maculatus var. *nitidiventris* Emery.
Formica fusca var. *gelida* Whlr.
Formica fusca var. *subsericea* Say.

Lachnus similis Gill. & Pal.
Formica cinera var. *neocinerea* Whlr.
Formica fusca var. *subsericea* Say.
Formica rufa subsp. *obscuripes* Forel.
Lachnus solitarius Gill. & Pal.
Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch.
Camponotus maculatus subsp. *vicinus* Mayr.
Formica fusca var. *subsericea* Say.
Formica neogagates subsp. *lasioides* var. *vetula* Whlr.
Formica oreas Whlr.
Formica sp. rufa group.
Formica rufa Linn. var. ?
Formica rufa subsp. *obscuripes* Forel. (2 records)
Lasius niger var. *neoniger* Emery. (3 records)
Lachnus splendens Gill. & Pal.
Camponotus herculeanus Linn. var. ?
Formica comata Whlr.
Formica rufa subsp. *obscuripes* Forel.
Formica fusca var. *subsericea* Say. (2 records)
Lachnus taxifoliae Swain
Camponotus herculeanus Linn. subsp. ?
Camponotus herculeanus var. *whymperi* Forel.
Camponotus maculatus subsp. *vicinus* Mayr.
Formica cinerea Mayr. var. ? (2 records)
Formica cinerea var. *canadensis* Santschi.
Formica cinerea var. *neocinerea* Whlr.
Formica fusca Linn. var. ?
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subsericea* Say.
Formica integroides var. *haemorrhoidalis* Whlr.
Formica oreas var. *comptula* Whlr.
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.
Lasius niger var. *neoniger* Emery.
Lachnus vandykei Wil.
Camponotus herculeanus var. *whymperi* Forel.
Liosomaphis aquatica Gill. & Bragg.
Formica fusca var. *neoclara* Emery.
Macrosiphoniella sanborni Gill.
Lasius niger var. *neoniger* Emery.
Macrosiphum sp.
Formica cinerea var. *canadensis* Santschi.
Formica sp. *fusca* group.
Formica fusca Linn.
Formica fusca Linn. var. ? (2 records)
Formica fusca var. *neorufibarbis* Emery.
Formica fusca var. *subaenescens* Emery.
Formica rufa obscuripes var. *nelanotica* Emery.
Firmica truncicola subsp. *integra* Nyl.
Macrosiphum ambrosiae Thos.
Formica cinerea Mayr. var. ?
Formica cinerea var. *canadensis* Santschi. (3 records)
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whrl. (4 records)
Formica fusca var. *neorufibarbis* Emery. (2 records)
Formica sanguinea subsp. *subintegra* Emery.
Lasius claviger Rogers.
Myrica brevinodis Emery.
Myrmica brevinodis var. *sulcinodoides* Emery.
Solenopsis sp. ?
Macrosiphum coweni Hunter.
Formica neogagates subsp. *lasioides* var. *vetula* Whlr.

Macrosiphum coweni var. *filifoliae* Gill. & Pal.
Formica fusca var. *subsericea* Say.
Formica truncicola subsp. *integroides* var. *coloradensis* Whlr.
Macrosiphum erigeronensis Thos.
Formica cinerea Mayr. var. ?
Formica fusca Linn. var. ?
Formica fusca var. *gelida* Whlr.
Formica oreas Whlr.
Formica sanguinea Latr. subsp. ?
Macrosiphum near *erigeronensis* Thos.
Formica fusca var. *argentea* Whlr.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subsericea* Say.
Macrosiphum euphorbiae Thos.
Formica fusca var. *argentea* Whlr.
Macrosiphum frigidae Oest.
Camponotus herculeanus var. *whymperi* Forel.
Formica criniventris Whlr.
Formica fusca Linn.
Formica fusca Linn. var. ?
Formica fusca var. *gelida* Whlr.
Formica rufa subsp. *obscuripes* var. *melanotica* Emery. (2 records)
Macrosiphum gaurae Will.
Monomorium minimum Buckley.
Macrosiphum grindeliae Will. ?
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Formica cinerea var. *neocinerea* Whlr.
Formica fusca Linn. var. ?
Formica fusca var. *gelida* Whlr.
Macrosiphum rudbeckiae Fitch.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subaenescens* Emery.
Macrosiphum solanifolii Ash.
Formica fusca var. *gelida* Whlr.
Lasius niger var. *neoniger* Emery.
Macrosiphum solidaginis Fab.
Formica sp.
Formica fusca var. *argentea* Whlr.
Formica fusca var. *gelida* Whlr.
Formica fusca var. *neorufibarbis* Emery.
Formica fusca var. *subaenescens* Emery. (2 records)
Formica rufa subsp. *obscuripes* Forel.
Formica truncicola var. *haemorrhoidalis* Emery.
Lasius niger var. *neoniger* Emery.
Macrosiphum taraxaci Kalt.
Formica fusca var. *argentea* Whlr.
Formica fusca var. *neoclara* Emery.
Lasius niger var. *neoniger* Emery.
Macrosiphum valerianae Clarke.
Camponotus herculeanus var. *whymperi* Forel.
Camponotus maculatus subsp. *vicinus* Mayr.
Formica sp. fusca group.
Formica fusca var. *gelida* Whlr.
Melanoxantherium bicolor Oest.
Cremastogaster sp.
Formica sp. (2 records)
Formica fusca Linn. var. ? (2 records)
Formica fusca var. *neoclara* Emery. (2 records)
Myrmica brevinodis Emery. var. ?

Melanoxantherium salicis Linn.
Formica fusca Linn. var. ?
Formica fusca var. *neorufibarbis* Emery.
Formica rufa subsp. *obscuripes* Forel.
Myrmica rubra var. *canadensis* Whlr.

Melanoxantherium smithiae Monell.
Formica sp.
Formica fusca var. *argentea* Whlr.
Formica fusca var. *gelida* Whlr.
Formica fusca var. *neoclara* Emery.
Formica pallidefulva subsp. *schaufussi* var. *incerta* Emery.
Formica sp. rufa group.

Microsiphum artemisiae Gill.
Formica sp.
Formica oreas var. *comptula* Whlr.
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.

Myzocallis discolor Monell.
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.
Formica fusca var. *neoclara* Emery.

Myzocallis ulmifolii Monell.
Formica fusca var. *neoclara* Emery. (2 records)
Formica fusca var. *neorifibarbis* Emery.

Myzus sp.
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.

Myrmica sp.
Lasius niger var. *neoniger* Emery.

Myzus cerasi Ftch.
Formica fusca Linn. var. ?
Formica fusca var. *gelida* Whlr.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *neorufibarbis* Emery.

Myzus glandulosus Kalt.
Aphaenogaster sp.
Formica cinerea var. *neocinerea* Whlr.
Lasius niger var. *neoniger* Emery. (2 records)

Myzus oenotherae Will.
Formica fusca Linn. var. ?

Myzus persicae Sulz.
Formica sp.
Formica cinerea var. *canadensis* Santschi. (2 records)
Formica fusca Linn.
Formica fusca Linn. var. ? (3 records)
Formica fusca var. *argentea* Whlr. (4 records)
Formica fusca var. *gelida* Whlr. (2 records)
Formica fusca var. *neoclara* Emery. (2 records)
Formica fusca var. *neorufibarbis* Emery. (2 records)
Formica oreas Whlr.
Formica pallidefulva subsp. *schaufussi* var. *incerta* Emery.
Myrmica brevinodis Emery. var. ?
Myrmica scabrinoides Nyl. var. ?
Pogonomyrmex occidentalis Cress.

Myzus ribis Linn.
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.

Pemphigus sp.
Formica fusca var. *subsericea* Say.

Pemphigus populi-ramulorum Riley.
Pheidole pilifera subsp. *coloradensis* Emery.

Prociphilus fraxinifolii Thos.
Formica cinerea Mayr. var. ?
Formica fusca var. *argentea* Whlr. (2 records)
Formica fusca var. *neoclara* Emery.
Formica fusca var. *neorufibarbis* Emery. (3 records)
Pterochlorus rosae Cholod.
Formica fusca var. *neoclara* Emery.
Pterochlorus viminalis Boyer.
Formica cinerea var. *canadensis* Santschi. (2 records)
Formica fusca Linn.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subaenescens* Emery.
Pterocomma populea Kalt.
Camponotus herculeanus var. *whymperi* Forel.
Rhopalosiphum hippophaes Koch.
Formica fusca var. *subsericea* Say.
Rhopalosiphum lactucae Kalt.
Formica fusca var. *argentea* Whlr.
Rhopalosiphum nervatum Gill.
Formica fusca var. *neorufibarbis* Emery.
Formica fusca var. *subsericea* Say.
Myrmica brevinodis Emery. var. ?
Rhopalosiphum nymphaeae Linn.
Formica cinerea Mayr. var. ?
Rhopalosiphum rhois Monell.
Formica fusca var. *argentea* Whlr.
Myrmica sp. ?
Rhopalosiphum ribis Linn.
Formica fusca var. *subsericea* Emery.
Schizolachnus tomentosus De Geer.
Formica fusca var. *subaenescens* Emery.
Formica fusca var. *subsericea* Say.
Tapinoma sessile Say.
Symydobius americanus Baker.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subsericea* Say.
Lasius niger var. *neoniger* Emery.
Lasius niger var. *sitkaensis* Pergande.
Symydobius salicicorticis Essig.
Formica fusca Linn.
Formica rufa subsp. *obscuripes* Forel. (2 records)
Formica rufibarbis var. *gnava* Buckley.
Myrmica brevinodis Emery. var. ?
Thecabius populi-monilis Riley.
Camponotus maculatus subsp. *sansabeanus* Buckley.
Camponotus maculatus subsp. *vicinus* Mayr.
Formica rufa subsp. *obscuripes* Forel.
Pheidole vinelandica Forel.
Toxoptera graminum Rond.
Camponotus herculeanus var. *whymperi* Forel.

APHID LIST WITH NUMBER OF GENERA AND SPECIES OF ANT ATTENDANTS

Legend: 1, number of genera; 2, number of species; 3, number of records.

Aphid name	1	2	3
Anuraphis sp.	2	2	2
Aphis sp.	4	22	50
Aphis albipes Oest.	1	3	3

Aphis artemisicola Will.	3	11	19
Aphis avenae Fabr.	2	2	2
Aphis bakeri Cowen.	2	4	6
Aphis canae Will.	1	2	2
Aphis carbocolor Gill.	1	2	2
Aphis near *cardui* Linn.	2	7	9
Aphis cardui Linn.	2	5	5
Aphis cerasifolii Ftch.	2	4	6
Aphis chrysothamnicola Gill. & Pal.	1	1	2
Aphis cornifoliae Ftch.	1	1	1
Aphis near *eriogoni* Cowen.	2	15	33
Aphis eriogoni Cowen. ?	1	3	5
Aphis forbesi Weed.	3	5	10
Aphis gossypii Glover	4	7	17
Aphis helianthi Monell ?	2	5	5
Aphis helianthi Monell	7	32	71
Aphis hederae Kalt.	1	1	1
Aphis heraclei Cowen.	1	3	3
Aphis hermistonii Wil. or near.	2	6	9
Aphis houghtonensis Troop.	1	2	2
Aphis near *lugentis* Will.	2	7	9
Aphis lugentis Will.	2	8	8
Aphis nerii Fonsc.	1	1	1
Aphis maidis Ftch.	2	5	6
Aphis marutae Oest.	1	1	1
Aphis medicaginis Koch.	2	22	40
Aphis menthae Walk.	1	1	1
Aphis menthae-radicis Cowen.	1	1	1
Aphis middletonii Thos.	2	12	14
Aphis minutissima Gill. & Pal.	1	1	1
Aphis neilliae Oest.	1	3	3
Aphis oenotherae Oest.	2	2	2
Aphis oregonensis Wil.	2	4	4
Aphis pentstemonis Will. ?	1	1	1
Aphis pomi De Geer.	3	11	20
Aphis rufa Gill. & Pal.	1	1	1
Aphis rumicis Linn. ?	1	1	1
Aphis saliceti Kalt.	2	5	5
Aphis sambucifolii Ftch.	1	2	2
Aphis sorbi Kalt.	2	2	2
Aphis spiraeella Patch.	1	2	3
Aphis symphoricarpi Thos.	1	1	1
Aphis tetrapteralis Ckl.	1	1	1
Aphis tridentatae Wil.	1	1	1
Aphis near *valerianae* Cowen.	4	5	5
Aphis valerianae Cowen.	2	7	7
Aphis varians Ptch.	1	1	1
Aphis viburnicola Gill.	1	1	1
Asiphum sp.	1	1	1
Asiphum sacculi Gill.	1	1	1
Bipersona torticauda Gill.	3	20	27
Brevicoryne brassicae Linn.	1	2	2
Capitophorus rosarum Kalt.	1	3	3
Cerosipha sp.	1	1	1
Chaitophoroides maculatae Cest.	2	5	6
Chaitophorus sp.	4	13	16
Chaitophorus negundinis Thos.	4	9	21
Chaitophorus populella Gill. & Pal.	5	15	24
Chaitophorus populicola Thos.	5	27	52
Chaitophorus salicti Schk.	1	1	1
Chaitophorus viminalis Monell.	3	14	20

Drepanaphis acerifolii Thos.	2	3	3
Drepanosiphum braggii Gill.	1	4	5
Eriosoma americana Riley	1	1	1
Eriosoma crataegi Oest.	1	1	1
Eriosoma lanigera Hausm.	1	1	1
Essigella sp. ?	1	1	1
Essigella fusca Gill. & Pal.	1	1	1
Forda sp.	3	5	5
Forda formicaria Heyd.	2	3	3
Forda olivaceae Rohw.	1	3	5
Geoica sp. ?	1	1	1
Geoica phaseoli Pass.	1	1	2
Geoica radicola Essig.	1	3	3
Geoica squamosa Hart.	2	2	2
Hyalopterus arundinis Fab.	2	4	4
Hysteroneura setariae Thos.	1	2	2
Lachnus sp.	4	4	4
Lachnus apini Gill. & Pal.	4	12	16
Lachnus ater Gill. & Pal.	2	3	3
Lachnus brevispinosus Gill. & Pal.	2	2	2
Lachnus coloradensis Gill.	2	2	2
Lachnus edulis Wil.	5	11	11
Lachnus flexilis Gill. & Pal.	1	3	3
Lachnus glaber. Gill. & Pal.	3	9	12
Lachnus near *grossus* Kalt.	2	2	2
Lachnus hottesi Gill. & Pal.	3	4	4
Lachnus murrayanae Gill. & Pal.	2	2	2
Lachnus occidentalis David.	1	2	2
Lachnus oregonensis Wil.	2	5	7
Lachnus ponderosae Will.	3	12	15
Lachnus rosae Cholod.	1	1	1
Lachnus sabinae Gill. & Pal.	2	2	2
Lachnus schwarzii Wil.	3	13	18
Lachnus sibiricae Gill. & Pal.	2	3	3
Lachnus similis Gill. & Pal.	1	3	3
Lachnus solitarius Gill. & Pal.	3	9	12
Lachnus splendens Gill. & Pal.	2	4	5
Lachnus taxifoliae Swain	3	13	14
Lachnus vandykei Wil.	1	1	1
Liosomaphis aquatica Gill. & Bragg.	1	1	1
Macrosiphoniella sanborni Gill.	1	1	1
Macrosiphum sp.	1	8	9
Macrosiphum ambrosiae Thos.	4	10	17
Macrosiphum coweni Hunter.	1	1	1
Macrosiphum coweni var. *filifoliae* Gill. & Pal.	1	2	2
Macrosiphum erigeronensis Thos.	1	5	5
Macrosiphum near *erigeronensis* Thos.	1	3	3
Macrosiphum euphorbiae Thos.	1	1	1
Macrosiphum frigidae Oest.	2	6	6
Macrosiphum gaurae Will.	1	1	1
Macrosiphum grindeliae Will. ?	2	4	4
Macrosiphum rudbeckiae Fitch.	1	2	2
Macrosiphum solanifolii Ash.	2	2	2
Macrosiphum solidaginis Fab.	2	8	9
Macrosiphum taraxaci Kalt.	2	3	3
Macrosiphum valerianae Clarke	2	4	4
Melanoxantherium bicolor Oest.	3	6	7
Melanoxantherium salicis Linn.	2	4	4
Melanoxantherium smithiae Monell	1	6	6
Microsiphum artemisiae Gill.	1	3	3
Myzocallis discolor Monell.	1	3	3

Myzocallis ulmifolii Monell.	1	2	2
Myzus sp.	2	3	3
Myzus cerasi Ftch.	1	4	4
Myzus glandulosus Kalt.	3	3	4
Myzus oenotherae Will.	1	1	1
Myzus persicae Sulz.	3	13	22
Myzus ribis Linn.	1	2	2
Pemphigus sp.	1	1	1
Pemphigus populi-ramulorum Riley.	1	1	1
Prociphilus fraxinifolii Thos.	1	4	7
Pterochlorus rosae Cholod.	1	1	1
Pterochlorus viminalis Boyer.	1	4	5
Pterocomma populea Kalt.	1	1	1
Rhopalosiphum hippophaes Koch.	1	1	1
Pterocomma populea Kalt.	1	1	1
Rhopalosiphum nervatum Gill.	2	3	3
Rhopalosiphum nymphaeae Linn.	1	1	1
Rhopalosiphum rhois Monell.	2	2	2
Rhopalosiphum ribis Linn.	1	1	1
Schizolachnus tomentosus De Geer.	2	3	3
Symydobius americanus Baker.	2	4	4
Symydobius salicicorticis Essig.	2	4	5
Thecabius populi-monilis Riley.	3	4	4
Toxoptera graminum Rond.	1	1	1

A LIST OF ANTS ASSOCIATING TOGETHER IN APHID COLONIES

In many cases 3 species of ants were taken together in the same aphid colony and in order to have them alphabetically arranged, it was necessary to make double entries as given below.

Camponotus maculatus var. *nitidiventris* Emery. with
    Formica fusca Linn. var. ?
Camponotus maculatus subsp. *vicinus* Mayr. with
    Formica fusca Linn. var. ?
        and *Myrmica scabrinodis* Nyl. var. ?
    Formica fusca var. *gelida* Whlr.
    Formica rufa subsp. *obscuripes* Forel.
    Myrmica scabrinodis Nyl. var. ?
        and *Formica fusca* Linn. var. ?
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery. with
    Formica fusca Linn.
        and *Formica munda* Whlr.
    Formica fusca Linn. var. ?
    Formica fusca var. *subaenescens* Emery.
    Formica munda Whlr.
        and *Formica fusca* Linn.
    Formica neogagates subsp. *lasioides* var. *vetula* Whlr.
Camponotus herculeanus Linn. subsp. with
    Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch and *Formica* sp.
    Formica sp. and *Camponotus herculeanus* subsp. *ligniperda* var. *noveboracensis* Fitch.
    Formica fusca var. *subaenecens* Emery.
Camponotus herculeanus Linn. var. ? with
    Formica rufa subsp. *obscuripes* var. *melanotica* Emery.
        and *Lasius niger* var. *americanus* Emery.
    Lasius niger var. *americanus* Emery.
        and *Formica rufa* subsp. *obscuripes* var. *melanotica* Emery.

Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch. with
Camponotus herculeanus Linn. subsp. ?
Camponotus herculeanus Linn. subsp. ? and *Formica* sp.
Formica sp. and *Camponotus herculeanus Linn.* subsp. ?

Camponotus herculeanus subsp. *pennsylvanicus* De Geer. with
Formica fusca subsp. *subsericea* Say.

Camponotus herculeanus var. *whymperi* Forel. with
Formica fusca Linn. var. ?
Formica fusca subsp. *subsericea* Say.
and Formica *rufa* subsp. *integra* Nyl.
Formica rufa subsp. *integra* Nyl.
and Formica fusca subsp. *subsericea* Say.
Formica sanguinea subsp. *subintegra* Emery.

Cremastogaster sp. with
Formica munda Whlr.

Cremastogaster lineolata Say. with
Formica fusca Linn. var. ?
Formica oreas var. *comptula* Whlr.

Dorymyrmex pyramicus Rogers with
Myrmica mutica Emery.
Pheidele vinelandica Forel.

Formica sp. with
Camponotus herculeanus Linn. subsp. ?
and *Camponotus herculeanus* subsp. *ligniperda* var. *noveboracensis* Fitch.
Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch.
and *Camponotus herculeanus* Linn. subsp. ?
Formica fusca var. *gelida* Whlr.
Tapinoma sessile Say.

Formica cinerea Mayr. var. ? with
Formica sanguinea Latr. subsp. ?
Myrmica sp.

Formica cinerea var. *altipetens* Whlr. with
Polyergus rufescens subsp. *breviceps* Emery.

Formica cinerea var. *canadensis* Santschi. with
Formica fusca Linn.
Formica fusca Linn. var. ? (3 records)
Formica fusca Linn. var. ?
and *Pogonomyrmex occidentalis* Cress.
Formica neogagates Emery.
Pogonomyrmex occidentalis Cress.
and *Formica fusca* Linn. var. ?

Formica cinerea var. *neocinerea* Whlr. with
Myrmica brevinodis var. *sulcinodoides* Emery.

Formica comata Whlr. with
Formica dakotensis Emery.

Formica dakotensis Emery. with
Formica comata Whlr.

Formica exsectoides subsp. *opaciventris* Emery. with
Formica fusca Linn. var. ?

Formica fusca Linn. with
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
and *Formica munda* Whlr.
Formica cinerea var. *canadensis* Santschi.
Formica fusca Linn. var. ? (2 records)
Formica munda Whlr.
Formica munda Whlr.
and *Camponotus maculatus* subsp. *vicinus* var. *nitidiventris* Emery.
Formica sanguinea subsp. *puberula* Emery.
Lasius niger var. *sitkaensis* Pergande.
Myrmica brevinodis Emery. var. ?
Myrmica rubra subsp. *brevinodis* Emery.

Formica fusca Linn. var. ? with
Camponotus herculeanus var. *whymperi* Forel.
Camponotus maculatus subsp. *vicinus* Mayr.
and *Myrmica scabrinodis* Nyl. var. ?
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Camponotus maculatus var. *nitidiventris* Emery.
Cremastogaster lineolata Say.
Formica cinerea var. *canadensis* Santschi.
and *Pogonomyrmex occidentalis* Cress.
Formica cinerea var. *canadensis* Santschi. (2 records)
Formica exectoides subsp. *opaciventris* Emery.
Formica fusca Linn. (2 records)
Formica fusca var. *gelida* Whlr.
Formica fusca var. *neoclara* Emery.
Formica neogagates Emery.
Formica rufa subsp. *obscuripes* Forel.
Lasius latipes Walsh.
Lasius niger var. *sitkaensis* Pergande.
Myrmica sp.
Myrmica brevinodis Emery. var. ? (2 records)
Myrmica rubra subsp. *brevinodis* Emery.
Myrmica rubra subsp. *brevinodis* var. *canadensis* Whlr.
Myrmica scabrinodis Nyl. var. ?
and *Camponotus maculatus* subsp. *vicinus* Mayr.
Pogonomyrmex occidentalis Cress.
and *Formica cinerea* var. *canadensis* Santschi. (2 records)

Formica fusca var. *argentea* Whlr. with
Formica fusca var. *neoclara* Emery.
Formica rufa subsp. *obscuripes* Forel.
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.
Lasius niger var. *neoniger* Emery. (5 records)
Myrmica sp.
Myrmica brevinodis Emery. var. ? (3 records)
Myrmica rubra Linn. var. ?
Myrmica scabrinodis Nyl. var. ? (3 records)

Formica fusca var. *gelida* Whlr. with
Camponotus maculatus subsp. *vicinus* Mayr.
Formica sp.
Formica fusca Linn. var. ?
Formica fusca var. *neorufibarbis* Emery.
Formica fusca var. *subsericea* say. (2 records)

Formica fusca var. *neoclara* Emery. with
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.
Formica fusca var. *subaenescens* Emery.
Formica rufa subsp. *obscuripes* Forel.
Lasius niger var. *sitkaensis* Pergande.
Myrmica brevinodis Emery. var. ?

Formica fusca var. *neorufibarbis* Emery. with
Formica fusca var. *gelida* Whlr.
Pogonomyrmex occidentalis Cress.

Formica fusca var. *subaenescens* Emery. with
Camponotus herculeanus Linn. subsp. ?
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
Formica fusca var. *neoclara* Emery.
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.
Formica ulkei Emery.
Lasius niger var. *neoniger* Emery. (2 records)
Myrmica scabrinodis Nyl. var. ?

Formica fusca var. *subsericea* Say. with
Camponotus herculeanus subsp. *pennsylvanicus* De Geer.

Camponotus herculeanus var. *Whymperi* Forel
and *Formica rufa* subsp. *integra* Nyl.
Formica fusca var. *gelida* Whlr. (2 records)
Formica rufa var. *aggerans* Whlr.
Formica rufa subsp. *integra* Nyl.
and *Camponotus herculeanus* var. *whymperi* Forel.
Formica rufa subsp. *obscuripes* Forel.
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.
Formica oreas var. *comptula* Whlr. (2 records)
Formica sanguinea subsp. *aserva* Forel.
Formica truncicola subsp. *integroides* var. *coloradensis* Whlr.
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.
Lasius niger var. *neoniger* Emery.
Tapinoma sessile Say.

Formica munda Whlr. with
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.
and *Formica fusca* Linn.
Cremastogaster sp.
Formica fusca Linn.
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.

Formica neogagates Emery. with
Formica cinerea var. *canadensis* Santschi.
Formica fusca Linn. var. ?
Formica rufa subsp. *obscuripes* Forel.

Formica neogagates subsp. *lasioides* var. *vetula* Whlr. with
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.

Formica oreas Whlr. with
Formica rufa Linn. var. ?

Formica oreas var. *comptula* Whlr. with
Cremastogaster lineolata Say.
Formica fusca var. *subsericea* Say. (2 records)

Formica rufa Linn. var. ? with
Formica oreas Whlr.
Formica rufa var. *aggerans* Whlr. with
Formica fusca var. *subsericea* Say.

Formica rufa subsp. *integra* Nyl. with
Camponotus herculeanus var. *whymperi* Forel.
and *Formica fusca* var. *subsericea* Say.
Formica fusca var. *subsericea* Say.
and *Camponotus herculeanus* var. *whymperi* Forel.

Formica rufa subsp. *obscuripes* Forel. with
Camponotus maculatus subsp. *vicinus* Mayr.
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.
Formica fusca var. *neoclara* Emery.
Formica fusca var. *subsericea* Say.
Formica neogagates Emery.

Formica rufa subsp. *obscuripes* var. *melanotica* Emery. with
Camponotus herculeanus Linn. var. ?
and *Lasius niger* var. *americanus* Emery.
Formica fusca var. *subaenescens* Emery.
Formica fusca var. *subsericea* Say.
Lasius niger. var. *americanus* Emery.
and *Camponotus herculeanus* Linn. var. ?

Formica sanguinea Latr. subsp. ? with
Formica cinerea Mayr. var. ?

Formica sanguinea subsp. *aserva* Forel. with
Formica fusca var. *subsericea* Say.

Formica sanguinea subsp. *puberula* Emery. with
Formica fusca Linn.

Formica sanguinea subsp. *subnuda* Emery. with
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.
Lasius niger var. *sitkaensis* Pergande
Formica sanguinea subsp. *subintegra* Emery. with
Camponotus herculeanus var. *whymperi* Forel.
Formica truncicola subsp. *integroides* var. *coloradensis* Whlr. with
Formica fusca subsericea Say.
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery. with
Formica fusca var. *argentea* Whlr.
Formica fusca var. *subsericea* Say.
Formica sanguinea subsp. *subnuda* Emery.
Formica ulkei Emery. with
Formica fusca var. *subaenescens* Emery.
Lasius latipes Walsh. with
Formica fusca Linn. var. ?
Lasius niger var. *americanus* Emery. with
Camponotus herculeanus Linn. var. ?
and *Formica rufa* subsp. *obscuripes* var. *melanotica* Emery.
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.
and *Camponotus herculeanus* Linn. var. ?
Lasius niger var. *neoniger* Emery. wtih
Formica fusca Linn. var. ?
and *Myrmica brevinodis* Emery. var. ?
Formica fusca var. *argentea* Whlr. (5 records)
Formica fusca var. *subaenescens* Emery.
Formica fusca var. *subsericea* Say.
Myrmica brevinodis Emery. var. ?
and *Formica fusca* Linn. var. ?
Myrmica scabrinodis Nyl. var. ?
Lasius niger var. *sitkaensis* Pergande. with
Formica fusca Linn.
Formica fusca Linn. var. ?
Formica fusca var. *neoclara* Emery.
Formica sanguinea subsp. *subnuda* Emery.
Myrmica sp. with
Formica cinerea Mayr. var. ?
Formica fusca Linn. var. ?
Formica fusca var. *argentea* Whlr.
Myrmica brevinodis Emery. var. ? with
Formica fusca Linn.
Formica fusca Linn. var. ?
Formica fusca Linn. var. ?
and *Lasius niger* var. *neoniger* Emery.
Formica fusca var. *argentea* Whlr. (3 records)
Formica fusca var. *neoclara* Emery.
Lasius niger var. *neoniger* Emery.
and *Formica fusca* Linn. var. ?
Myrmica brevinodis var. *sulcinodoides* Emery. with
Formica cinerea var. *neocinerea* Whlr.
Myrmica mutica Emery. with
Dorymyrmex pyramicus Rogers
Myrmica rubra Linn. var. ? with
Formica fusca var. *argentea* Whlr.
Myrmica rubra subsp. *brevinodis* Emery. with
Formica fusca Linn.
Formica fusca Linn. var. ?
Myrmica rubra subsp. *brevinodis* var. *canadensis* Whlr. with
Formica fusca Linn. var. ?
Myrmica scabrinodis Nyl. var. ? with
Camponotus maculatus subsp. *vicinus* Mayr,
and *Formica fusca* Linn. var. ?

Formica fusca Linn. var. ?
and *Camponotus maculatus* subsp. *vicinus* Mayr.
Formica fusca var. *argentea* Whlr. (3 records)
Formica fusca var. *subaenescens* Emery.
Lasius niger var. *neoniger* Emery.
Pheidole vinelandica Forel. with
Dorymyrmex pyramicus Rogers.
Pogonomyrmex occidentalis Cress.
Pogonomyrmex occidentalis Cress. with
Formica cinerea var. *canadensis* Santschi.
and *Formica fusca* Linn. var. ?
Formica fusca Linn. var. ?
and *Formica cinerea* var. *canadensis* Santschi.
Formica fusca var. *neorufibarbis* Emery.
Pheidole vinelandica Forel.
Polyergus rufescens subsp. *breviceps* Emery. with
Formica cinerea var. *altipetens* Whlr.
Tapinoma sessile Say. with
Formica sp.
Formica fusca var. *subsericea* Say.

A LIST OF MIXED ANTS WITH GENERA AND SPECIES ASSOCIATING TOGETHER IN APHID COLONIES

Legend: 1, number of different genera; 2, number of species of same genus; 3, total number species; 4, number of observations.

Name of ant	1	2	3	4
Camponotus maculatus var. *nitidiventris* Emery.	1	0	1	1
Camponotus maculatus subsp. *vicinus* Mayr.	2	0	3	3
Camponotus maculatus subsp. *vicinus* var. *nitidiventris* Emery.	1	0	5	5
Camponotus herculeanus Linn. subsp. ?	2	1	2	2
Camponotus herculeanus Linn. var. ?	2	0	2	2
Camponotus herculeanus subsp. *ligniperda* var. *noveboracensis* Fitch.	2	2	3	3
Camponotus herculeanus subsp. *pennsylvanicus* De Geer	1	0	1	1
Camponotus herculeanus var. *whymperi* Forel.	1	0	5	5
Cremastogaster sp.	1	0	1	1
Cremastogaster lineolata Say.	1	0	2	2
Dorymyrmex pyramicus Rogers.	2	0	2	2
Formica sp.	2	1	4	4
Formica cinerea Mayr. var. ?	2	1	2	2
Formica cinerea var. *altipetens* Whlr.	1	0	1	1
Formica cinerea var. *canadensis* Santschi.	2	4	5	5
Formica cinerea var. *neocinerea* Whlr.	1	0	1	1
Formica comata Whlr.	0	1	1	1
Formica dakotensis Emery.	0	1	1	1
Formica exsectoides subsp. *opaciventris* Emery.	0	1	1	1
Formica fusca Linn.	3	5	9	10
Formica fusca Linn. var. ?	5	8	21	25
Formica fusca var. *argentea* Whlr.	2	3	8	18
Formica fusca var. *gelida* Whlr.	1	4	5	6
Formica fusca var. *neoclara* Emery.	2	4	6	6
Formica fusca var. *neorufibarbis* Emery.	1	1	2	2
Formica fusca var. *subaenescens* Emery.	3	3	7	8
Formica fusca var. *subsericea* Say.	2	9	12	14
Formica munda Whlr.	2	1	3	3
Formica neogagates Emery.	0	3	3	3

Formica neogagates subsp. *lasioides* var. *vetula* Whlr.	1	0	1	1
Formica oreas Whlr.	0	1	1	1
Formica oreas var. *comptula* Whlr.	1	1	2	3
Formica rufa Linn. var. ?	0	1	1	1
Formica rufa var. *aggerans* Whlr.	0	1	1	1
Formica rufa subsp. *integra* Nyl.	1	1	2	2
Formica rufa subsp. *obscuripes* Forel.	1	5	6	6
Formica rufa subsp. *obscuripes* var. *melanotica* Emery.	2	2	4	4
Formica sanguinea Latr. subsp. ?	0	1	1	1
Formica sanguinea subsp. *aserva* Forel.	0	1	1	1
Formica sanguinea subsp. *puberula* Emery.	0	1	1	1
Formica sanguinea subsp. *subnuda* Emery.	1	1	2	2
Formica sanguinea subsp. *subintegra* Emery.	1	0	1	1
Formica truncicola subsp. *integroides* var. *coloradensis* Whlr.	0	1	1	1
Formica truncicola subsp. *integroides* var. *haemorrhoidalis* Emery.	0	3	3	3
Formica ulkei Emery.	0	1	1	1
Lasius latipes Walsh.	1	0	1	1
Lasius niger var. *americanus* Emery.	2	0	2	2
Lasius niger var. *neoniger* Emery.	2	0	6	10
Lasius niger var. *sitkaensis* Pergande.	1	0	4	4
Myrmica sp.	1	0	3	3
Myrmica brevinodis Emery var. ?	2	0	5	7
Myrmica brevinodis var. *sulcinodoides* Emery.	1	0	1	1
Myrmica mutica Emery.	1	0	1	1
Myrmica rubra Linn. var. ?	1	0	1	1
Myrmica rubra subsp. *brevinodis* Emery.	1	0	2	2
Myrmica rubra subsp. *brevinodis* var. *canadensis* Whlr.	1	0	1	1
Myrmica scabrinodis Nyl. var. ?	3	0	5	5
Pheidole vinelandica Forel.	2	0	2	2
Pogonomyrmex occidentalis Cress.	2	0	4	4
Polyergus rufescens subsp. *breviceps* Emery.	1	0	1	1
Tapinoma sessile Say.	1	0	2	2

SUMMARY

1. The relation between the ants of the *Formica* group and the aphids of the genus *Aphis* is a good example of mutualism.
2. The ants of the genera *Lasius* and *Formica* obtain a larger portion of their food from aphids than do the ants of other genera.
3. The dissemination of aphids by ants is for the purpose of obtaining a greater production of honey-dew, this being accomplished when ants place the aphids on new tender growth where there is an abundance of sap.
4. Aphids in their association with ants are very instrumental in transmitting plant diseases such as cucurbit wilt, fire blight and mosaic disease of sugar cane.
5. An excess of honey-dew on the leaves of plants near large aphid colonies signifies a lack of sufficient ant attendants and is detrimental to the plant.

6. Ants attending aphids may be either a single species or a mixed group, just as they occur in their colonies, and may contain as high as three genera associating with one colony of aphids all at the same time.
7. More than one species of ants may attend a single species of aphid on the same species of plant.
8. One species of ant may attend the same species of aphid on different host plants.
9. The agricultural ant which was unknown as an attendant of aphids, has been found under favorable circumstances, to imbibe the honey-dew of aphids.
10. More species of the genus *Aphis* are attended by ants than any other species. *Aphis helianthi* Monell has the greatest number of genera and species of ant attendants (7 and 32 respectively). The genus *Lachnus* comes second, with an average of 3 genera of ants attending each species.
11. The ant genus *Formica* comprises over half of the total number of species that attend aphids. *Formica fusca* var. *neoclara* Emery. and *Formica fusca* var. *argentea* Whlr. attend the greatest number of aphids, both in genera and species (15 and 42; and 14 and 31 respectively). *Myrmica* and *Camponotus* are about even for second place, in the number of aphid species attended.
12. Ten percent of the total number of ants that attend aphids are in mixed groups and the genus *Formica* mixes more readily than other ants. This genus furnishes over half of the total number of mixed species of ants, and individuals mix as readily with their own species as they do with species of other genera.
13. Ants cannot be artifically mixed in an aphid colony by placing stray ants on the plant that harbors the aphids.

BIBLIOGRAPHY ON ANTS AND APHIDS

The following bibliography is an attempt to bring together, as far as possible, what has been published on the relations which exist between ants and aphids. Altho a great deal of time has been spent consulting various entomological papers, magazines and other sources for information bearing on this subject, it is believed that a number of interesting articles have escaped notice and many minor references have been omitted. Therefore this bibliography is by no means exhaustive. Almost every zoology and textbook on entomology has a statement, either under ants or aphids, relative to the interrelation of these two widely different insects. No attempt has been made to cite literature that does not deal directly with ants and aphids, and

whenever possible the original papers were reviewed. Where only abstracts were consulted, notation is made to that effect. References prefixed with an asterisk were unobtainable and consequently not reviewed. However, it was deemed advisable to include them in order to make this bibliography as complete as possible.

Up to the present time the bibliography of J. B. King (173) which gives ten citations was the largest single bibliography found on this subject. However, W. M. Wheeler (353) gives an exhaustive biography on all ant literature and has prefixed an asterisk to citations on myrmecophily, symbiosis and parasitism, and J. Bequart (11) in his publication, "Ants and their Diverse Relation to the Plant World," gives 53 pages of bibliography on the above subject many of which are directly or indirectly related to ants and aphids

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